INVESTIGATION INTO EXTENT OF COMPLIANCE WITH AUTOMOBILE WASTE MANAGEMENT AND DISPOSAL REGULATIONS IN FEDERAL CAPITAL TERRITORY, ABUJA AND NIGER STATE, NIGERIA

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Abstract

This study was designed to investigate the extent of compliance with automobile waste management and disposal regulations in Federal Capital Territory, Abuja and Niger State, Nigeria. The study answered two research questions and tested two null hypotheses at .05 level of significance. A sequential explanatory mixed method design was used for the study and a total of 885 copies of the questionnaire were completely filled by automobile mechanics, automobile users and technical staff of environmental agencies and were used for the analysis using IBM SPSS Statistics version 20. Mean and standard deviations were used for the research questions, while independent sample t-test and ANOVA was used to test the hypotheses. Turkey HSD was also used as Post Hoc test for the rejected hypothesis. The research questions were ranked for the purpose of assessing the relative priorities. Some of the findings of the study revealed that: state environmental agencies are not monitoring the activities of automobile mechanics, automobile mechanics and automobile users are not storing oily absorbents and grease according to environmental regulations and are not trained in emergency preparedness against chemical hazard, rules and regulations governing automobile waste collection and disposal are not effectively enforced in the state, automobile waste generated are rarely in compliance with environmental regulations.

Introduction

The evolution of regulations for controlling wastes in Nigeria started essentially from concentrating on environmental hygiene, until recently when the regulations started evolving into more all-embracing regulations that address additional waste management and disposal problems. Environmental transformation has made the development of waste management very complicated because of the increasing problems which is getting beyond communal health safety. Automobile waste management and disposal is now well managed in the developed countries of the world. In developing countries like Nigeria, it is not controlled and this can lead to severe health and continuing environmental challenges in Nigeria.

Automobile waste management and disposal is to a large extent, regulated by legislations and policies implemented at the three tiers of governance in Nigeria. Significant national regulations such as National Policy on Environment (NPE) of 1989; Federal Environmental Protection Agency (FEPA) of 1999; The Environmental Impact Assessment (EIA) Act of 1992; Oil in Navigable Water Act; National Environmental Standards and Regulations Enforcement Agency (NESREA) Act 2007;the National Waste Management Rules of 1991 which control the gathering, treatment and management of harmful and solid wastes generated in the metropolis and through manufacturing process; and the 1989 National Policy on Environment (NPE) are of

great importance in automobile waste management in Nigeria. Nwufo (2010) concluded that the problem of Nigeria is majorly lack of compliance and enforcement of environmental policies. The Abuja Environmental Protection Board (AEPB) for instance was inaugurated by an Act of 1997. The legislations include the Waste Management Rates/Charges Regulations of 2005 and the Solid Waste Control Environmental Monitoring Regulations of 2005. The functions of the AEPB include, among others, waste collection and disposal, landfill development, and working with the six Area Councils of Abuja on hygiene, organise environmental associations for schools, management of industrial waste, automobile waste, pollution monitoring and management services. There is also, the Niger State Environmental Protection Agency (NISEPA) strategic waste management established in 2008 for the management and control of environmental waste. The methodology adopted for the strategy include undertaking sample survey of waste generation and management, evaluating institutional arrangement, sensitising and guiding stakeholders on strategy for waste management. The Niger State approach is to concentrate on prevention, minimisation, re-use, reprocess, and energy recovery. The regulation generally concern problems in environmental hygiene, industrial waste and any other wastes produced therein, particularly end-of-life (Automobile Waste), effluent, industrial, radioactive, solid and packaging wastes. Nwufo (2010) however stressed that there has never been a clear-cut prosecution of any individual or corporate body under the provision of these regulations.

Automobile waste in emerging nations such as Nigeria is either piled up on the street, unconventional dump sites, in water drainages, or in open sites which invariably alters environmental pleasantness. The effect of contamination problems related to waste from automobile activities has been reported by different researchers in Nigeria (Iwegbue, (2007); Ipeaiyeda and Dawodu, (2008), and Adie and Osibanjo, (2009).). The report of these studies showed that when automobile waste is not appropriately collected and managed it poses danger to public as well as the environment. Kalu, Modugu and Ubochi (2009) reported respectively that about 2.7%, 8.1% and 2.7% of solid waste policy were implemented in Benin City, Nigeria.This study therefore was carried out to investigate the extent of compliance to environmental regulations on automobile waste management and disposal in F C T, Abuja and Niger state, Nigeria.

Research Questions

1. What are the current practices of automobile waste management and disposal in F C T, Abuja and Niger State, Nigeria?
2. What is the extent of compliance with automobile waste management and disposal regulations in F C T, Abuja and Niger State, Nigeria?

Hypotheses

Ho_1: There is no significant difference between the mean responses of automobile mechanics and automobile users on the current practices of automobile waste management and disposal in F C T, Abuja and Niger State, Nigeria.

Ho_3: There is no significant difference amongst the mean responses of automobile mechanics, automobile users and the technical staff of environmental protection agencies on the extent of compliance with automobile waste management and disposal regulations in F C T, Abuja and Niger State, Nigeria.

Research Methodology

The study makes useof sequential explanatory mixed method designwith a quantitative data from a descriptive survey and qualitative data from interview and observation. A total of 885 copies of the questionnaire were collated from among the automobile mechanics, automobile users and technical staff of environmental protection agencies. The result of equal length Spearman-Brown reliability co-efficient of and Guttman Split half correlation co-efficient of 0.857 was obtained for the reliability coefficient. Mean and Standard Deviation was used to answer research questions 1 and 2 using the real limit of number. t-test was used to test null hypothesis 1, while One-way Analysis of Variance (ANOVA) was used to test null hypothesis 2 at .05 level of significance. Tukey Honestly Significant Differences (HSD) test of multiple comparisons was used as Post Hoc test for the rejected hypothesis. The result of the interview and observation was analysed and interpreted using transcription and categorisation. Finally the result was used appropriately in support of discussion of findings.

Results

Research Question 1

What are the current practices of automobile waste management and disposal in F C T, Abuja and Niger State, Nigeria?

Table 1

Mean and Standard Deviation of Automobile Mechanics, and Automobile Users on the Current Practices of Automobile Waste Management and Disposal. *N=885*

S/N	*ITEMS*	$\bar{X}$	σ	*Remark*
1	Pallets with impermeable base are put to use for bad battery storage.	2.39	0.82	Strongly Disagree
2	All containers are labelled with the name of the material they should contain.	2.36	0.80	Strongly Disagree
3	Oil, chemicals, and hazardous materials have effective inventory system in the work shop.	2.40	0.76	Strongly Disagree
4	Food is consumed within the work shop area.	2.58	0.98	Disagree
5	State environmental agency monitors the activities of mechanics.	2.43	0.88	Strongly Disagree
6	Waste fluids are always being stored in separate drums or tanks.	2.38	0.79	Strongly Disagree
7	Oily absorbents and grease are stored according to state environmental regulations.	2.34	0.80	Strongly Disagree
8	Automobile waste dumping site in the work shop are labelled.	2.37	0.82	Strongly Disagree
9	Drains are clearly marked to increase awareness of the pollution risk.	2.38	0.82	Strongly Disagree

10	Effective fire extinguishers are always positioned in strategic area of the workshop.	2.51	0.96	Disagree
11	Staffs are trained in emergency preparedness against chemical hazard	2.37	0.79	Strongly Disagree
12	Inspection of materials/spare parts immediately upon delivery for leaks or other damage.	2.33	0.95	Strongly Disagree
13	Oily rags are placed in sealed containers or rack.	2.28	0.83	Strongly Disagree

KEY: N = Number of respondents, $\bar{X}$ = Mean, σ = Standard Deviation.

The analysis in Table 1 indicates that the respondents disagree with all the items in the questionnaire. The standard deviation value of the 13 items in Table 1 ranges from 0.76 – 0.98 which inferred that the respondents were closer to each other in their responses to the items. Item 5 revealed that the agencies have not been monitoring the management and disposal of automobile waste. In support of this assertion one of the mechanics revealed that the State Environmental Agency does not monitor the activities of the mechanics. The mechanic said "I heard it from somebody who said there is an agency like that" another mechanic stated that he is not satisfied with the services the Agencies are rendering. z

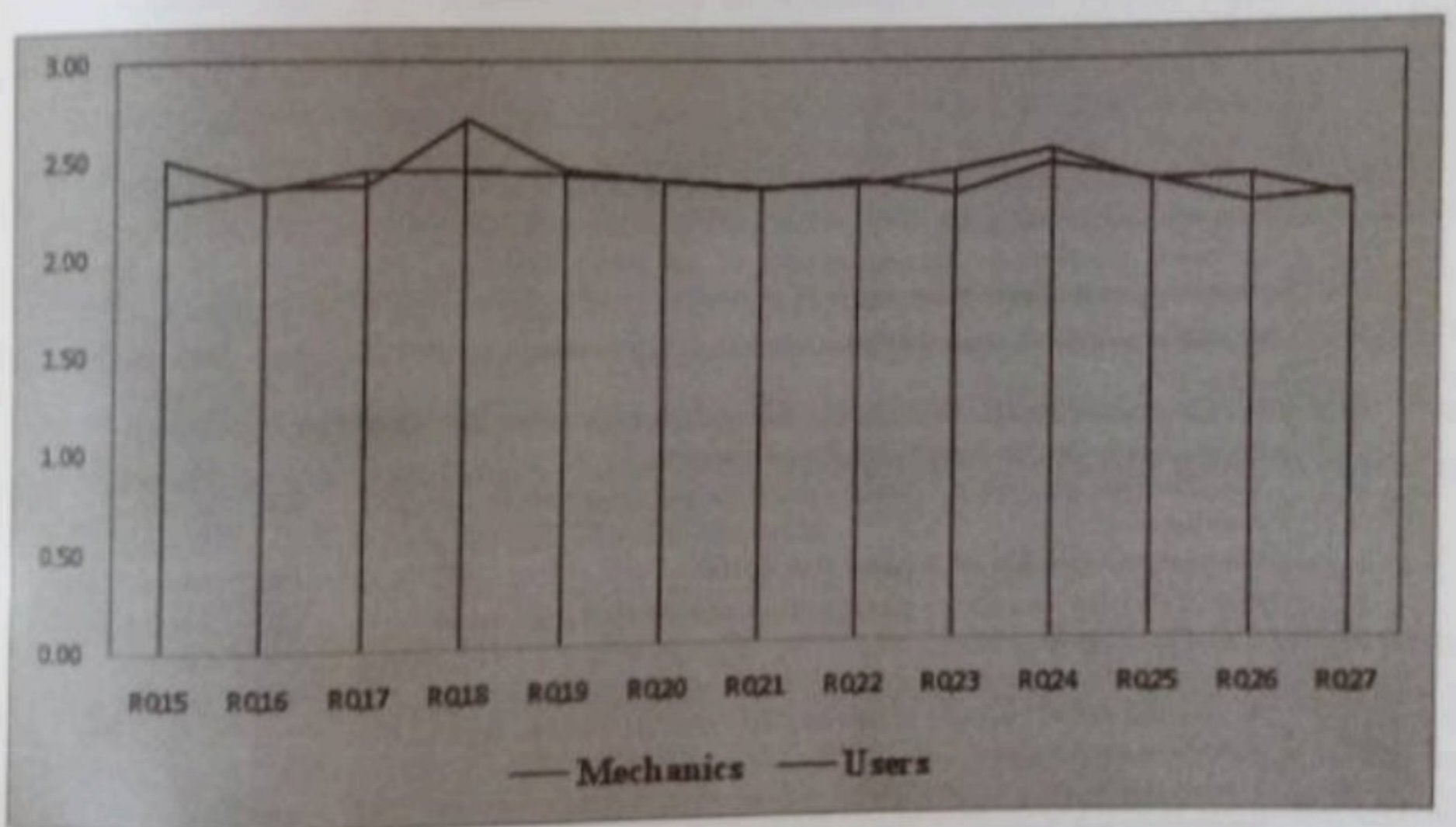

Figure 1: **Mean cluster of group responses on the current practices of automobile waste management and disposal.**

Analysis in Figure 1 showed the cluster nature of automobile mechanics and automobile users on the current practices of automobile waste management and disposal. Automobile mechanics (2.50) disagree to the usage of impermeable base storage of bad battery, though automobile users also disagree (2.29) with the item 1. Item 11 was unanimously disagreed on by both automobile mechanics (2.38) and automobile users (2.37) that staffs are trained in emergency preparedness against chemical hazard. This is an indication that respondents were not been prepared for emergency against chemical hazard. Findings by observation show that

some of the mechanics operating under trees without due regards to environmental consequences.

Research Question 2

What is the extent of compliance with automobile waste management and disposal regulations inF C T, Abuja and Niger State, Nigeria?

Table 2: Mean and Standard Deviation of Automobile Mechanics, Automobile Users and Environmental Agencies on the Extent of Compliance with Automobile Waste Management and Disposal Regulations. *N=885*

S/N	ITEMS	$\bar{x}$	σ	Remark
1	Automobile mechanics must pass a test demonstrating their knowledge on regulatory requirements as regard automobile waste management.	3.81	1.21	Agree
2	Hazardous substances are released into water streams.	3.78	1.16	Agree
3	Environmental agencies always make available policies on how to properly dispose used absorbents.	2.69	1.11	Disagree
4	Paint booths are covered when not in use or during usage for proper waste management.	2.66	1.08	Disagree
5	Gas dispensing facilities should be covered when not in use.	2.78	1.22	Disagree
6	Rules and regulations governing automobile waste collection and disposal are effectively enforced in the state.	2.74	1.18	Disagree
7	Waste from automobile are analysed before disposal.	2.71	1.19	Disagree
8	Report of waste analysis are reported to the nearest environmental agency.	2.56	1.19	Disagree
9	All automobile waste generated should be evaluated to see if they constitute danger to the society.	3.92	1.36	Agree
10	Automobile waste is disposed in proper disposing centres.	2.71	1.21	Disagree
11	Accidental discharge of automobile liquid waste are reported to the nearest environmental agency.	2.70	1.23	Disagree
12	Evaluation processes for the management of automobile waste are reviewed by environmental agencies.	2.74	1.11	Disagree
13	Records of automobile waste evaluation are properly kept in files.	2.33	1.05	Strongly Disagree
14	In case of emergency the nearest office the agency serves as "On-the-Scene-Co-ordinator" to coordinate all response activities.	2.45	1.02	Strongly Disagree
15	The person that generates automobile waste is the one responsible for the clean-up.	2.43	0.97	Strongly Disagree
16	Wastes from automobile are disposed of in landfill.	2.62	1.01	Disagree
17	Nearest environmental agency gives permission for the discharge of used oil into public drain.	2.44	1.01	Strongly Disagree
18	There is a clear responsibility sharing between agencies, and ministries on environmental policy implementation on automobile waste management and disposal.	2.54	0.93	Disagree
19	There is legal backing to the activities of automobile mechanics on waste management and disposal.	2.47	0.83	Strongly Disagree

KEY: N = Number of respondents, $\bar{x}$ = Mean, σ = Standard Deviation.

The analysis of the result in Table 2 showed that the respondents disagree with majority of the items in the questionnaire except items 1, 2, and 9 which have their mean within 3.50 and 4.49 real limit of numbers. The standard deviation values of the 19 items in Table 2 range from 0.83 – 1.36, this shows that the respondents are reasonably divergent in opinion on the items. Item 6 indicated that rules and regulations governing automobile waste collection and disposal are not being effectively enforced in the study area. Interview with one of the mechanics supported this by saying that "if there is any agency responsible for guiding the operations of mechanics, I expect them to have visited my shop but I have never seen them here". Interview with one of the

agency summarised this finding, the agency said:

> "we cannot effectively enforce the laws for now because what we are supposed to do has not been done, for instance we are yet to conclude plan on the mechanic village, though the plan on ground is to have three transfer station for the disposal of solid waste including automobile. On the issue of the person that generates automobile waste to be the one responsible for the clean-up, all we need to do is to educate the mechanics on the policies that are on ground before implementing them".

Figure 2 shows the cluster distribution of the respondents for clarity of response.

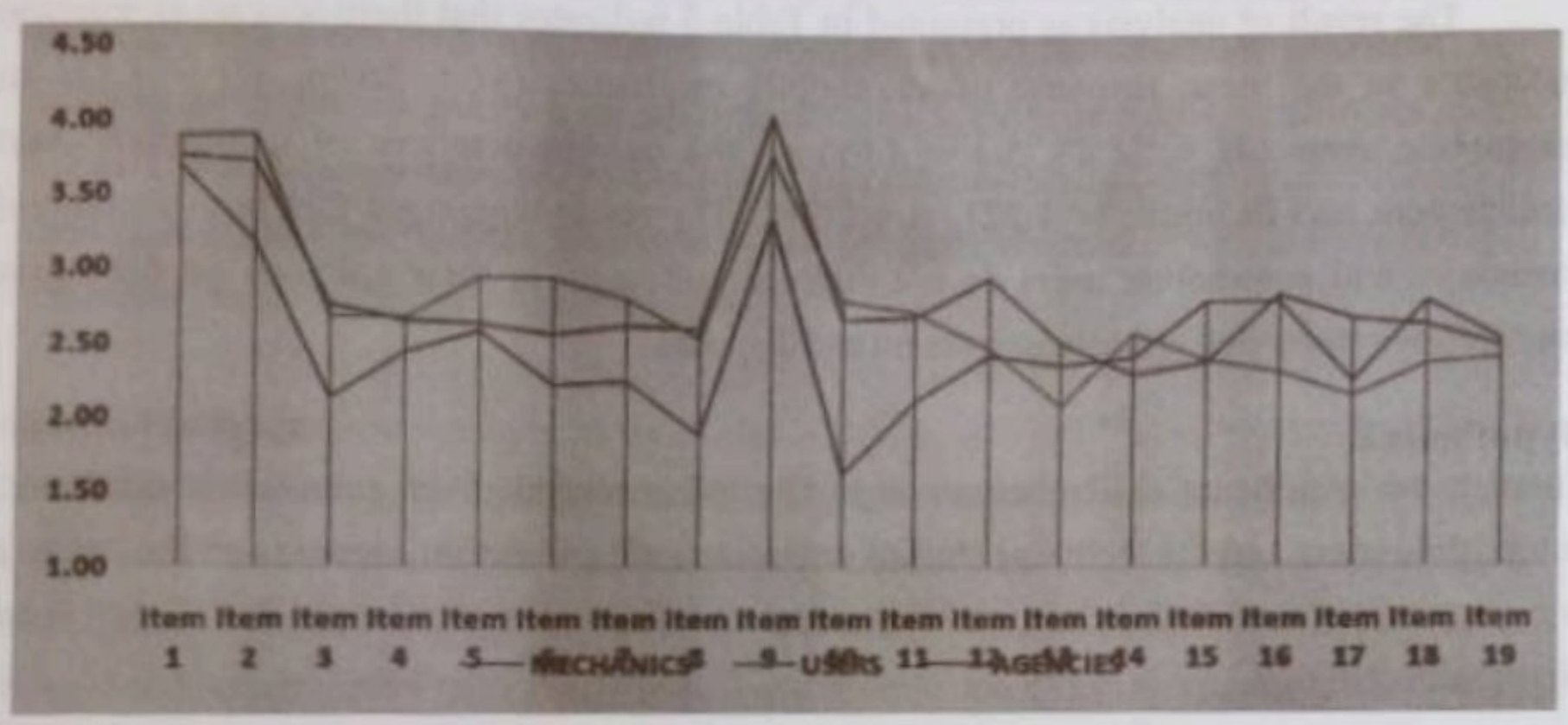

Figure 2 shows the cluster distribution of the respondents for clarity of response.

Figure 2: Mean cluster responses of Automobile Mechanics, Automobile Users and Technical Staff of Environmental Agencies on the extent of compliance to environmental regulations on automobile waste and disposal.

Figure 2 shows the cluster nature of the responses with respect to each item in the questionnaire. The respondents agree with items 1, 2, and 9 but disagree on items 4, 5, 6, 12, 13, 14, 16, 18, and 19 with diverse opinion. For instance, for item 9 the average mean of automobile mechanics was 3.80, automobile users have 4.08 while technical staff of environmental agencies has 3.38. This result shows that automobile waste generated are not being evaluated to see if they constitute danger to the society.Item 14 indicated that automobile mechanics had 2.59, automobile users have 2.32 and technical staff of environmental agencies also has 2.43. This is an indication that in an emergency situation the closest office of the Agency has not been serving as "On-the-Scene-Co-ordinator" to coordinate all response activities. The three respondents have similar opinion on all other items.

Hypothesis 1

There is no significant difference in the mean responses of automobile mechanics and automobile users on the current practices of automobile waste management and disposal in F C T,

Abuja and Niger State, Nigeria.

Table 3: t-test of Difference Between the Mean Responses of Automobile Mechanics and Automobile Users on the Current Practices of Automobile Waste Management and Disposal.

Respondents	N	Mean	SD	df	t	Sig. (2tail)
Automobile Mechanics	404	30.96	4.37	931.9	1.521	.218
Automobile Users	439	31.28	4.09			

The result of analysis as presented in Table 3 indicates that there was no significance difference in the mean response of automobile mechanics ($M = 30.96$, $SD = 4.37$) and automobile users ($M = 31.28$, $SD = 4.09$) on the current practices of automobile waste management and disposal. t= 1.521, p = 0.218. The result suggested that both automobile mechanics and automobile users do not differ significantly in their opinions on the current practices of automobile waste management and disposal.

Hypothesis 2
There is no significant difference amongst the mean responses of automobile mechanics, automobile users and the technical staff of environmental protection agencies on the extent of compliance with automobile waste management and disposal regulations in F C T, Abuja and Niger State, Nigeria.

Table 4
One-way ANOVA of mean responses of automobile mechanics, automobile users and the technical staff of environmental protection agencies on the extent of compliance with automobile waste management and disposal regulations.

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1321.547	2	660.774	9.842	.000
Within Groups	59213.849	882	67.136		
Total	60535.397	884			

The result of the analysis as presented in Table 4 showed that there was a statistically significant difference ($p < .05$) in the mean of the respondents. The data supported the hypothesis, $F(2, 882) = 9.842, p = .000$. Post-Hoc test was conducted to indicate where the discrepancy came from using Tukey HSD with equal variance assumed. The post-hoc result indicated that there was a statistically significant difference between automobile mechanics, automobile users and technical staff of environmental agencies ($p = .000$ and $p = .002$). This result suggests that the automobile mechanics are not complying with the environmental regulations on automobile waste management and disposal, meanwhile there is an indication that the technical staffs of environmental agencies are also not enforcing the laws.

Findings

1. Findings on the current practices of automobile waste management and disposal revealed that: effective inventory system in the workshop for oil, chemicals, and hazardous materials is lacking;state environmental agencies are not monitoring the activities of automobile mechanics; the respondents are not storing oily absorbents and grease according to environmental regulations; and are not trained in emergency preparedness against chemical hazard.
2. Findings on the extent of compliance with automobile waste management and disposal regulations revealed that:rules and regulations governing automobile waste collection and disposal are not effectively enforced in the state; automobile waste generated are rarely in compliance with environmental regulations; accidental discharge of automobile liquid waste is rarely reported to the nearest Environmental Agency;and in case of emergency, the closest office the Agency has not been serving as "On-the-Scene-Co-ordinator" to coordinate response activities.

Discussion of Findings

Findings on the current practices of automobile waste management and disposal revealed that oil, chemicals, and hazardous materials do not have effective inventory system in automobile workshop. This is an indication that automobile waste is not being managed properly, which is against the Best Management Practices(BMPs) of automobile waste management as specified in the ISO 14001. Proper management of automobile waste will prevent motor vehicle mechanics from confronting environmental disaster, which can be very expensive. EPA (2000) reported that the importance of these BMPs should be on avoiding contamination and how to minimise waste.

Findings also revealed that staffs of motor vehicle mechanics and environmental agencies are not trained in emergency preparedness against chemical hazard. EPA (2000) warned that a number of the essential BMPs are excellent automobile shop keeping procedures to decrease the rate of leakages and spillage and to enhance effective use of materials. Examples of this type of guidance as explained by EPA (2000) include educating the automobile mechanics on ideal material usage, storing, and regular checking of materials records. The use of drip pans and trays in the workshop by the mechanics for liquid collection and replacing non-chlorinated thinner and aqueous stain remover for chlorinated thinner to minimise health hazards that are related with chlorinated solvents will also be a good method of automobile waste management. The researchers are of the opinion that the mechanics and automobile users will have to be educated on the consequences of disregard to environmental regulations as regard automobile waste disposal in other to have a sustainable environment that will be save for all.

Findings on the extent of compliance to environmental regulations on automobile waste and disposal revealed that automobile mechanics must pass a test demonstrating their knowledge on regulatory requirements as regard automobile waste management. The findings also show that rules and regulations governing automobile waste collection and disposal are not being effectively enforced in the state. This is against the regulations that establish the N E P

regulations, S.I.9, 1991. This policy requires facilities such as mechanic villages to have waste evaluation and monitoring sections within their locations or sites and bear responsibility for environmental management. Waste generated in solid, gaseous and liquid forms produced by such facilities should be subjected to evaluation on monthly basis and the result should be submitted in form of report to the closest office of the Agency. The nearest office of any of the environmental agencies should be notified of any accidental discharge of waste such as chemicals, oil or petrol in less than 24 hours of the discharge

The N E P regulations, S.I.9, 1991 demand that companies or facilities such as automobile mechanic shops should present an inventory of chemicals being used in its repair operations, information's on methods of storage, and acquisition procedures. Every mechanic is supposed to abide with these regulations for proper management of wastes generated from such sources. The law is clear that any person who spills harmful substances is legally responsible to pay for the expenses of cleaning up such discharges along with the expenditures encountered during the rebuilding or replacement of natural resources destroyed as a result of such incidence. This is an indication that environmental agencies will have to stand up to their responsibilities by making information available to the public.

Other findings revealed that automobile waste is being discharged off directly into rivers/streams/canals. This is against both national and international laws and policies guiding the operations of waste management. These prohibited releases of harmful wastes signifies some level of offences which if a person is convicted, the person pays a fine of not more than ₦100,000:00, sentence to prison term not more ten (10) years or both. Corporate offenders are legally responsible to continue to pay for as long as they commit the crime (Section 20 (3)). Corporate offenders committing the offences are legally responsible to pay except they can show evidence of lack of knowledge of the offence. Nwufo (2010) stressed that there has never been a clear-cut prosecution of any individual or corporate body under the provision of these regulations. Automobile waste management policies have to be enforced and environmental agencies will have to do more till the idea of cleaner environment is realised. This is in accordance with Kalu, Modugu and Ubochi (2009) who stated that about 2.7%, 8.1% and 2.7% of solid waste policy were implemented respectively in Benin City, Nigeria.

Conclusion

This study indicated that automobile mechanics, automobile users and environmental agencies are not complying with environmental regulations guiding automobile waste management and disposal and this may be borne out of lack of effective monitoring on the part of environmental agencies. The government will have to strengthen public awareness on the Best Management Practices (BMPs) of automobile waste, in order for the environment to be secured. Various environmental agencies responsible for effective management and disposal of automobile waste should be strengthened for effective management and disposal of automobile waste in accordance with environmental regulations and above all, Section 20 of the 1999 Constitution of Nigeria.

Recommendations

The following recommendations are made based on the findings of the study:

1. Automobile mechanics and automobile users should be trained in emergency preparedness against chemical hazard and oil, and create effective inventory system in the work shop for hazardous materials;
2. Automobile mechanics and automobile users should beeducated by environmental agencies on automobile waste minimization (reduce, reuse and recycling) by effectively enforcing the rules and regulations governing automobile waste management and disposal;
3. Environmental agencies should regulate the setting up of automobile mechanics shops;
4. Accidental discharge of automobile wastes oil by automobile mechanics and automobile users should always be removed by licensed personnel under the supervision of environmental agencies and make sure that automobile mechanics and automobile users store liquid waste according to the manufacturer's requirements; and
5. Effective monitoring and evaluation of automobile waste management and disposal by environmental agencies should be conducted at least every two years as stipulated by law.

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