

# Knowledge, Attitude and Practices of Automobile Waste Management and Disposal Among Road Side Mechanics in North East, Nigeria for Greener Environment

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## Abstract

The purpose of the research was to explore the knowledge, attitude and current practices of road side mechanics (RSMs) on automobile waste management and disposal in the north-east Nigeria for greener environment. Five research questions and two hypotheses were formulated for the study. The study employs descriptive correlational design. Meanwhile, the population of the study consists of 7900 registered road side mechanics under NATA in north east Nigeria. A simple random sampling was used to extract 378 sample subjects. The instruments for data collection in this study was a semi-structured questionnaire. Descriptive and analytical statistics was used to analyze the data collected using Statistical Package for the Social Sciences (SPSS). For the purpose of this study, Pearson Product Moment Correlation (PPMC) was used to establish the relationship between knowledge, attitudes and practices of road side mechanics on automobile waste management and disposal in North-East Nigeria. The findings of the study revealed a strong relationship between knowledge, practice and attitude of automobile waste management and disposal among road side mechanics in north-east Nigeria for greener environment. Based on the findings of the study, it was concluded that RSMs in north-east Nigeria have inadequate knowledge of automobile waste management and disposal and that with this knowledge the attitude and practice correlated with one another. As a result, it was recommended that health educators/environmental health officers should embark on sensitization of RSMs on automobile waste management and disposal in North-East Nigeria.

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## I. Introduction

The main environmental problems in Nigeria can be attributed to the proliferation of urban solid wastes due to the increase in commercial and industrial activities within the country since the 1970s, thereby evolving urban centers with high population influx (Balogun et al, 2020). This shows the significant challenges facing municipalities who already lack the basic resources needed to manage waste, also, importation of used vehicles, known as “Tokunbo” into the country increases annually, as it became cheaper to buy due to economic constrain facing the nation (Oloruntoba, and Ogunbunmi 2020). The Nigerian Custom Service (NCS) also, lamented that a total of 192,287 units of vehicles came into Nigeria in the first 10 months of 2021 (Punch Nov, 2022). This figure is enough to place Nigeria as a biggest market for used vehicles in Africa. Despite the necessities of automobiles importation to the nation needs, it ends up resulting in waste generation both in operation and after sparing their lifespan. Therefore, this can assume to be a great source of automobile waste materials. Sharma et, al (2016) asserted that, automobile is a major material consumer nowadays as the average vehicle is made out of a mixture of these materials: steel body frame, glass windows, rubber tires, lead batteries, copper wires, as well as traces of metals like zinc, magnesium, tin, platinum and cobalt.

So, the issue of consumable and non-consumable materials associated with running automobiles that ensures its normal operations are the great source of waste. For example, it has been estimated that Kano municipal alone generated about 156,678 tons of solid waste per month, automobile waste inclusive Ogwueleka, (2009).

The term “waste,” as multidisciplinary research area of interest has various definitions. For instance, the European Union defined waste as any substance or object which the holder discards or intends to discard (Council Directive, 2008). Another definition by Festus and Omoboye (2015) reveals that wastes are materials

or substances that are either spoiled, rejected or no longer required for their original purpose. Hence waste can be regarded as any substance or material which requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt and as such lost its usefulness.

In the year 2021 about 17 million new passenger's vehicles hit the roads while, another 27 million cars worldwide reach their final destination. Those vehicles were made from over 30,000 different parts, every automobile comes with a lot of hazardous and non-hazardous waste. Hence, the waste that is generated and obtained from automobile is called automobile waste. The waste from automobile can be broadly categorized as solid waste, liquid waste and gaseous waste.

However, negative environmental and public health issues of automobile waste and automotive transportation result from the fact that its several components that yield the 3 categories of waste have been at a cost to the environment. This is evident, as they were found to pollute the air with emissions of incomplete combustion of the old engines and affect the quality of groundwater especially in the areas where the activities of auto-mobile workshops are located. Those chemicals compound emission and decomposition of metallic residues need to be reduced to meet the demand of the National Pollution Policy (NPP), National Environmental Standards & Regulations Enforcement Agency (NESREA), Nigeria Industrial Standard for Drinking Water Quality (NISDQW), World Health Organization (WHO) guidelines for drinking water quality and the United Nations Environment Program (UNEP) mandate at large.

Therefore, it is highly crucial to assess the knowledge, attitude and practice of automobile waste disposal among motor vehicle mechanic garage operators in north western Nigeria. The research is also expected to provide statistical data on attitude, knowledge and practice of automobile waste management that could be used for policy making on waste management strategy, economic impact of reusable waste and appropriate method of handling hazardous waste to protect lives and environment are also anticipated in this research work.

### **Objectives OfThe Study**

The purpose of the research is to explore the knowledge, attitude and current practices of road side mechanics on automobile waste management and disposal in the north-east Nigeria. Specifically, the study seeks to:

- I. Assess the knowledge level of road side mechanics on automobile waste management and disposal in north-east Nigeria.
- II. Identify the attitude of road side mechanics on automobile waste management and disposal in north-east Nigeria.
- III. Identify the current practices of road side mechanics on automobile waste management and disposal in north-east Nigeria.
- IV. Find out the relationship between knowledge and attitudes of road side mechanics on automobile waste management and disposal in north-east Nigeria.
- V. Find out the relationship between knowledge and practices of road side mechanics on automobile waste management and disposal in north-east Nigeria.

### **Hypotheses**

Two null hypotheses were equally formulated to guide the study and will be tested at 0.05 level of significance.

- I. There is no significant relationship between knowledge and attitudes of road side mechanics on automobile waste management and disposal in north-east Nigeria.
- II. There is no significant relationship between knowledge and practices of road side mechanics on automobile waste management and disposal in north-east Nigeria.

## **II. LiteratureReview**

### **Theoretical Framework for the Study**

In this study, an integrated framework for wastes management and disposal will be used. It was developed by McDougall in 2005 which serves as the basis for a sustainable waste management system. The framework, presented in Figure 1, depicts the integrated components of a waste management system that can be utilized to achieve sustainability. This part of the framework focuses on economic and environmental aspects of sustainability, while social factors were not incorporated in the model (McDougall, 2005).

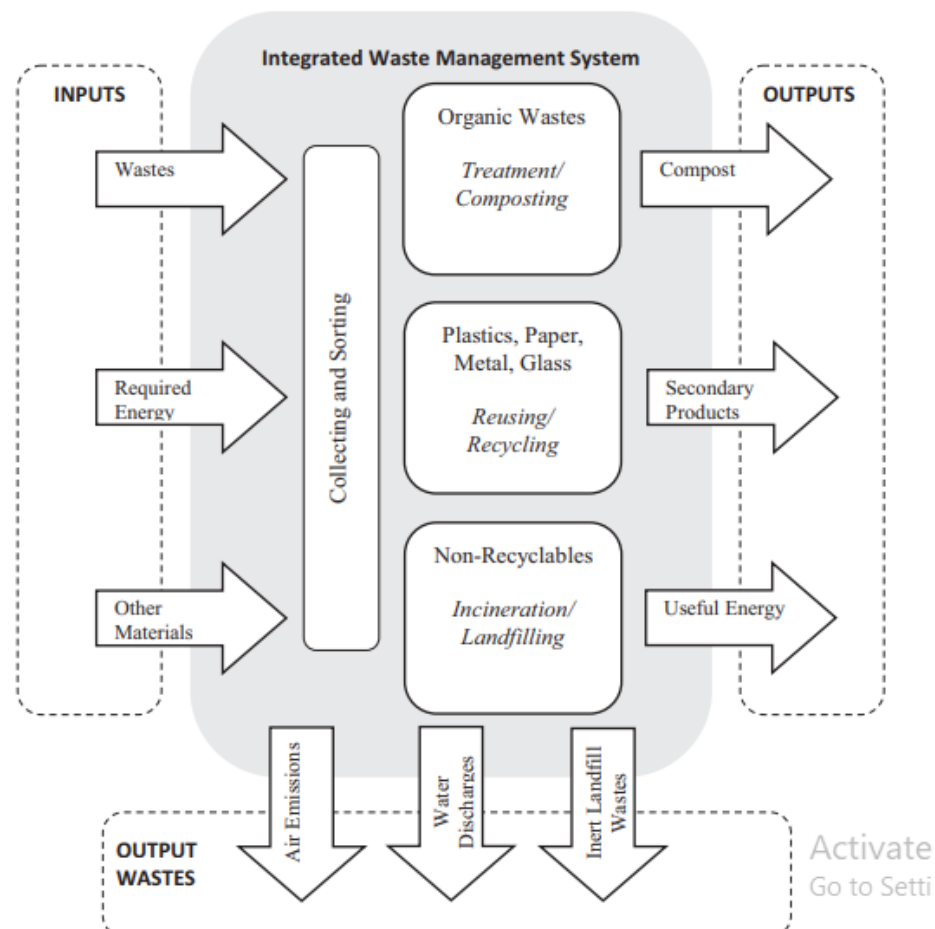


Fig.1. A framework for an integrated waste management and disposal system

### Environmental Problems in Nigeria

The main environmental problems in Nigeria can be attributed to the proliferation of urban solid wastes due to the increase in commercial and industrial activities within the country since the 1970s, thereby evolving urban centers with high population influx (Balogun, et al 2020). This shows the significant challenges facing municipalities who already lack the basic resources needed to manage waste, also, importation of used vehicles, known as “Tokunbo” into the country increases annually, as it became cheaper to buy due to economic constrain facing the nation (Oloruntoba, and Ogunbunmi 2020). The Nigerian Custom Service (NCS) also, lamented that a total of 192,287 units of vehicles came into Nigeria in the first 10 months of 2021 (Punch Nov, 2022). This figure is enough to place Nigeria as a biggest market for used vehicles in Africa. Despite the necessities of automobiles importation to the nation needs, it ends up resulting in waste generation both in operation and after sparing their lifespan. Therefore, this can assume to be a great source of automobile waste materials. Sharma et, al (2016) asserted that, automobile is a major material consumer nowadays as the average vehicle is made out of a mixture of these materials: steel body frame, glass windows, rubber tires, lead batteries, copper wires, as well as traces of metals like zinc, magnesium, tin, platinum and cobalt.

So, the issue of consumable and non-consumable materials associated with running automobiles that ensures its normal operations are the great source of waste. For example, it has been estimated that Kano municipal alone generated about 156,678 tons of solid waste per month, automobile waste inclusive Ogwueleka, (2009).

### Waste Generated by Automobiles

The term “waste,” as multidisciplinary research area of interest has various definitions. For instance, the European Union defined waste as any substance or object which the holder discards or intends to discard (Council Directive, 2008). (Anifowose et al., 2011), in their research work define waste as any substance or material which requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt and as such lost its usefulness. Another definition by (Festus and Omoboye 2015) reveals that wastes are materials or substances that are either spoiled, rejected or no longer required for their original purpose.

In the year 2021 about 17 million new passenger's vehicles hit the roads while, another 27 million cars worldwide reach their final destination. Those vehicles were made from over 30,000 different parts, every automobile comes with a lot of hazardous and non-hazardous waste. Hence, the waste that is generated and obtained from automobile is called automobile waste. The waste from automobile can be broadly categorized as solid waste, liquid waste and gaseous waste.

The Solid materials used in manufacturing automobile include; Plastic parts which are required for components such as door panel, hood, illuminations, wiper, sun visor, whilst textile products are necessary for seat, roof, seat fabric and foam, real parcel shelf. Furthermore, metal products are used for seat structure, roof, chassis and drive train. More specifically, metal raw materials can be listed as cold-rolled iron, hot-rolled iron, and various sizes of screws, iron pipes, aluminum pipes and plates, composite materials, tin plates, steel plates. Plastics and chemicals used can be grouped as PVC plates, polyethylene, polypropylene, ABS, polyamide, rubber, Woodstock plate, isocyanate, and polyol. Textile components used consist of glass fiber, glue, foam, felting, and fabric. Erdogan and Salihoglu (2018). All these solid materials mentioned are the constituent of solid waste generated by automotive vehicle in operation and by the end of their life.

The liquid form of waste generated by automobiles are largely made up of based oil products, synthetic fluids, cleaning solvents, paints and acids from batteries as a part of their service process and results in decomposition of oily waste water which will affect the physio-chemical parameters such as electrical conductivity, alkalinity, by the presence of heavy metals in the groundwater. hydrocarbons and most of the time hazardous when contaminated with sludge and metallic substances. According to Galita and Cano (2015) stated that an average motor vehicle garage generated 15 to 25 liters of Liquid waste daily, which is from used engine oil and used brake fluid.

The gaseous waste product generated by automotive vehicles are often continuous process in the lifecycle of an automobile self-propel engines operation. And hence, the use of flammable liquid known as gasoline is the cheap source of waste, it burns off while the vehicles are in operation and henceforth emits mostly noxious gaseous substances that are threatening to human health. The major component chemicals product releases by automobiles include; carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), soot, hydrocarbons (HC), oxides of nitrogen (NO<sub>x</sub>), oxides of carbon (CO<sub>x</sub>), particulate matter, sulfur dioxide (SO<sub>2</sub>), photochemical oxidants and water vapor (H<sub>2</sub>O), ozone, and chlorofluorocarbon (CFCs). Nduka, Kelle, Ogoko and Okafor, (2019). All these gases are in higher concentration released into the atmosphere by automobile exhaust emission and decomposing automobile waste irrespective of transportation mode.

### **Health and Environmental Issues of Automobile Waste**

However, negative environmental and public health issues of automobile waste and automotive transportation result from the fact that its several components that yield the 3 categories of waste have been at a cost to the environment. This is evident, as they were found to pollute the air with emissions of incomplete combustion of the old engines and affect the quality of groundwater especially in the areas where the activities of auto-mobile workshops are located. Those chemicals compound emission and decomposition of metallic residues need to be reduced to meet the demand of the National Pollution Policy (NPP), National Environmental Standards & Regulations Enforcement Agency (NESREA), Nigeria Industrial Standard for Drinking Water Quality (NISDQW), World Health Organization (WHO) guidelines for drinking water quality and the United Nations Environment Program (UNEP) mandate at large.

Therefore, it is highly crucial to explore the knowledge, attitude and practice of automobile waste disposal among motor vehicle mechanic garage operators in north western Nigeria. The research is also expected to provide statistical data on attitude, knowledge and practice of automobile waste management that could be used for policy making on waste management strategy, economic impact of reusable waste and appropriate method of handling hazardous waste to protect lives and environment are also anticipated in this research work.

### **III. Methodology**

This study adopted descriptive correlational research design. The research study area was the North-Eastern Sub region of the Federal republic of Nigeria. The North-Eastern sub-region comprises of six states, namely Adamawa State, Bauchi State, Borno State, Gombe State, Taraba State and Yobe State. The population of the study consists of 7,900 Road Side Mechanics (RSM) registered under National Automobile Technicians Association (NATA) within the six states of North-Eastern geopolitical zone of Nigeria. The sample size for this study was of 378 RSMs. The sample was determined using a Sample Size Determination Table by Krejcie and Morgan (1970).

A semi-structured questionnaire was adapted from Saidu (2021). The instrument was subjected to face and content validation. Cronbach alpha test statistics was used for the reliability of the instrument and was found to be 0.84 which is a suitable degree.

The data obtained was analyzed using mean and standard deviation for research questions 1-3. For research questions 4 and 5 Pearson Product Moment Correlation Coefficient was used to find the relationship between knowledge, attitudes and practices of road side mechanics on automobile waste management and disposal.

**IV. Results And Discussion**

Question One: What is the knowledge level of road side mechanics on automobile waste management and disposal in north-east Nigeria?

**Table 2: Knowledge level of road side mechanics on automobile waste management and disposal in north-east Nigeria.**

S/N	Items	Mean	SD
1.	I am aware of different types of automobile waste that are generated in my workshop	2.65	1.14
2.	I am aware of the environmental impacts associated with improper automobile waste	2.21	1.05
3.	I know that improper disposal of automobile waste can affect soil and water quality	2.23	1.09
4.	I am aware of local and national regulations regarding the disposal of automobile waste	2.29	1.16
5.	I received formal training regarding proper automobile waste management and disposal	2.28	1.14
6.	I use to receive information regularly regarding proper automobile waste management and	2.43	1.21
7.	I am aware that transported automobile waste often fall indiscriminately on the road making	2.41	1.21
8.	I am aware that proper automobile waste management is the responsibility of every member of the workshop.	2.24	1.12
9.	I am aware that use of truck helps in evacuating of automobile waste.	2.37	1.15
10.	I know that automobile waste can be recycled to usable materials	2.50	1.17
	<b>Cumulative Mean</b>	<b>2.361</b>	<b>1.144</b>

According to Table 2 above, the knowledge of road side mechanics on automobile waste management and disposal in north-east Nigeria is relatively low. This is because their cumulative mean of 2.36 is below 2.50 standard/decision mean. Specifically they are aware of different types of automobile waste that are generated in their workshops with a mean of 2.65. In the same vein most of the RSM have knowledge that automobile waste can be recycled to usable materials, as this has a mean 2.50 which is equal to the 2.50 standard/decision mean.

In summary, The knowledge of RSMs about automobile waste management and disposal in north-east Nigeria is relatively low, especially their knowledge of the environmental impacts associated with improper automobile waste disposal, effect of improper disposal of automobile waste on soil and water quality. They also have low knowledge of local and national regulations regarding the disposal of automobile waste.

**Table 3. Question Two: What is the attitude of road side mechanics on automobile waste management and disposal in north-east Nigeria.**

S/N	Items	MEAN	SD
1.	I feel that automobile waste collected should not be disposed into water bodies.	2.36	1.04
2.	I think it is necessary to properly manage and dispose of automobile waste	2.34	0.93
3.	I am concerned about the impact of improper automobile waste disposal on the environment	2.32	1.01
4.	I feel that it is my responsibility to dispose of automobile waste properly	2.27	0.98
5.	I do care when automobile waste materials are dumped at the designated station.	2.81	0.93
6.	I feel that lack of facilities is the biggest barrier to properly manage and dispose automobile waste	2.50	1.15
7.	I am interested in receiving training on best practices for automobile waste management and disposal site.	2.52	1.10
8.	I believe that actions taken by individual mechanics like myself can make a significant difference in reducing the negative environmental impact of automobile waste	2.41	1.11
9.	I will support stricter government policies and regulations on automobile waste management and disposal	2.28	1.11
10.	I use the designated areas for dumping of different types of automobile waste.	2.21	1.12
	<b>Cumulative mean</b>	<b>2.402</b>	<b>1.048</b>

According to Table 3. above, the attitude of road side mechanics on automobile waste management and disposal in north-east Nigeria is negatively low. This is because their cumulative mean of 2.40 is below the 2.50 standard/decision mean. Specifically they have positive attitude on only three items which shows that they do care to dump automobile waste materials at the designated stations with 2.81. They also feel that lack of facilities is the biggest barrier to properly manage and dispose automobile waste with 2.50 and lastly they are interested in receiving training on best practices for automobile waste management and disposal site 2.52.

In summary, the attitude of RSMs about automobile waste management and disposal in north-east Nigeria is negatively low, especially their attitudes towards disposing of automobile waste collected into water bodies, necessity to properly manage and dispose of automobile waste, concerned about the impact of improper automobile waste disposal on the environment and not taking responsibility to dispose of automobile waste properly.

**Table 4. Question Three: What is the Practices of road side mechanics on automobile waste management and disposal in north-east Nigeria.**

S/N	Items	MEAN	SD
1.	I practice segregation disposal of automobile waste according to their nature such as plastic, metal, fluid, asbestos e.t.c. or hazardous and non hazardous.	2.41	1.21
2.	I dispose hazardous waste such as batteries, brake fluid, antifreeze etc according to government regulation	2.36	1.14
3.	I actively participate in recycling programs for waste materials such as metal scraps, plastic containers, and old tires.	2.22	1.11
4.	I use personal protective equipment (PPE) when handling automobile waste.	2.36	1.14
5.	I put measures in place to minimize waste and prevent pollution in my workshop.	2.41	1.20
6.	I keep records of how and where the waste from my workshop is disposed of.	2.29	1.16
7.	I dump at site designated for dumping automobile waste.	2.21	1.05
8.	Government has provided dumping containers which I use.	2.23	1.09
9.	I dump automobile waste from my workshop inside gutter.	2.30	1.11
10.	I use cart pushers to dump the automobile waste generated at my workshop.	2.68	1.13
	<b>Cumulativemean</b>	2.347	1.134

Table 4. above shows that the practices level of road side mechanics on automobile waste management and disposal in north-east Nigeria is negatively low. This is because their cumulative mean level of 2.347 is lower than the 2.50 standard/decision mean. Specifically they agreed on only one item which shows that they use cart pushers to dump the automobile waste generated at their workshops which has 2.68. but they did not agree on practicing segregation disposal of automobile waste according to hazardous and non hazardous, disposing hazardous waste such as batteries, brake fluid, antifreeze etc according to government regulation, actively participating in recycling programs for waste materials such as metal scraps, plastic containers, and old tires, using personal protective equipment (PPE) when handling automobile waste, putting measures in place to minimize waste and prevent pollution in workshops and keeping records of how and where the waste from their workshops are disposed of. In summary, the practices level of road side mechanics on automobile waste management and disposal in north-east Nigeria is negatively low, as most of them do not abide by the automobile waste management and disposal regulations.

Research Question Four: What is the relationship between knowledge and attitude road side mechanics on automobile waste management and disposal in north-east Nigeria?

**Table 5: Correlational statistics on relationship between knowledge and attitude of road side mechanics on automobile waste management and disposal in north-east Nigeria?**

Correlations			
		Knowledge	Attitude
Knowledge	Pearson Correlation	1	.974**
	Sig. (2-tailed)		.000
	N	10	10
Attitude	Pearson Correlation	.974**	1
	Sig. (2-tailed)	.000	
	N	10	10
**. Correlation is significant at the 0.01 level (2-tailed).			

The Correlation statistics revealed that there is a very strong and positive relationship between knowledge and attitude of automotive waste management and disposal among RSMs in north-east Nigeria with a correlation coefficient of 0.974 at a p value of 0.00 which means that the relationship is statistically significant. The relationship between knowledge and attitude of automotive waste management is directly proportional, that is,

the higher their knowledge of automobile waste management disposal, the higher and better their attitude towards automotive waste management and disposal and vice versa.

**Question Five:** What is the relationship between knowledge and practice of road side mechanics on automobile waste management and disposal in north-east Nigeria?

**Table 4.2.5: Correlation statistics between knowledge and practice of road side mechanics on automobile waste management and disposal in north-east Nigeria**

Correlations			
		Knowledge	Practice
Knowledge	Pearson Correlation	1	.970**
	Sig. (2-tailed)		.000
	N	10	10
Practice	Pearson Correlation	.970**	1
	Sig. (2-tailed)	.000	
	N	10	10
**. Correlation is significant at the 0.01 level (2-tailed).			

The Correlation statistics revealed that there is a very strong and positive relationship between knowledge and practice of automotive waste management and disposal among RSMs in north-east Nigeria with a Correlational Coefficient of 0.970 at a p value of 0.00 which means that the relationship is statistically significant. The relationship between knowledge and practice of solid waste management is directly proportional, that is, the higher their knowledge of automobile waste management disposal, the higher and better their practice towards automotive waste management and disposal and vice versa.

### V. Conclusion

Based on the analysis of the results from the findings gathered in this study, these conclusions were made by the researchers.

There is a paucity of knowledge among Road Side Mechanics in North-Eastern Nigeria on automobile waste management and disposal.

The attitude of Road Side Mechanics towards automobile waste management and disposal is relatively negative.

The current practices of Road Side Mechanics on automobile waste management and disposal in north-east Nigeria is not in tandem with standard regulation of automobile waste management and disposal.

There is a strong relationship between knowledge and attitudes of road side mechanics on automobile waste management and disposal in north-east Nigeria.

There is a strong relationship between knowledge and practices of road side mechanics on automobile waste management and disposal in north-east Nigeria.

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