INFLUENCE OF INDUSTRIAL WASTE MANAGEMENT, WORKERS SAFETY PRACTICES AND OCCUPATIONAL HEALTH ATTITUDE ON EMLOYEES HEALTH STATUS IN URBAN COMMUNITY IN, NIGERIA

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ABSTRACT

Industrial wastes are basically hazardous and as the name implies poses threat and potential risk to human health if not properly managed. Thus, this study examines effects of industrial waste management practices (incineration, recycling), worker's safety practices and worker's occupational health attitudes on employees' health status in selected industries in Oyo State, Nigeria. Descriptive survey research design was adopted for this study while the study population comprised of industrial workers in Ibadan, Oyo State. Simple random sampling technique was used to select a sample of 270 employees and qualitative method ((use of questionnaire) was used for data. An instrument specially designed for this study tagged "Industrial Waste Management and Workers Health Status Inventory (IWMWHSI was used for data collection.). Two research hypotheses were tested and analyzed with the use of Multiple Regression analysis and Pearson Moment Correlation Analysis at 5% level of significance. Findings revealed that there was a positive significant correlation between incineration and workers' health status (r= .32, N= 270, P < .05), a positive significant relationship between recycling and workers' health status (r= .24, N= 270, P < .05), a positive significant relationship between workers' safety practices and workers' health status (r= .16, N= 270, P < .05), and a positive significant relationship between workers' occupational health attitude and workers' health status (r= .17, N= 270, P < .05) Result also showed that waste management practices independently and significantly influenced employees health status while waste management practices, workers safety practices, workers occupational health attitude jointly and significantly predicted employees health status. The study concludes that

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waste management practices, worker's safety practices, worker's occupational health attitude were strong predictors of employee's health status in industries in Nigeria. We therefore recommend that government should put policy in place to regulate and punish offenders of standard waste management practices. Erring industries should be sanctioned and also pay heavy compensation to affected workers.

Keywords: Industrial, Waste Management, Workers Occupational Health Attitude, Workers Health status, Incineration, Recycling.

INTRODUCTION

The quest for development and economic advancement had stepped up rate of industrialization in developing Counties and by extension in major cities and towns. While this development is capable of creating jobs, reduce youth restiveness, improve per capital income of the citizenry and enhance domestic and foreign earnings for the country, it however come with adverse consequences such as generation of industrial waste which may be injurious to human health if poorly managed. World health organization (2004) defined waste as something which the owner no longer wants at a given time and place and which has no current or perceived market value. "Environmental Sanitation Edict (1985), section 322", of Lagos State, Nigeria defined waste as follows: (a) waste of all description (b) any constancy which constitutes scrap materials or an effluent or other, unwanted surplus substance arising from the application of any process. Waste constitutes a bye-product of human activities both at home and at the work setting. Thus, it can be categorized into domestic and industrial waste. The industrial waste is more hazardous than domestic waste as the former is a bye-product of toxic chemicals that are used in processing and conversion of industrial raw materials into finished products.

Waste can also be categorized on the basis of where they are found and the state at which they are. Thus, we can have the municipal solid waste (MSW) which is the product of production conversion of materials and substances as well as consumption of its products within the urban setting (Ana and Sridhar, 2009). In the environmental and industrial setting, waste can be defined as any solid, liquid or gaseous materials that is being discarded by disposal, recycling, burning(incineration)

which may be a bye – product of a manufacturing process or an obsolete commercial product that can no longer be used for intended Purpose and requires disposal (IFC, 2007). Waste from industrial activities includes liquid waste water or effluents, gaseous emission and solid waste. While gaseous emission has assumed a position of tremendous concern, liquid waste and effluents poses the most shattering and direct effect on workers' health (Garcia, Pongracz & Keiski, 2004). Industrial wastes are generally hazardous and as the poses a threat and great risk to human health and the environment if not properly managed. Industrial pollution directly affects health through serious chemicals they discharge depending on the nature of the industry. These chemicals, beyond a specified limit have adverse consequences on human health. The effects may be seen in the heart, blood, kidneys, reproductive organs, lungs, liver of human beings amongst others. Hazardous wastes contaminate soil, water and air.

The pollution of these three key components tied to the existence of mankind undoubtedly creates a precarious relationship detrimental to sustainable growth and development. Health impact of industrial activities include exposure to toxic chemicals through air, water and soil, exposure to infection and biological contaminants, stress related to odor and noise, vermin and visual amenity, risk of fires, explosions and subsidence, spills, accidents and transport emission among others. (Douwes et al., 2000).

The management of industrial waste is crucial to the health and performances of the employees working in such organization as well as people residing in that community. It follows therefore that, when industrial waste is well managed, workers' and community members are likely to be healthy and employees' productivity in such organization may be high. Conversely, where industrial waste is badly managed the health status of the workers' may be in jeopardy and employee's productivity may drop. For this reason, industrial firms have to look beyond their factory walls, and seek for external utilization of their waste, in accordance with the principles of Industrial Ecology (EI). Studies have shown that waste minimization and resource use optimization is the most important objective of waste management (Pongracz, 2002), it was argued that there is considerable overlapping between the goals of IE and waste management where waste minimization is concerned.

The principles of IE and waste minimization measures are evident (Wagner, 2002). There are two major ways in which industrial waste are

managed across the selected industries for this study. These are incineration and recycling. Incineration involves burning of the waste at designated spots within the organization while recycling entail conversion of the waste into a more useful product that is, into state of value through another round of processing. Whichever waste management practices adopted there are still health implications for the workers' and community members in the industrial area. Thus, this study examined the impact of incineration and recycling methods of waste management practices on the health status of the workers among the selected industries in Oyo State, Nigeria. It also examined the relationship between the practices of incinerations and recycling on workers' health status. Finally, it examined the safety practices put in place by these organizations and its impact on workers' occupational health status.

The study hypothesized that: there is independent and joint relationship between incineration, recycling, safety practices and occupational health attitude of workers' and workers' health status. It also hypothesized that, waste management practices (incineration, recycling), worker's safety practices, worker's occupational health attitude did not predict employee's health status in industries in Oyo State, Nigeria.

The concept of waste, industrial waste management and workers' health status are complex phenomenon in which many researchers and theorists have adopted various approaches to explain. For instance, Pohjola and Tanskanem (1998) using an oriented modeling language (PSSPIM) based on the ontological commitment argued that every real thing can be formalized as an object having four attributes which are, purpose, structure, state and performance.

Waste can be categorized waste into four classes; the non-wanted things, created not intended or not avoided with no purpose. The second class is things that were given a finite purpose, thus destined to become useless after fulfillment. The third class are things that with well-defined purpose but whose performances ceases being acceptable due to a flaw in their structure or state, while the fourth class are things with well-defined purpose and acceptable performance but their users failed to use them for their intended purpose (Pongracy 2002). Using this classification, Pongracz, Phillips and Keiski (2004) identified the following waste: Demolition waste, re-use waste, end-of-life waste and owner abandonment waste. They opined that, demolition waste (waste of class 2) is a waste that has fulfilled its purpose. For example, when a structurally intact tile is separated from the aggregate object of

demolition waste, it can be assigned a new purpose and thus shall no longer be considered 'a waste'.

The end-of-life vehicles represent waste in the third class. These are aggregate things composed of numerous structural parts. The loss of performance can be attributable to the inability of one or several structural parts to perform their purpose. Repair or changing the faulty structural parts can extend useful life. The owner abandoned waste (such as car) represents the waste in the fourth category. In this case, unless the owner argues that the car did not meet his expectations of superior performance, (usually attributable to newer cars), it cannot be considered as owner abandoned waste. On the positive side, finding a new car owner willing to tolerate the shortcoming of a new car will render it non-waste. Pongracy et al (2004) argued further that, efforts have to be made to minimize waste through the use of some industrial ecological principles. They identified seven waste minimization measures and the corresponding industrial ecological principles associated with it. According to them, the first measure is "strict avoidance of waste creation or waste prevention at source.

This is based on the ecological principles that every molecule that enters a specific manufacturing process should leave that process as part of a saleable product. In other words, every erg of energy used in manufacturing should produce a desired material transformation. The second waste minimization strategy is the reduction, of waste by application of more efficient production technologies. This strategy is predicted on the principle that industries should make minimum use of materials and energy in products, processes and in service.

Another measure is "source-oriented improvement of waste quality. This involves substitution of hazardous substances. The principle behind this strategy is that industries should choose abundant, non-toxic materials when designing products. The fourth measure is the 're-use of products or part of product'. This is hinged on the principle that every process and product should be designed to preserve the embedded utility of the materials used. The fifth measure of waste minimization strategy is the "disassembling of complex products and re-use of components". The principle behind this strategy is that an efficient way to accomplish this goal is by designing modular equipment and by remanufacturing. The sixth measure is the internal recycling of production waste. This is based on the principle that industries should get most of the needed materials through recycling streams (theirs or those of others) rather than through

raw materials extractions, even in the case of common materials. Finally, the seventh strategy is the external recycling. This principle behind this strategy is that every product should be designed so that it can be used to create other useful products at the end of its life. Pongracy et al (2004) therefore recommend that in order to minimize industrial waste, every industrial landholding or facility should be developed, constructed or modified with the intention to maintaining or improving local habitats and species diversity, and to minimize impacts on local and regional resources. They also recommend that, close interactions should be developed with materials suppliers, customers and representatives of other industries with the aim of developing co-operative ways of minimizing, packaging, recycling and re-using materials. However, prevention of waste creation is the main priority of waste management, which corresponds to the principal goal of waste management and conservation of resources. Waste minimization requires that the firm commits itself to increasing the proportion of non-waste production process. It has been argued that it follows from the laws of thermodynamics, that producing bye-products is concomitant of a main product (Baumgartner & deSwaan, 2003). For this reason, industrial firms have sought for external utilization of their waste, in accordance with the principles of Industrial Ecology (EI).

Therefore, one can clearly recognize goals and principles similar in IE as well as waste minimization. The main difference comes from the large scale of IE which reaches far beyond the walls of an industrial facility, and encourages responsible co-existence with the surrounding environment and creating interlocking eco-systems with other companies to achieve an efficient circulation of materials. It is, also, important that industrial facilities learn to internalize global objectives.

NEUROTOXICITY THEORY AND WASTE MANAGEMENT

This theory was propounded by Masters (2003) and premised on the sociologist assertion that violence and aggressive behaviors occur more in places with environment pollution that other places. Environmental pollutants such as toxic metals and manganese have been implicated to cause aggressive behavior and more importantly loss of control over impulsive behavior. These made Masters (2003) develop the neurotoxicity hypothesis. According to the hypothesis, environmental pollution is one of the causes of aggressive behavior through toxic pollutants. Specifically, the toxic metals lead and manganese cause increase in aggressive behavior and more importantly loss of control over impulsive behavior. Masters (2003) argued that, the neurotoxicity

must hypothesis pass five-required test for it to be considered valid, these five conditions are:

1. It must be shown that individuals who engage in aggressive behaviour are more likely to have absorbed toxic chemicals than a comparable population.
2. The hypothesis must be able to predict future aggressive behaviour of people exposed to toxic pollutants.
3. It must establish that there is a biological basis for believing that lead, manganese and other toxic chemicals found in polluted environment (s) could cause a person to lose control over impulsive and aggressive behaviour.
   He further states that lead in the brain damages glia, a kind of cell associated with inhibition and detoxification, manganese lowers levels of serotonin and dopamine which are neurotransmitters associated with impulsive control and planning. Low levels of serotonin in the brain are known to cause mood disturbances, poor impulse control and increases in aggressive behavior.
4. For the neurotoxicity hypothesis to hold up, individuals must receive doses of toxic pollutants sufficient to be associated with violent behaviour.
5. If the neurotoxicity hypothesis is valid, then measures of environmental pollution should correlate with higher rates to aggression.

To test this hypothesis, Masters collected data from the FBI for violent crimes in all countries of the United State and correlated this with data on levels of environmental pollution in the countries, using data from the US Environmental Protection Agency. He also examined demographic and socioeconomic variables for each country. He found, after controlling for all the conventional measures of, social deterioration, that counties with high levels of neurotoxicity-lead and manganese have rates of violent crime three times them the national average. Masters (2003) thus concludes that environmental pollution has a strong effect on aggressive behavior and violent crime.

The implication of the neurotoxicity hypothesis for this present study is that in companies where industrial waste is badly managed. In such places, workers' agitations and industrial disharmony are likely to be rampant. Though workers were not allowed to unionize in the selected industries for this study, evidences abound to confirm industrial disharmony (between the workers' and management) as it was observed that, worker's merely bottled-up their anger against

management but expresses aggression to other people around in line with neurotoxicity hypothesis.

METHODOLOGY

Descriptive survey design was used for this study. The populations of study are the industrial workers in Oyo State while the sample consists of the 270 randomly selected employees of two selected industries in Ibadan, Oyo State, Nigeria. Ibadan was selected for this study because it contains the highest number of industries in Oyo State due to its cosmopolitan nature. It is the largest black city in the south of Sahara and the political head quarter of the old western region in Nigeria. It is currently the capital of Oyo State.

A combination of sampling methods was used for this study. For instance, purposive sampling method was used for selecting the population of this study (industrial workers) as well as the area of the study (Ibadan, Oyo State). Random sampling method (balloting technique) was used for the selection of the (2) two participating companies while accidental (convenience) sampling method was used for the selection of participants in the study. The randomly selected companies are Zartech Farms, Sumail Foods Nigeria limited. Quantitative method (use of questionnaire) was used for data collection. The questionnaire was sub-divided into two sections A consists of demographic factors while section B consists of thirty (30) questions that were adapted from World Health Organization (1996) Municipal Solid Waste Management Questionnaire, University of East Anglia, Norwich 2010 Staff and Student Occupational Health Service Scale and University of Cambridge (2014) Occupational Health and Safety Questionnaire.

These was structured on four rating scale ranging from strongly agree to strongly disagree with scores of '5' and '1' respectively. The Questionnaire was adapted by the researcher and re-validated for the study. The instrument was administered to the workers' in their industry with the assistance and cooperation of the human resource personnel of the respective companies. In addition to instructions written on the questionnaire, the participants were given verbal instructions and clarifications where necessary. The entire administered questionnaire was properly filled and retrieved by the researcher. The socio-demographic data collected were analyzed using frequency distribution and simple percentages while the two hypotheses in the study were statistically analyzed using Pearson moment correlation and multiple regression analysis.

RESULTS

Result of the analysis of socio-demographic data revealed that, 180(72.0%) of the respondents were male while their female counterparts were 70(28.0%). The highest percentage of respondents was male. 126(50.4%) respondents were within 21-30 years, 111(44.4%) were within 31-40 years, 11(4.4%) were within 41-50 years while 2(0.8%) were within 51-60 years. This implies that highest percentages of respondents were within age range 21-30years. 155(62.0%) of the respondents were Christians, 94(37.6%) were Muslims while 1(0.4%) was a Traditional worshipper.

The Christian respondents have the highest percentage. Majority 171(68.4%) of the respondents were married while 79(31.6%) were single. 92(36.8%) of the respondents were junior staff, 56(22.4%) were middle staff while 102(40.8%) were senior staff respectively. This means that the highest percentage of respondents were senior staff. Result of testing hypothesis one which posited that there is no significant independent and joint influence of incineration, recycling, workers' safety practices and workers' occupational health attitude on workers' health status presented in table 1 on the append showed that there was a significant joint influence between the variables (R^2 = .13, F = 9.209, P< .05). Also on table1, incineration a significant influence on workers' health status and made a contribution of 25% (β = .25, P< .05). Recycling indicated a no significant influence on workers' health status but made a contribution of 11% (β = .11, P< .05). Workers. Safety practices also indicated a no significant influence on workers' health status and made 4% contribution (β = .10; P< .05).

Workers occupational health attitude showed a non-significant influence on workers' health status with a contribution of 10% (β = .10; P< .05). Thus, incineration significantly predicted workers' health status while recycling, workers' safety practices and workers' occupational health attitude did not. This result does not however mean that, waste recycling methods in use by these companies and the workers' safety practices for waste disposal did not influence workers' health attitude and health status, what it means that, the impact of the influence is less visible and relatively insignificance statistically. The non-significance influence of these variables on workers' health status could be as a result of the high immune system and strong bodily resistance to the effect of waste recycling methods among the workers'. Also, the influence of workers' safety practices may not necessarily mean that the company under investigation had sound practices in place, but the effect of poor

workers' safety practices may not be noticeable until there were emergencies. Such emergency like fire outbreak that can call to question the quality of safety devices and practice in place. Of-course, workers' occupational health attitude may not indicate remarkable negative indicators in-spite of the poor health practices is most companies. A number of unemployed people loiter around every day while the list of application for employment continues to increase on daily basis. The economic recession has also led to the adoption of adverse measures such as layoffs, downsizing and outsourcing among others. These and many more, keep workers' perpetually under fear of job insecurity and as such may not show unfavorable attitude under poor occupational health situation.

Hypothesis one posited a non-significant correlation between incineration, recycling, workers' practices, and occupational health attitude on employee's health status was tested using Pearson Moment analysis and result presented in table1, 2, 3, & 4.

TABLE 1: Table of inter correlation analysis showing the relationship between incineration and employees health status.

Variable	Mean	Std. Dev.	N	R	P	Remark
Incineration Employees Health Status	10.8440 13.9560	3.7239 3.7793	250	.323	.000	Sig.

*Sig. at .05 levels

On table 1, that there was a significant relationship between incineration and employee's health status ($r = .321$, $N= 250$, $P < .05$). Hence, incineration had influenced on employee's health status in the study. Null hypothesis is rejected. This result is supported by the findings of Lee, Hong, Kwon, Chang & Jang (2003) who estimated the exposure status of hazardous substances and their health effects in workers and residents near a municipal solid waste (MSW) incinerators and residents near the industrial waste incinerators in Korea. They found that workers around industrial waste incinerator are exposed to hazardous substance such as Polychlorinated dibenzo-p-dioxins (PCDD) which causes respiratory infections and diarrhea diseases.

Hypothesis 2: There is no significant relationship between recycling and workers health Status.

TABLE 2: Table of inter correlation analysis showing the relationship between recycling and Employee's health status.

Variable	Mean	Std. Dev.	N	R	P	Remark
Recycling	11.8640	3.0678	250	.240	.000	Sig.
Employees Health Status	13.9560	3.7793				

*Sig. at .05 levels

It is shown in table 2that, there was a significant relationship between recycling and employees health status (r = .240, N= 250, P < .05). Hence, recycling had influenced on employee's health status in the study. Null hypothesis is rejected. The result correlates with the findings of Ana, Sridhar & Olawuyi (2005) who discovered that physical contact with poisons, dust inhalation, exposure to organic and inorganic chemicals of industrial workers during recycling of waste have adverse effects on human health. The effects are seen in damaged heart, blood, and kidneys. The study also found that health effect such as skin disorders and respiratory tract infections were associated with exposure to high concentrations of the atmospheric pollutants, via ammonia and total suspended articles during recycling of waste.

Hypothesis 3: There is no significant relationship between workers' safety practices and Employees health status.

TABLE 3: Table of inter correlation analysis showing the relationship between workers' safety practices and employee's health status

Variable	Mean	Std. Dev.	N	R	P	Remark
Workers' Safety Practices	14.4480	2.0396	250	.160	.011	Sig.
Employees Health Status	13.9560	3.7793				

*Sig. at .05 levels

It is shown in the above table 3 that there was a significant relationship between workers' safety practices and employees health status (r = .160, N= 250, P < .05). Hence, workers' safety practices had influenced on employee's health status in the study. Null hypothesis is rejected. This result is supported by the findings of Lee, Hong, Kwon, Chang & Jang (2003) that worker's safety practices within an industry has a direct effect on their health and safety. A worker may be instructed to wear personal protective equipment's which he or she may not comply with when there are no strict instructions. This attitude may lead to damage to

health and safety of such a worker at the detriment of the industry. Based on this finding, adequate compliance mechanism should be readily made available and stronger punitive measures taken against erring workers.

Hypothesis 4: There is no significant relationship between workers' occupational health attitude and employee's health status

TABLE 4: Table of inter correlation analysis showing the relationship between workers' Occupational health attitude and employee's health status.

Variable	Mean	Std. Dev.	N	R	P	Remark
Workers' Occupation Health Attitude	15.1040	2.3638	250	.168	.008	Sig.
Employees Health Status	13.9560	3.7793				

*Sig. at .05 levels

It is shown in table 4 that there was a significant relationship between workers' occupational health attitude and employees health status ($r = .168$, $N= 250$, $P < .05$). Hence, workers' occupational health attitude had influenced on employee's health status in the study. Null hypothesis is rejected. The result correlates with Alberta (2006) study of the components of effective health and safety management system in industries. The study found that the kind of attitude workers have towards occupational health will have a positive or negative effect on their health status irrespective of effective health management system put in place by the employer. For instance, a worker may be instructed to wear personal protective equipment's which he or she may not comply with when there are no strict instructions.

This attitude may lead to damage to health and safety of such a worker at the detriment of the industry. To enforce control methods of workers' attitude toward occupational health, management should develop a constructive enforcement policy, and communicate the consequences to employees and the steps that will be taken if noncompliance occurs.

CONCLUSION

The study concludes that, waste management practices such as use of incineration, recycling and safety practice by the industry have health implications on workers' occupational health attitude and employee's health status. Waste management practices (incineration and recycling),

workers' safety practices and workers' occupational health attitude relates significantly with employees' health status. In other words, employee's health status is sound in industries where good waste management practices are used. It will also be sound where the company and employees embraced standard safety practices. In such industries, workers' occupational health attitude will be favorable and employees' health status is sound.

We also conclude that, incineration, recycling, workers' safety practices and workers' occupational health attitude independently and jointly predicted employees' health status in the selected industries in Oyo State, Nigeria. In other words, waste management and safety practices employed by the organization determined workers' occupational health attitude and employee's health status. Therefore, in order to enjoy worker's high productivity, employees' health status should be well taken care of. This may be achieved when the organization engages in good waste management and safety practices.

RECOMMENDATION

The study recommends that agencies concerned with enforcement of safety and waste management standard such as Standard Organization of Nigeria (SON) National Environmental and Safety Protection Agency (NESRA), Nigerian Labor Congress (NLC), Trade Union Congress (TUC) as well as the relevance committees in state and National Assembles should evoke enforce relevant regulations for the use of good waste management and workers' safety practices in the industries in Oyo State and Nigeria in general.

1) Management of industries should continually invest in engineering controls and equipment's designed to reduce the impact of waste generation on worker's health. These will assist in ensuring prevention of waste or its reduction as well as guarantee a safer and healthier workforce. Management should also encourage worker's involvement and participation in health and safety issues. Workers contribution should be entertained through regular study and research within the facility.
2) Employers of Labour should establish sick bay or health centre in the industry where workers can get quick and quality medical attention to any of their health challenges. Also, worker's attitude to health and safety practices must be pruned by total compliance and zero tolerance for incidents and accidents.
3) The industrial social workers should design interventions for enhancing emotional intelligence of industrial workers and design

support systems to enable them to shoulder their work responsibilities effectively and efficiently without damaging their health.

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