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PERCEIVED EFFECT OF WASTE GENERATION ON THE CLIMATE AMONG RURAL HOUSEHOLDS IN OYO STATE, NIGERIA

Adejumo A.A, Adekoya A.E and Sangotegbe N.S

Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan Nigeria

ABSTRACT: *This study examined the perceived effect of waste generation on climate change among rural households in Oyo state, Nigeria. Two local government areas were randomly selected from the three senatorial districts in Oyo state from which five villages each were randomly selected. A total of 15 households across the selected villages were randomly selected to give a total sample size of 150 respondents. Data were collected through the use of interview schedule and analyzed using frequencies and percentages to present the descriptive analysis, while Pearson Product Moment Correlation and Chi- Square were used for inferential analysis. The findings of the study revealed that the average age of the respondents in the study area was 37 years, as majority (75.0%) were married and had no formal education (63.2%). Majority (90.0%) were farmers, had small farm size (86.1%) of range 1-5 acres. Kitchen waste (94.7%), crop waste (88.8%) and animal waste (65.3%) were the major waste generated within the households in the study area. Most (92.0%) of the respondents disposed their wastes making use of sacks (83.3%) 62.0% and 74.7% dispose their waste into drainage channels (62.0%) and flowing stream (74.7%) respectively. Few (14.7%) obtained information on waste management practices through the radio. Majority (78.2%) had low knowledge level on waste management practice and wrong perception (79.2%) of the effects of waste generation to climate change. Level of education (χ^2 = 9.273, sources of information on waste management practices (r = 0.325) and knowledge on waste management practices (r = 0.276) have influence on the perceived effect of waste generation to climate change. There is the need to create awareness on the environmental effect of waste and inappropriate waste management practices among rural households.*

KEYWORDS: Waste, Waste Generation, Waste Management, Knowledge on Waste Management, Perceived Effect of Waste, Climate Change

INTRODUCTION

One of the most pressing problems in the world today is the escalation of solid waste generated due to an increasing population, leading to the deterioration of the environment. Wastes have been defined in different ways. Laquian (2005), defined waste as materials left over productive use or things that could no longer be utilized for the purpose of which they were meant. Household solid waste, according to Ogwuche . and Yusufu (2011) are those wastes from human, animal and economic activities in the household. These wastes could be solid organic substances that are biodegradable e.g. cash crops, peels, grasses, vegetables, etc and inorganic substances that are non-degradable e.g. plastics, bottles, metals etc.

Research has shown that poor waste disposal practices are capable of producing emissions of several greenhouse gases (GHGs), Contributes to global climate change (International panel on Climate Change, 2006). The most significant GHG gas produced from waste is methane. Other forms of GHGs are in form of carbon monoxide. Even the recycling of waste produces

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some emissions (although these are offset by the reduction in fossil fuels that would be required to obtain new raw materials). However, many people do not realize that solid waste is a part of the loop that contributes to climate change.

Several studies on waste generation in Nigeria (Oguwuche and Yusufu 2011; Agunwamba 2003; Nnamani, 2000) have been carried out with more emphasis on the urban areas. Statistics on waste generation are lacking (Nicholson, 2001). However, the assertion of Nabegu (2011) suggests that waste generation in rural Nigeria is assuming an upward trend. This he outlined in the areas of burning, agricultural activities and solid wastes among others.

Agriculture which is the most predominant human activity in the rural area contributes to waste generation and causes change in climate if indiscrimately practiced. Agricultural waste burning releases pollutants such as carbon monoxide, nitrous oxide, nitrogen dioxide and particles (smoke carbon). These pollutants are accompanied by the formation of ozone and nitric acid (Hegg *et.al.*1987), hence contributing to acid deposition thereby posing risk to human and ecological health.

Environmental pollution from animal waste (faeces, urine, and respiration and fermentation gases) is a global concern and is much more serious in countries with high concentrations of animals on a limited land base for manure disposal. Animal wastes are excreted in solid, liquid, and gaseous forms. Respiration and fermentation gases are lost to the environment soon after being produced by the animal. After excretion, solid and liquid animal waste is subjected to microbial conversion (mainly anaerobic), which converts organic substrates into microbial biomass and soluble and gaseous products. Some of these products have impact on the environment, as well as effects on water quality, soil deterioration, and air pollution.

The degree in which waste generation affects the climate change depends on one hand on the level of knowledge and the perception of individuals and the other on mitigation and adaptive capacity to the change phenomenon. However, it is unclear how rural household perceive the effects of waste on the climate. Hence it becomes imperative to determine the perceived effect of waste generation on the climate among rural households

Objective of the study

1. To describe personal characteristics of the respondents
2. To identify the ways in which rural households contribute to waste generation
3. To identify the waste disposal methods utilized by rural households
4. Identify rural households sources of information on waste management
5. To examine the knowledge level of the rural dwellers on waste management practice
6. To determine the perceived effects of waste generation to climate change among the rural households.

Hypotheses of the study

Ho1: There is no significant relationship between the personal characteristics of rural households and their perceived effect of waste generation to climate change

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Ho2: There is no significant relationship between the knowledge level of rural households on waste management and their perceived effects of waste generation to climate change

Ho3: There is no significant relationship between respondents' attitudes to waste management and their perceived effects of waste generation to climate change among rural households

METHODOLOGY

The study was conducted in Oyo State which is geographically located in the South West region of Nigeria between latitude $7^{o}02^{1}$N and $9^{o}10^{1}$N and longitude $2^{o}04^{1}$E and $4^{o}30^{1}$E. It is bounded in the South by Ogun state, in the north by Kwara State, in the West, it is partly bounded by Ogun State and partly by the Republic of Benin, while in the East by Osun State. The State enjoys a tropical climate with prominent wet and dry seasons. The state is made up of thirty three (33) local government areas (LGAs). Two local government areas were randomly selected from the three senatorial districts in Oyo state from which five villages each were randomly selected. A total of 15 households were across the selected villages were randomly selected to give a total sample size of 150 respondents. Data were collected through the use of interview schedule and analyzed using frequencies and percentages to present the descriptive analysis, while Pearson Product Moment Correlation and Chi- Square were used for inferential analysis.

RESULTS AND DISCUSSIONS

Personal characteristics of respondents

The result in table 1 shows that majority (61.4%) of the respondents fall within the age range of 31-50 years while 38.6% were above fifty years. The mean age of the respondents was 37 years with a standard deviation of 9.55. This implies that majority of the respondents were active. Result obtained from the study also showed that 55.3 % of the respondents were males while 44.7% were female, most (75.3%) of the respondents were married, 10.7% were widowed, 10.0% were single while 4.0% were divorced. The distribution also shows that more than half (62.3%) of the respondents had non-formal education while 46.7% had one form of formal education or the other. This is an indication that most of the respondents in the study area are illiterate and this could affect their knowledge level on waste management practices and the way they perceive the effect of waste generation to climate change. Result from the study also revealed that majority (90.0%) of the respondents engaged in crop farming (90.0%) and livestock rearing (60.0%). This is an indication that most of the respondents contribute one way or the other to climate change through these activities. Finding from the study shows that more than half (52.0%) of the respondents indicated a household size of range 4-6 members, 38.3% had 1-3 household size, while 10.0% had above six household size The implication of this finding is that more waste would be generated by larger house hold size.

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Table 1: Distribution of respondents according to their personal characteristics of respondents

Variable	Frequency	Percentage
Age		
31-40	54	36.1
41-50	38	25.3
51-60	25	16.6
>60	33	22.0
Marital status		
Married	113	75.3
Single	15	10.0
Divorced	06	4.0
Widowed	16	10.7
Educational qualification		
No-formal	95	63.3
Primary	34	22.7
Secondary	16	10.7
Tertiary	05	3.3
Occupation		
Farming	135	90.0
Trade	06	4.0
Teacher	05	3.3
Artisans	04	2.7
Livestock rearing	90	60.0
Household size		
1-3	57	38.0
4-6	78	52.0
7-9	10	6.7
>9	05	3.3

Source: Data analysis, 2014

Types of waste generated by households

Table 2 shows that crop waste (88.8%), kitchen waste (94.7%) and animal dung were major waste generated by the respondents in the study area. This implies that most of the wastes generated in the study area are biodegradable. This finding corroborates with Akpu and Yusuf (2011) who reported that food remnant constitutes the bulk of the waste in the rural area. Result obtained from the study further showed that poly-ethane/nylon (62.0%), plastic (35.3%), and bottles (30.0%) constitute non -degradable waste in the study area.

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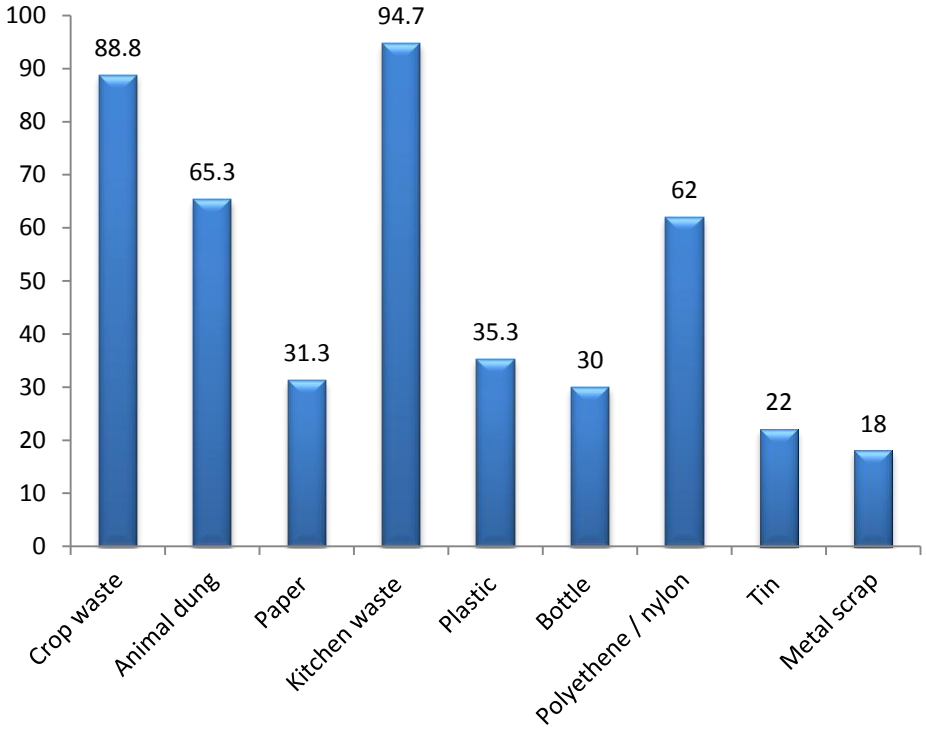

Figure: Distribution of respondents according to the types of waste generated
source: Field survey, 2013

Means of waste disposal

Results obtained from the study showed that 92.0% of the respondents disposed their household waste by burning. Burning of combustible non-biodegradable gives off gasses which eventually lead to acid rain, global warming and ozone layer depletion. The result further shows that 83.3% make use of sacks, 82.0% reported that they dispose their waste into a pit, 76.7% made use of the open dump system. This finding is in consonance with Ogboi and Kperegbeyi (2010) who reported burning and open dump as major waste disposal methods in the rural area. The study also showed that 74.7% and 62.0% of the respondents disposed waste inside drainage channels and streams respectively. Since refuse dumped in drainage and streams may result in flood and consequent loss of lives, this result suggests that respondents face the risk of flooding and possible loss of lives and properties unless there are drastic measures to control this act of indiscriminate dumping of refuse. However, a minority (7.3%) indicated the government waste service tank as a means of waste disposal.

Table 3: Distribution of respondents according to methods of waste disposal

Methods of waste disposal	Responses	%	**Rank**
Burning	138	92.0	1
Open dump	115	76.7	5
Waste bin	62	41.3	8
Sacks	125	83.3	2
Dispose infront of house/buiding	53	35.3	10
Dispose at open or vacant post	57	38.0	9
Dispose into flowing stream	93	62.0	7

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Dispose into drainage channel	112	74.7	6
Government waste service tank	11	7.3	11
Dumping animal feaces on open farm lands to serve as manure	118	78.7	4
Defecating on streets	75	5.0	12
Dumping in a dug pit	123	82.0	3

Source: Data analysis, 2014

Sources of information on waste management

In Table 5 below, most respondents claimed to have their information from all sources listed. However, 36.0% obtained information on waste management from friends/relatives, 14.7% of t claimed they get their information from the radio and government officials. This suggests that rural households in the study area do not have access to adequate information on waste management. This could also have a negative influence on their perception of the effect of waste generation to climate change.

Table 4: Distribution of respondents according to sources of information on waste management

Sources of information on waste management	Frequency	%	Rate at which information on waste management is passed					
			Always		Occasionally		Rarely	%
Radio	27	14.7			20	13.3	07	1.4
Television	13	8.7	-	-	11	7.3	02	1.3
Newspaper	08	5.3	-	-	03	2.0	05	3.3
Friends/relatives	54	36.0	36	24.0	13	8.7	05	3.3
Government officials	22	14.7	08	5.3	11	7.3	03	2.0
Seminars	11	7.3	07	4.7	02	1.3	02	1.3

Source: Data analysis, 2014

Knowledge on waste management

Table 5 shows that majority (68.6%) of the respondents indicated that waste from food and farm lands can be compost and used as organic manure. About 73.3% and 52.0% of the respondents claimed that proper waste management practices limits air pollution and bring about healthy environment respectively. However, a few proportion of the respondents 12.0%, 18.0% and 22.0% indicated that domestic and farm waste can be used as bio-gas, poor waste management practice could pollute the soil respectively and biodegradable waste should be separated from non-degradable waste respectively. The implication of this is that large proportion of the households are not well informed on waste management.

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Table 5: Distribution of respondents according to knowledge on waste management

Knowledge statement	Frequency	Percentage
Waste from food and farm lands can be compost and used as organic manure	103	68.6
Animal parts such as bones and horns can be processed into decorating materials or plates	33	22.0
Proper waste management brings about a healthy environment	110	73.3
Waste management can help reduce erosion	45	30.0
Waste management practices limits air pollution	78	52.0
Domestic and farm waste can be used as bio-gas	18	12.0
Poor waste management practice can pollute the soil	27	18.0
Indiscrimate disposal of waste into rivers can cause flooding	68	45.3
Poor disposal of waste causes contamination of surface and ground water	56	37.3
Polythene bags and plastics are non-degradable waste so they should be sorted from biodegradable waste	33	22.0

Source: Data analysis 2014

Knowledge level on waste management

Table 6 further shows that 79.2% of the respondents had low knowledge level on waste management. This suggests a need for more enlighten programme on waste management practices in the study area. The implication of this is that the low knowledge level on waste generation could affect the way respondents' perceive the effect of waste generation on climate.

Table 6: Distribution of respondent according to their knowledge level on waste management

Knowledge level	Freq.	%	Mean
Low	117	78.0	4.30
High	33	22.0	

Source: Data analysis 2014

Perceived effect of waste generation to climate change

Table 7 shows that a large proportion of the respondents disagreed that increased generation of methane gas occurs when solid waste are dropped indiscrimately (92.0%), open dumpsite emits methane gas which causes global warming, disposal of inevitably large amounts of liquid waste from livestock waste from livestock and waste livestock products in form of bone and fat emits high amount of greenhouse gases when disposed in water ways (90.0%). Finding from the study further revealed that about 76.7% of the respondents agreed that waste only affects one's health and has no effect on climate change. This suggests that most of the respondents in the study area have wrong perception of the effects of waste generation to climate change.

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Table 7: Distribution of respondents according to perceived effect of waste generation to climate change

Perceived effect of waste generation to climate change	A	%	U	%	D	%
Increased generation of methane gas occurs when organic solid waste are dropped indiscrimately	2	1.3	10	6.7	138	92.0
Un controlled Burning of refuse releases smoke and gaseous contaminants which contributes to change in climate	09	6.0	19	12.7	122	81.3
Open dump site emits methane gas which causes global warming	07	4.7	08	5.3	135	90.0
The emission of methane gas from animal waste can contribute to climate change	03	2.0	07	4.7	140	93.3
Occurrence of flooding could be traced to indiscrimate waste disposal	83	55.3	60	40.0	07	4.7
Methane from waste water contributes to climate change	02	1.3	50	33.3	98	65.3
Disposal of inevitably large amounts of liquid waste from livestock and waste livestock products in form of bone and fat emits high amount of greenhouse gases when disposed in water ways	-	-	15	10.0	135	90.0
Waste only affect ones health and has no effect on climate change	114	76.0	25	16.7	11	7.3

Source: Data analysis, 2014

Table 8: Level of Perceived effect of waste generation to climate change

Table 8 shows that majority (79.2%) had negative perception of the effect of waste generation to climate change as against respondents who had positive (20.8%) perception. This suggests the need to create awareness on the environmental effect of waste.

Level of perceived effect	Frequency	Percentage	Mean
High	31	20.8	12.3
Low	119	79.2	

Source: Data analysis, 2014

Relationship between educational qualification and perceived effect of waste generation to climate change

There is a significant relationship between respondents' educational qualification ($\chi^2 = 9.273$, $p \leq 0.05$) and perceived effect of waste generation to climate change. The deduction that can be drawn from this, is that the more education acquired by the households, the more they are inform and this invariably will have positive influence on the way they perceive the effect of waste generation to climate change.

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Table 9: Distribution according to the relationship between educational qualification and perceived effect of waste generation to climate change

Variable	χ^2	Df	p
Educational qualification	9.273	3	0.026
Household size	0.512	3	0.473

Source: Data analysis, 2014

Relationship between sources of information on waste management and perceived effect of waste generation to climate change

Table 10 shows that there is a relationship between the rate at which rural household obtain information on waste management ($r = 0.325$, $p \leq 0.05$) and perceived effect of waste generation on climate change.

Table 10: Distribution according to the relationship between sources of information on waste management and perceived effect of waste generation to climate change

	r	P
Sources of information vs. perceived effect	0.325	0.001

Source: Data analysis 2014

Relationship between knowledge on waste management and perceived effect of waste generation to climate change

Table 11 shows that there is a significant relationship between respondents' knowledge on waste management and perceived effect of waste generation to climate change. This implies that knowledge on waste management practices have influence on the perceived effect of waste generation to climate change.

Table 11: Distribution according to the relationship between knowledge on waste management and perceived effect of waste generation to climate change

	R	P
Knowledge on waste management vs. perceived effect	0.276	0.000

Source: Data analysis 2014

CONCLUSION

The study examined the perceived effect of waste generation on the climate among rural households in Oyo state, Nigeria. The knowledge of waste management among rural households was low and this is revealed in the indiscrimate ways in which they dispose their waste. The result further concludes that poor waste management practice is a reflection of the wrong perception of the effect of waste on the climate.

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RECOMMENDATIONS

The following recommendations are hereby made;

- There is a need for sensitization of rural households on the dangers of poor waste management.
- Government should design a mapped out strategy on how rural households can dispose waste and there should be penalty for nonconformity.
- There is a need for awareness creation on the negative impact of waste on the climate.

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