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(BEST)**



**BIOLOGICAL AND ENVIRONMENTAL SCIENCES
JOURNAL FOR THE TROPICS
(BEST)**

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**BIOLOGICAL AND ENVIRONMENTAL SCIENCES
JOURNAL FOR THE TROPICS
(BEST)**

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- improving the understanding of the relationship between scientific activity and the exchange of such ideas;
- assisting scientists improve their management of research findings and dissemination of research results; and
- creating a global village whereby researchers from far and wide are brought close through this forum.

This is, no doubt, a very ambitious programme and in the past editions and subsequent issues, we will continue to strive to live up to these aims with the help of our highly qualified and experienced team of reviewers. We were surprised at the vast interest generated by the announcement of the 'BEST' journal. We, of course, take this opportunity as a challenge to further publish large numbers of high quality scientific research papers.

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AN ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY SERVICES AND PRACTICES IN AGRO-ALLIED INDUSTRIES IN ZARIA METROPOLIS, KADUNA STATE, NIGERIA

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ABSTRACT

The health, safety and welfare of workers in and outside their workplaces have been an issue of concern for productivity. The agro-allied industries are known to be associated with a number of occupational hazards, diseases and injuries. This study was carried out to assess the occupational health programmes available in agro allied industries in Zaria. The study adopted a descriptive cross-sectional survey approach involving 297 randomly selected employees in six (6) industries. Data were collected using a 20-item questionnaire. The findings revealed that a variety of occupational health services are available for workers; mainly emergency care services (first aid), safety measures, and waste disposal. Striking issues of low use (2.4%) of face masks and bucket system of disposal of sewage (3.4%) in some of the industries were found. Health insurance, welfare services (loan and housing schemes) and recreational activities were also found to be either grossly inadequate or even absent. It was recommended that in addition to a recommended enhanced health insurance scheme, there is need for improvement in waste disposal practices and motivator factors like housing facilities, recreation and soft loans for industrial workers.

Keywords: occupational health services, agro-allied industries, Zaria, safety measures

INTRODUCTION

Although the history of occupational health dates back to 408BC during the Hippocratic era, it was in 1633 that it became established that occupation was associated with physical and physiological wellbeing, and a focus of health professionals (Hobson 2000). During the period of Industrial Revolution (1730-1830), renowned scholars such as Percival Polt, Robert Reel, Charles Turner Thachrah (often regarded as father of British occupational Medicine) and Phillipa Fowler (the first occupational health nurse) worked assiduously to establish occupational health services to provide better working environment. Occupational health legislations vary between countries despite inheriting them from their colonial mother countries. Such legislations in Nigeria were patterned along the British model.

In Nigeria, the early glimpses of occupational health services evolved from the railways in 1898 and a mines industry (Yesufu, 2001; Manua, 1976). In 1941, the Workers' Compensation Ordinance came into existence, and in 1945 the Labour Code Ordinance introduced a number of reforms. Then in 1955, the Factory Ordinance was passed. At independence, some ten industrial hospitals had been built with about thirty (30) fulltime industrial medical officers (Manua, 1976). Following the Indigenization Decree of 1977, industries in Nigeria witnessed a rapid growth (Asogwa, 1999). British Colonial Laws existed until late 1980s when in 1987, the Factory Decree in Nigeria came in force. According to Williams (2003) a factory, in this context, was defined as any premise in

which or within which or within the close or cartilage or precincts of which, one person is or more persons are employed in any process for or incidental to any of the following: The making of any article or part of any article, or The adapting for sale of any article, or The luterling, repairing, commenting, finishing, cleaning, or washing, or the breaking of, or demolition of any article. An industry on the other hand is the "production of goods from raw materials, especially in factories" (Oxford Advanced Learners' Dictionary 2008). Another decree, the Workmen Compensation Decree of 1987, clearly defines who a worker is, and provides for employer eligibility for compensation for death and incapacity, among others (Manua, 2003). All these legislations provide for occupational health services to workers and their families.

Agro-allied industries (i.e. those using agricultural raw materials for their production) constitute a group of industries and were no exception to such legislations. These industries make use of hides and skins for shoes, timber for plywood, cotton for clothing and oil, maize and other cereals for flour and beer, among others, and they are inherently hazardous. Occupational diseases and other hazards emerge as a result of the interaction between the workers and the environment (Rom, 1983). Thus, the need for workers in such industries to be protected becomes paramount or inevitable, hence occupational health services. However, globally it is reported that these services are available to only 10 - 15% of workers worldwide (Wikipedia.org 2009).



Occupational health is a comprehensive package addressing the health, safety and the welfare of the workers in the "workplace" and "off-work" environment (Adarsh, 2007). Ladau (2006) describes occupational health and safety as a cross-sectional area concerned with protecting the safety, health and welfare of people engaged in work or employment. According to WHO (2003), the Joint International Labor Organization and World Health Organization (ILO/WHO) Committee on Occupational Health views occupational health as the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations, the prevention amongst workers of departures from health caused by their working condition, the protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the workers in an occupational environment adapted to his physiological and psychological capabilities, and to summarize, the adaptation of work to man and of each man to his job. It addresses the physical, mental and social wellbeing of workers, and protects co-workers, family members, employers, customers, hosting communities, and other members of the public who are impacted upon by the workplace environment (James, 2002). Furthermore it involves interaction among many subject areas such as occupational medicine, industrial hygiene, public health, health physics, ergonomics, toxicology, epidemiology, sociology and psychology (Ladau, 2006).

Occupational health services, on the other hand, refer to the health programmes, for workers and their families, by the employers (private or governmental) to meet the health needs of workers and their families (WHO, 2003). These occupational health programmes are aimed at health protection and health promotion for workers for optimum productivity. The scope of occupational health services varies according to the type of industries. However, Herman (2006) describes the general characteristics occupational health services to cover sixteen main components, some of which are: advising Management in relation to workplace hygiene and environmental working condition, the health of the individual employee, process of recruitment health checks and new employees, rehabilitation, nutritional and food programs, and research, among others. According to James (2002), occupational health programmes also aim to identify and bring under control at the workplace all chemical, physical, mechanical, biological and psychological agents that are hazardous, promoting and maintaining the physical, mental and social wellbeing of workers in all occupations, safety and welfare of people in their workplace, and providing preventive and leadership support for safe working environment.

There are hazards (i.e. factors predisposing or making workers prone to other accidents, injuries or diseases in the course of the occupation) in

workplaces. Adarsh (2007) categorizes occupational hazards into physical (e.g. noise, vibrations, light, non-ionizing radiation, extreme temperatures, compressed air and lack of oxygen, etc), chemicals in form of solids, liquid or gas (e.g. heavy metals, dust, fumes and gases, benzene, organic phosphorus, and asbestos), biologic (e.g. bacteria, virus or fungi) and psychological usually to relate to family circumstances and work (e.g. urban life, maladjustments, etc causing absenteeism, fatigue, vague symptom, feeling of isolation, loneliness, depression, and poor coping with stressful conditions associated with jobs). These hazards can result into a variety of diseases and accidents. In the agro-allied, these diseases include pneumoconioses, lung disease due to inhaled insoluble dust, extrinsic allergic pneumonitis (due to hypersensitivity reaction to inhaled dust especially with fungal origin, occupational asthma, heat stroke and cramps, occupational dermatosis, vibrations causing disturbances of vascular peripheral nerve and musculoskeletal systems (angioneurosis- Raynaud phenomena) etc.

Industrial accidents are also common causing loss of man-hour, loss of production, injuries, death and disabilities. It is estimated that over 15 million occupational accidents occur every day globally (WHO 2008). The interaction between the worker, machine, and the environment plays significant roles. Human factors account over 90% of all accidents (WHO 1991, 1993, 2002) and these factors include poor visual acuity, impaired hearing, physical defect, negligence, non-use of protective measures, industrial fatigue, emotional instability, addiction and abuse, age and sex, literacy, experience and training status of the worker. On the other hand, environmental factors include over-crowding, loss of physical space, slippery floor, inadequate light, uncomfortable temperature, noise, excessive humidity, vibration, uncovered drains, and bad house-keeping, poor ventilation, among others. Machine faults constitute the third and the least of the factors. They include faulty design, lack of guard and fencing, maintenance, and poor monitoring. Adarsh (2007) had suggested anatomical considerations against occupational hazards through the following measures: the design of good work station, and tools and chairs must be adjustable to individual anatomical differences, physical working capacity (especially at its peak: 20 to 30 years).

To prevent occupational accidents in agro-allied industries, using the right caliber of health care providers: doctors, nurses, social workers, nutritionists, pharmacists, psychologists, psychiatrists and laboratory technicians, is paramount to the provision of occupational health care service (Samuel, 2004). Occupational health programmes/services should cover such areas as the provision of pre-employment, pre-placement, and periodic medical examination, health services (health insurance, rehabilitation, housing and loan schemes, etc).



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Similarly, Safety measures/personal protective measures (such as ear muffs, respirators, hand-gloves, aprons, shower baths and boots, satisfactory sewage and waste disposal, and good sources and storage facilities for drinking in the industry, safe environment through hazard elimination, substitution and suppression of hazard, and environmental monitoring of hazards (Adarsh 2007; Samuel 2004). Aliyu, Shehu & Singha (2009) found varying degrees of use of these protective devices (boots 96.3%, hand gloves 100% and ear plugs or muffs 58%) in a car assembly in Kaduna Nigeria. These and others form the focus of this study in agro-allied industries in Zaria. In Nigeria, Samuel (2004) reports that occupational health services (programmes) in many industries are virtually absent in many places; and where they exist, a plethora of problems plague them. How different is this situation in agro-allied industries in Zaria? There is lack of data to answer this question. The need therefore arises for this study to assess and evaluate the occupational health services (programmes) in the agro-allied industries in Zaria, Kaduna State, with a view to highlighting its availability or otherwise, protective devices used by workers, and to suggest to the Managements of these industries and others concerned to strategize towards improving the situation. The hosting communities should also become sensitized appropriately to guard against harmful effects.

MATERIALS AND METHODS

The Research Design: the study adopted cross-sectional descriptive approach.

The study area: Zaria metropolis is made up of two local governments in Kaduna states, namely, Zaria and Sabon Gari Local Government Areas. The two share boundary and one is located in the northern part of Kaduna State. They lie between 11.07° and 12° latitude to the North, 07.41° and 08.00° longitude to the East, 22.00 feet above sea level. They are located at a distance of about 962km from the Atlantic Ocean and about 70km North of Kaduna. With its Guinea savanna with tropical intercontinental climate, there are dry and rainy seasons. The main tribes are Hausa and Fulani, and the major religions are Islam and Christianity. Zaria was among the first set of local governments established in Nigeria in 1960 shortly after Independence. Sabon Gari was carved out of Zaria Local Government in 1994, and together the local governments which constitute the metropolis have a population of about two million. Among the infrastructures found in the two local governments are higher institutions of learning, including the famous ABU, a Polytechnic, College of Education, among others. Also sited within the area are eleven industries, among which eight agro-allied industries. Only six of these were functional at the time of study. The employees of these six industries form the target population of this study.

Sampling procedure and Data Collection: the six agro-allied industries had about 3300 employees at

the time of the study (August – October 2009). They include Sunseeds Nigeria Plc. (A), British America Tobacco Nigeria Ltd. (B), Masalaha Seeds Ltd. (C), Premier Seeds Nigeria Ltd. (D), Zaria Industries Ltd.(E), and San Yoghurt Nigeria Ltd (F). Each industry was considered as a cluster, and each cluster was stratified into five departments (Administration/Personnel, Engineering, Production, Marketing/Transportation, and Medical Services). Ten workers from each stratum (department) were selected using simple random sampling. Fifty workers were thus selected from each cluster (industry), making a total of 300 workers; i.e. about 10% of the target population (Ali, 2006). A pre-tested self-constructed questionnaire was used to collect data from respondents, after due Institutional Clearance, and consent from the workers. A total of 297 out of the 300 questionnaires distributed were returned (a return rate of 99.0%). The data collected were analyzed descriptively.

RESULTS AND DISCUSSIONS

A: Personal data of Respondents

The age distribution of respondents (Table 1) shows that most of them were males (90.6%, n=269), between 26-35 years (42.1%), and married (63.3%, n=188). Generally, majority of the respondents had higher national diploma holders. The male predominance of industries workers supports the various assertions that in developing countries majority of workers particularly in industries are males (Schillings, 2008). This may suggest that the male gender is still considered as the preferred or available working population in the study area. The youthful working population found in this study (74.7% were between 18 and 35 years) is characteristic of industrial settings in many developing countries, agreeing with what Rodney (1969) believed to be the majority of population in industries in developing countries. Similarly, the 63.3% married population further suggests that most of the workers are in their productive years, a common feature in the setting. Manua (2004) had opined that the study area (Zaria) is characterized by early marriage among the young adults. Most of the workers (72.5%) had at least post secondary education, showing a relatively high enlightened working population in such industries.

Health Services in Agro-allied Companies

Figure 1 and Table 2 show the health services provided for the workers in the industries in Zaria. Most of the respondents stated that first aid services (81.5%) formed the major services provided, followed by pre-employment and routine medical examinations carried out (62.3%). The least provided services indicated were loan and health insurance schemes (8.1% and 19.9%) respectively. Only three companies were reported to provide recreational facilities (Table 2).



The provision of Emergency Care Services (first aid care) is a common service in industries, as found in other studies. Attah and Eze (1997) had found it to be the commonest health services provided for workers in industries. The provision of rehabilitation (65.3%) and general medical services (62.3%) reported by workers goes to show what Asogwa (1999) suggested on the need to provide medical services on the premises of industries, to motivate workers for higher productivity.

Safety Measures in Agro-Allied Industries

Figure 2 and Table 3 present the various safety devices commonly used in these industries in Zaria: overall/apron (75.4%), hand gloves (61.3%), boots (56.6%) and helmet and head protectors (54.9%). Others include face masks (2.4%) and ear muffs (26.3%). While these numbers present an apparent good usage level, the proportion of workers not using even measures appear significant, despite the various hazards inherent in agro-allied industries (Adarsh, 2007). Face masks are the least used (2.7%). Specific companies A and E complied with foot wears while D and E reported not using face mask at all. Others have usage levels for the different devices as shown in the table. Williams (2007) findings of lack of protective aids among industrial workers are similar to the findings of this study. An earlier study (Okala, 1995) recorded high use of protective clothing, safety shoes (foots) and hand gloves. The findings of this study seem suggest that workers' use of these safety devices over time appear to be declining. A recent study (Aliyu, Shehu & Singha, 2009) in Kaduna found higher use of some these devices: boots (96.3%), hand gloves (100%) and ear plugs (58%). These could be attributed to a more organized supervision by health and safety officers in a big car plant like one studied. Industry A in this study, another large industry, presents similar results (see Table 3).

Waste Disposal in the Agro-Allied Industries

The assessment of the waste disposal in these companies shows different methods for solid and liquid waste. Table 4 shows that waste disposal in the industries were mainly by open dumping (41.1%) and burying (42.2%). while the use of water system constituted the main sewage disposal method. A good number of the workers (40.4%) reported using the open dump (see table 3 and 4) and few (3.4%) bucket system. Only 3 of the industries practiced incineration and recycling.

It is known that agricultural products decompose rapidly and produce repelling odours in the environment as well as serve as a good medium for microbial multiplication. This contributes to the infection proneness in the immediate and remote environs, as they can become air-or-water borne when washed away by rain. Flies can also pick such microbes to cause food- or water-related infections while reptiles and other dangerous animals may find harbour in such open dumps. The burying method reported by 42.2% of respondents is recommended by

many as this would provide a source of manure for agriculture.

Sewage disposal is mainly by water system (81.1%), as supported/ recommended by Okala (1995) and Eze (1997). A worrying finding about sewage disposal is the 3.4% reported cases of bucket system; another, the open dumping of sewage (40.4%). These practices are not compatible with agro-allied industries and the environments in which they operate.

Source and Storage of Drinking Water/Food

Drinking water was mainly from pipe-borne water (98.3%), boreholes (47.1%) and water tankers (34.3%) as indicated in Fig. 3. Water storage facilities include plastic tanks (80.5%), iron tanks (77.1%), cement or underground tank (18.9%) and clay pots (3.1%). This finding is line with Eze's (1997) findings and recommendations. The availability of water in industries has been identified as one of the essential needs of industrial workers (Ugwuanyi, 1996).

All the industries studied have provision for food services. In their canteens, warmers (81.0%) and refrigerators (78.5%) were the most frequently used storage facilities for food. Hertzman (2005) had recommended these for industrial canteens.

CONCLUSION

Agro-allied industries provide a wide range of health and welfare services to their workers but with limited rehabilitational, recreational, and housing facilities. Workers' use of basic protective aids like face masks is low and appears unsupervised. Many of the industries use conventional methods of waste disposal; many others still use very hazardous, primitive methods. All the industries make attempts at providing health services to their workers, at varying degrees. Industrial and environmental managers, industrial sociologists and health authorities are expected to make their input to occupational health services in agro-allied industries in view of their relevance to health and economy of any community/nation.

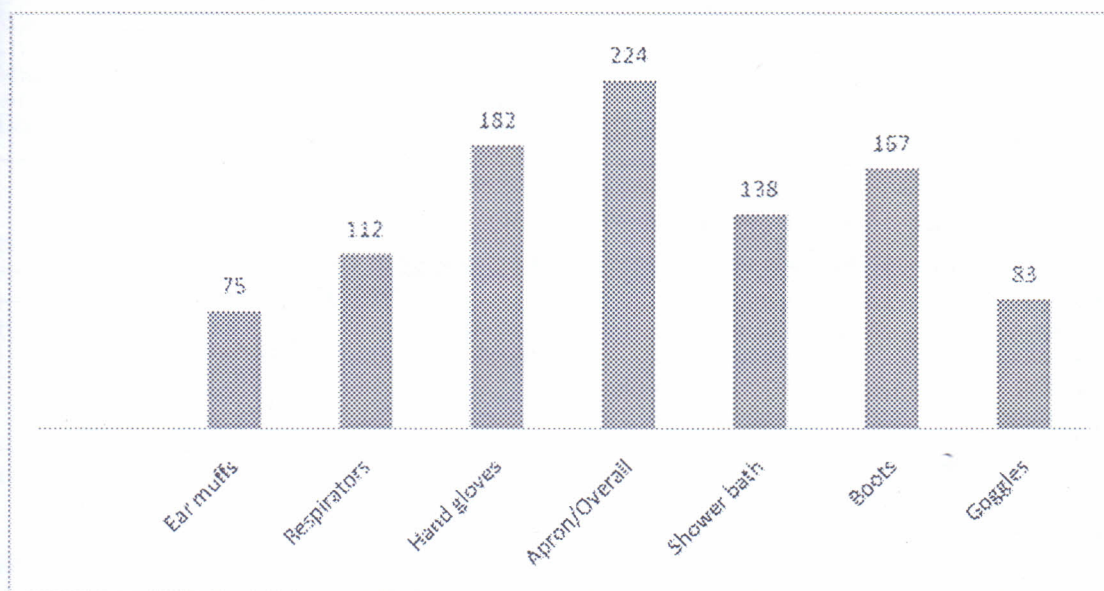
RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

- Industries should provide health insurance, loan and housing schemes to further enhance workers' productivity and wellbeing.
- Safety managers and occupational health workers need to be employed to properly enforce the use of protective devices and prevent occupational diseases and reduce hazards;
- Appropriate authorities within the industries and in the hosting communities need to monitor adequately how wastes are managed in the industries;
- Further studies are required to explore adequacy of medical services provided to workers and their families, in and out of service.

**Table 1: Socio-demographic characteristics of the sampled agro-allied workers in Zaria**

Variable	Frequency	Percentage
Age (in years)		
18 – 25	97	32.6
26 – 35	125	42.1
36 – 45	46	15.5
46 – 55	29	9.8
Total	297	100.0
Sex		
Female	28	9.4
Male	269	90.6
Total	297	100.0
Educational qualification		
SSCE/Secondary	83	28.0
Diploma	54	18.2
HND	85	28.6
Degree	75	25.2
Total	297	100.0
Marital status		
Single	109	36.7
Married	188	63.3
Total	297	100.0

**Figure 1: Health-related Services Provided for industrial workers in Zaria****Table 2: Health Services Provided for Workers in Agro-allied Industries in Zaria**

Industries	Housing	Counseling	First aid	Health Insurance	Loan scheme	Recreation	Medical examination	Rehabilitation (%)
A (n=50)	7 (14.0)	26 (52.0)	40 (80.0)	5 (10.0)	20 (40.0)	30 (60.0)	31 (62.0)	32 (64.0)
B (n=48)	26 (54.2)	48 (100.0)	48 (100.0)	5 (10.4)	15 (31.2)	50 (100.0)	48 (100.0)	46 (95.8)
C (n=50)	5 (1.0)	0	31 (62.0)	2 (4.0)	0	0	30 (60.0)	23 (46.0)
D (n=50)	5 (10.0)	2 (4.0)	36 (72.0)	5 (10.0)	0	0	19 (38)	26 (52.0)
E (n=49)	24 (49.0)	13 (26.5)	49 (100.0)	5 (10.2)	19 (38.0)	19 (38.8)	46 (93.9)	49 (100.0)
F (n=50)	6 (12.0)	5 (10.0)	34 (68.0)	2 (4.0)	0	0	9 (18.0)	21 (42.0)
Total (N=297)	73 (24.5)	94 (31.6)	241 (81.5)	24 (8.1)	59 (19.9)	99 (33.3)	188 (62.3)	297 (100.0)

Source: Field Survey (2009)

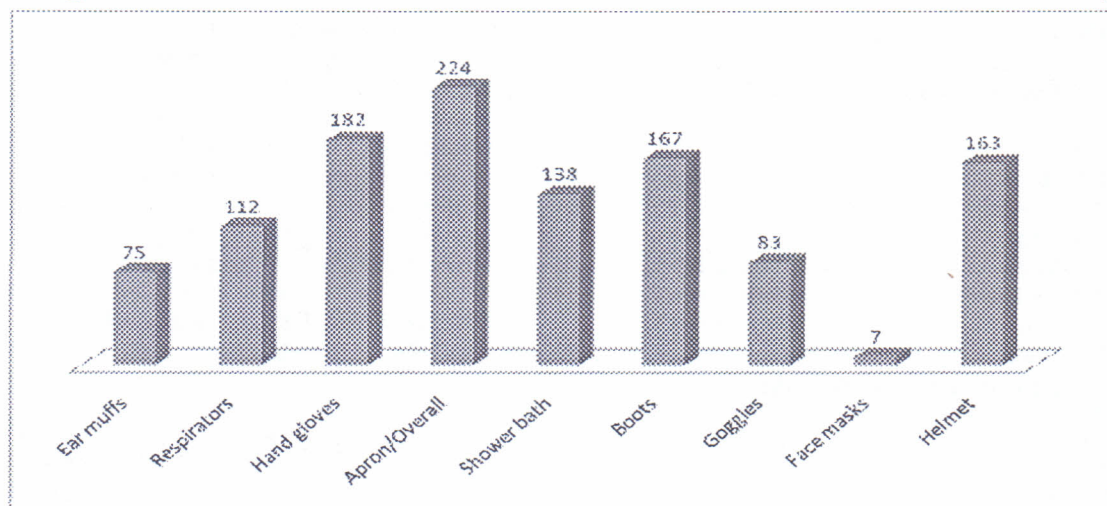


Figure 2: Safety measures and devices used in agro-allied industries in Zaria

Table 3: Safety devices used by Workers in Agro-allied Industries in Zaria

Industry	Ear muffs	Respirators	Hand gloves	Apron / overall	Shower bath	Boots	Goggles	Face mask	Helmet
A	40(80.0)	21(42.0)	41(82.0)	36(72.0)	38(76.0)	50(100.)	23(46.0)	2(4.0)	48(96.0)
B	5(10.4)	46(95.8)	40(83.3)	42(87.5)	37(77.1)	23(47.9)	6(12.5)	2(4.2)	20(41.7)
C	11(22.0)	2(4.0)	22(44.0)	30(60.0)	5(1.0)	20(40.0)	17(34.)	1(2.0)	14(28.0)
D	1(2.0)	4(8.0)	23(46.0)	36(72.0)	5(10.0)	20(40.0)	22(44.0)	0	26(52.0)
E	16(32.7)	49(100.0)	35(72.4)	40(81.6)	33(67.3)	49(100)	7(14.3)	0	48(98.0)
F	2(4.0)	0	21(42.0)	40(80.0)	20(40.0)	5(10.0)	8(16.0)	2(4.0)	7(14.0)
Total (N=297)	75(25.3)	112(41.1)	182(61.3)	224(75.4)	138(46.5)	167(56.2)	83(27.9)	7(2.4)	163(54.9)

Source: Field Survey (2009)

Key: A (n=50), B (n=48), C (n=50), D (n=50), E (n=49), F (n=50)

Table 4: Waste Disposal Methods used in agro-allied Industries in Zaria

Waste	Frequency*	Percentage %
Solid:		
Incineration	37	12.4
Recycling	41	13.8
Open dump	22	41.1
Burying	126	42.2
Sewage:		
Ventilated Improved Pit (VIP)	4	1.3
Water system	243	81.4
Pit latrine	75	25.2
Open dump	103	40.4
Bucket system	10	3.4

Source: Field Survey (2009)

*multiple responses

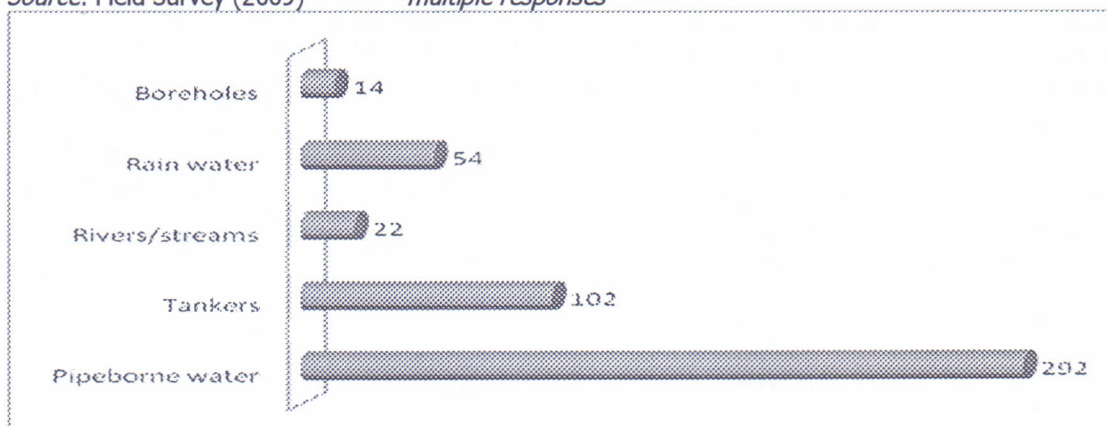


Figure 3: Sources of Drinking Water in the Industries



Figure 4: Storage facilities at Agro-allied Industries in Zaria

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