

ASSESSMENT OF THE CAUSES OF SHIP GENERATED MARINE POLLUTION IN NIGERIA COASTAL WATERWAY

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Abstract

The assessment of the causes of ship generated marine pollution in Nigeria coastal waterways has been studied utilizing a dependable questionnaire data - based approach. These questions were distributed to some key industry personnel who have cognition about marine pollution doubled with those who are working in the maritime related industries. After the survey- like questions distributions and collections, tabulation of the hypothetical response were used for the appraisal of the results. In each of the tabulation, seven questions were raised and sixty respondents were required to complete it. The respondent employment details coupled with some vital personal bio data were also required. And the percentage of each of the respondents was collated and tabulated. The result obtained from dependable Excel Software Program analysis shows that the issue discussed is true. Therefore, the need for proper implementation of the IMO laws enacted at the respective conventions for various classes of marine pollutions is needed.

KEYWORDS: Assessment; Causes; Marine pollution; Ship Generated Marine Pollutants; Coastal Waterways

1.0 INTRODUCTION

Ship's source of marine pollutants includes cargo carried coupled with the waste produced onboard. Marine pollutants normally encompass oily mixtures together with the harmful substances and its accumulation emanated from machines operations and domestic activities of crew members onboard. Precisely, ship borne pollutants include solid waste, antifouling materials (Umo and Nitonye, 2015). Conspicuously, researches have attested to the effects of ship supported pollution on the marine environment such as the spread of non – native/exotic species to the aquatic environment and the adverse effects it has on the economies of countries that is dependable on commercial fisheries (Kloff and Wicks, 2004).

Marine pollution may be classified as point source (pollutants whose occurrence is in a single, noticeable, and confined source like directly discharging of sewage) and non point source (when the pollution comes from unclear and copious sources such as agricultural storms water discharges together with the flows of irrigation's agriculture and urban runoff) (Umo and Nitonye, 2015; Mitchell, 2004). However, the marine pollution had continually been tempting the human race right from the time of old. Also, being ecologically very significant focal centers, coastal zones having the knowledgeable human induced adverse environmental effects like coastal erosion, urban sprawl, and pollution (Ozdemir, *et al.*, 2016). Precisely, these marine pollutions coupled with the event of the advancement of ship's propagated marine pollution have drawn the attention of international maritime community in order to promote safer shipping and defense of the maritime environment. The thriving concern about pollution centers on the efficacy for shipping business to adversely affect the marine environment and related biodiversities (Helen, *et al.*, 2016). Internationally, different legal instruments and controls have been furnished to promote law and enforcement by flag, coastal and port states control, examples of the legal instruments

include, the International Maritime Organization (IMO) convention on Marine Pollution – MARPOL 73/78 which outlines ways of elimination of intentional and unruly in discharging into the sea of oil and unhealthy or destructive substances such as chemicals, packaging materials, sewage and garbage (Annexes I,II,III,IV and V of MARPOL 73/78) (See Appendix I). These laws enacted so far and used by IMO have produced fruitful results peculiarly in the curtailment of pollution related to accidental spills due to collisions (Szepes, 2013). While marine pollution that happened from non – accidental sources uninterruptedly unabated and several port authorities have been discovered lacking as regards to the provision of the needful reception facilities (Momoh, 2013). The IMO convention of March, 1992 via its committee on marine environment adoptively approved a new law for new tanker’s vessels and the ones already in existent. In that new law of Annex 1, it is compulsory for new tanker’s vessels to possess double hull and the requisition of the new tanker’s vessels comparable to the double sides coupled with the bottom as depicted in Figure 1 and Figure 2 shows the classification of ship borne waste which may be deposited in deep sea, inland waterways or at the port due to the absence of reception facilities and the ones deposited by ships plying the Nigeria coastal waterways necessitated this study (Umo and Nitonye,2015; Ralph,1993; Akankali and Jamabo,2012; Sulton and Shun,1996; Donatus, *et al.*, 2017) . Hence, this study will limit its scope to the causes of marine pollution in Nigeria coastal waterways utilizing recognizable questionnaire approach to assess the conceivable and dependable data, and ways to reduce it will be the prime focus of this work.



Figure 1: Double Hull Tanker Vessel (Umo and Nitonye, 2015)

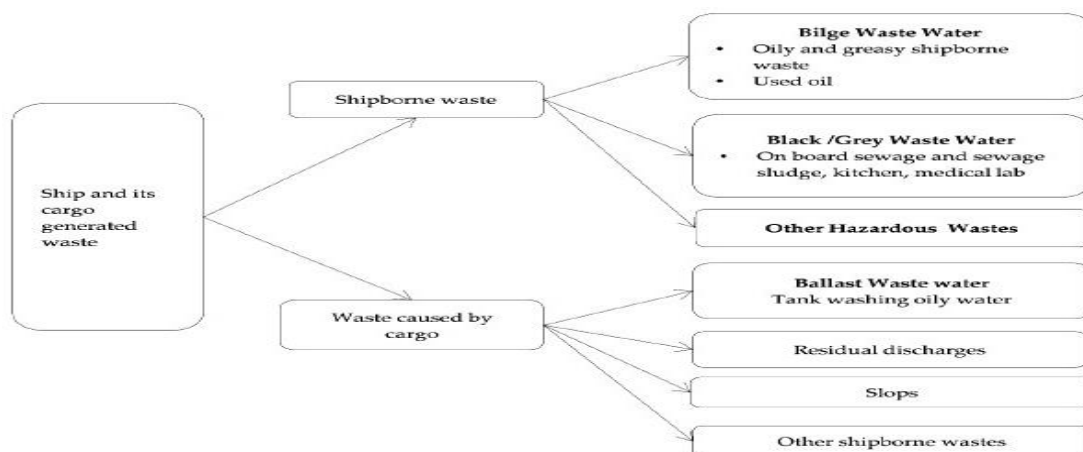


Figure 2: Categorization of Ships and Cargoes that Produced Waste in and out Port and its Waterways (Donatus, *et al.*, 2017; Wills, 2000; Patin, 1999)

2.0 Materials and Methods

The investigation which encompasses a questionnaire approachable technique was performed utilizing about twenty one questions raised which bothered on marine pollution caused by ships voyaging in the Nigeria coastal waterways. These questions were distributed to some key industry personnel who have cognition about marine pollution together with those who are working in the maritime related industries. After the survey- like questions distributions and collections, tabulation of the hypothetical response were used for the appraisal of the results. The tabulation was done in three categories which includes Table 1: The main causes of Marine Pollution; Table 3: Effects of Marine Pollution on human Health and Table 5: Palliative preventative, monitoring, and Control measures, respectively. The Table 1 entails questions of marine pollution that have to do with vessel plying on the waterways, ships' bilge, tanker vessel accident, untreated waste water discharged, garbage disposal, operational error from faulty pumps and valves as a result of oil spillage together with the organism carried into the waterways from the ballast tank. While the Table 3 comprises of questions of causes of marine pollution to human health and it has to do with how marine pollution develop cancerous diseases, the immune endocrinal system, non – compliance to IMO laws, damage of water and decrement of amenities, disturbance to fishing operation, obstruction to economic and activities of the host communities. Furthermore, Table 5 includes questions that have to do with palliative preventative, monitoring and how to control marine pollution and they are about the IMO laws for marine pollution control and prevention, strict compliance to the Annex 1, introduction of double hull tanker vessels, treatment of the ballast water, seaport reception equipment and treatment of ship sewage. In each of these tabulations, seven questions were raised and sixty respondents were required to complete it including the respondent employment details doubled with some vital personal bio data and the percentage of each of the respondents was collated and tabulated. The questionnaire was then appraised with a known statistical data appraisal technique (Lipson and Sheth, 2007). Precisely, the Excel Software was utilized to analyze the data collated and computed (see Figure 3 – Figure 8).

3.0 RESULTS

Table 1: Questions on Main Causes of Marine Pollution (Igoma, 2019)

S/N	QUESTIONS RAISED	RESPONSE		
		YES	NO	TOTAL
1.	Do ships plying on the waterways pollute the waters?	58	2	60
2.	Does ship's bilge water pollute the water ways?	59	1	60
3.	What about tanker accident, does it causes marine pollution in the waterways?	60	0	60
4.	Does discharge of waste water that is not treated causes marine pollution?	58	2	60
5.	What about disposal of garbage in our waterways?	59	1	60
6.	What about operational error caused by faulty pumps and valves that resulted to oil spilling?	60	0	60
7.	What about micro-organisms carried in the ballast tank, do they cause problem to our ecological life in the waterways?	60	0	60

Table 2: Percentage of YES/NO Reponses of the Main Causes of Marine Pollution

S/N	YES (%)	NO (%)
1	96.67	3.33
2	98.33	1.67
3	100.00	0.00
4	96.67	3.33
5	98.33	1.67
6	100.00	0.00
7	100.00	0.00

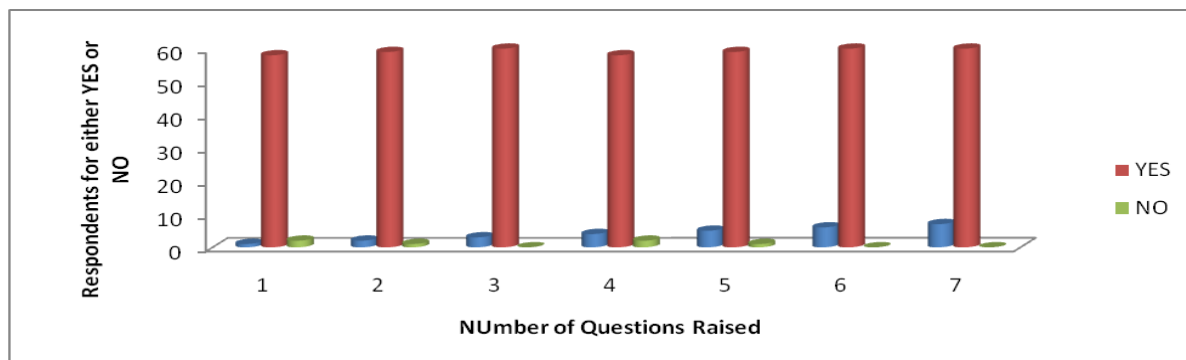


Figure 3: Bar Chart Result of the Respondents of the Main Causes of Marine Pollution

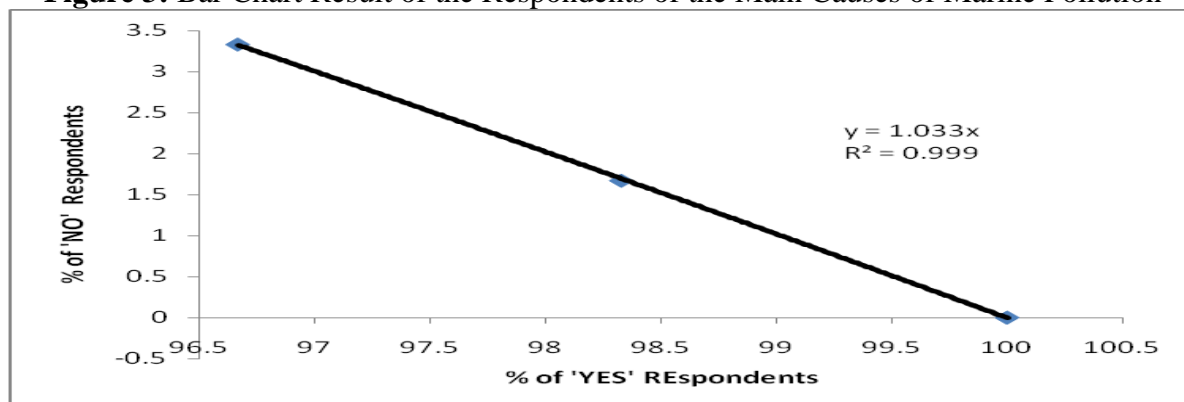


Figure 4: Correlation Graphical Representation of the Percentage of the NO/YES Respondents of the Main Causes of Marine Pollution.

Table 3: Questions on Effects of Marine Pollution to Human Health (Igoma,2019)

S/N	QUESTIONS RAISED	RESPONSE		TOTAL
		YES	NO	
1.	Does marine pollution causes development on cancerous diseases in human?	45	15	60
2.	Does marine pollution disturb the immune and endocrinal systems?	40	20	60
3.	Do non compliance o IMO laws contribute marine pollution in our waterways?	54	6	60
4.	Are the damage of water quality and the decrement of amenities as a result of marine pollution in our waterways?	56	4	60
5.	Does marine pollution obstruct fishing operational activities?	60	0	60
6.	Does pollution of marine in the waterways affects economical activities of the host communities?	60	0	60
7.	Is oil spill the most important avenue of marine pollution in our waterways?	43	17	60

Table 4: Percentage YES/NO Responses of the of the Effects Marine Pollution to Human Health

S/N	YES (%)	NO (%)
1	75.00	25.00
2	66.67	33.33
3	90.00	10.00
4	93.33	6.67
5	100.00	0.00
6	100.00	0.00
7	71.67	28.33

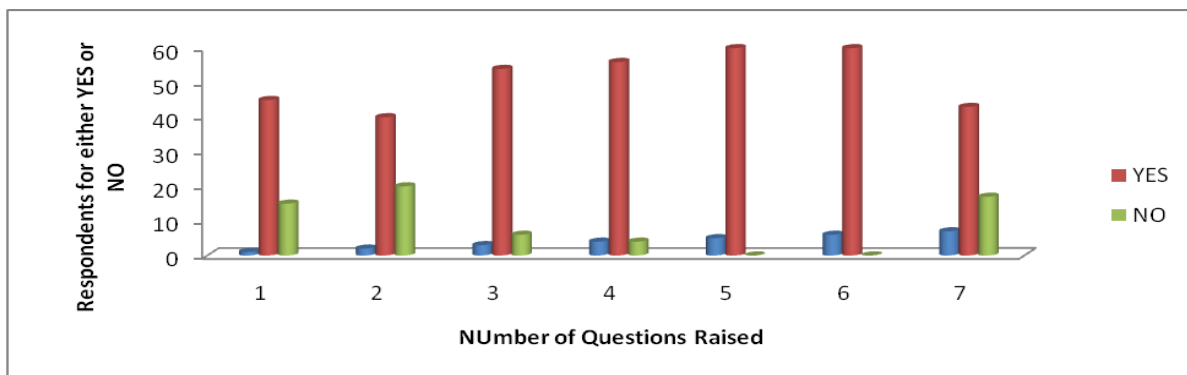


Figure 5: Bar Chart of the Result of Respondents for the Effects of Marine Pollution to Human Health

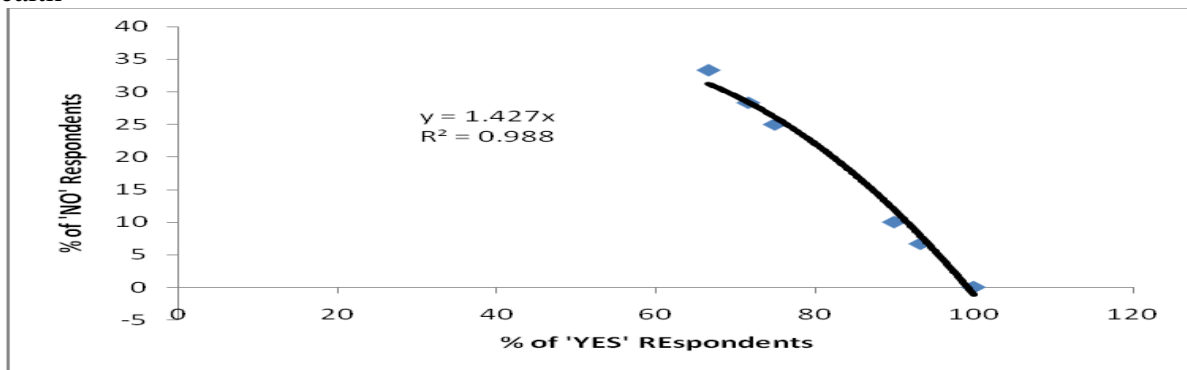


Figure 6: Correlation Graphical Representation of the Percentage of the NO /YES Respondents of the Effect of Marine Pollution to Human Health

Table 5: Questions on Palliative Preventative, Monitoring and Control Techniques of Marine Pollution (Igoma, 2019)

S/N	QUESTIONS RAISED	RESPONSE		
		YES	NO	TOTAL
1.	Does IMO have Laws guiding the control and prevention of marine pollution?	50	10	60
2.	If yes, do those laws enacted followed accordingly?	49	11	60
3.	What about Annex 1 of IMO convention, does it guarantee control of oily – water discharged?	59	1	60
4.	Does introduction of double hull tankers prevents marine pollution in the waterways?	55	5	60
5.	Does treating of ballast water save our waterways from aggressive pest that is from the ballast discharges?	50	10	60
6.	Does the seaport have reception equipment facilities?	45	15	60

7. Does treating the ship sewage help in controlling the amount of bacterial discharge into our waterways? 58 2 60

Table 6: Percentage of YES/NO Responses Response of the preventative, Monitoring and Control Techniques

S/N	YES (%)	NO (%)
1	83.33	16.67
2	81.67	18.33
3	98.33	1.67
4	91.67	8.33
5	83.33	16.67
6	75.00	25.00
7	96.67	3.33

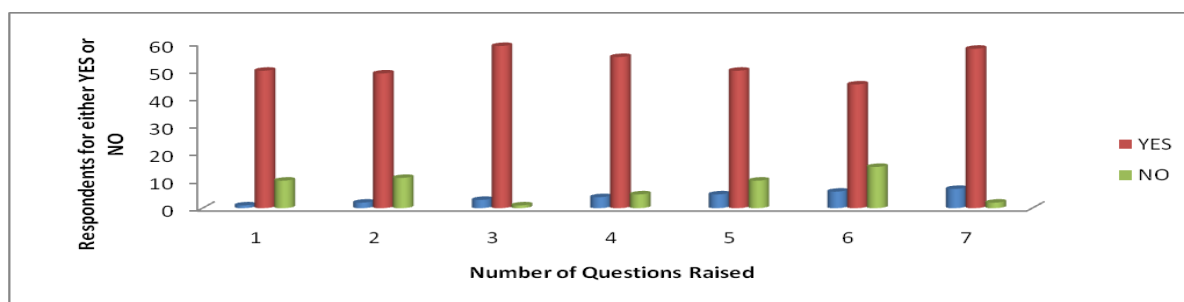


Figure 7: Bar Chart of the Result of Respondents for the Preventative, Monitoring and Control Technique.

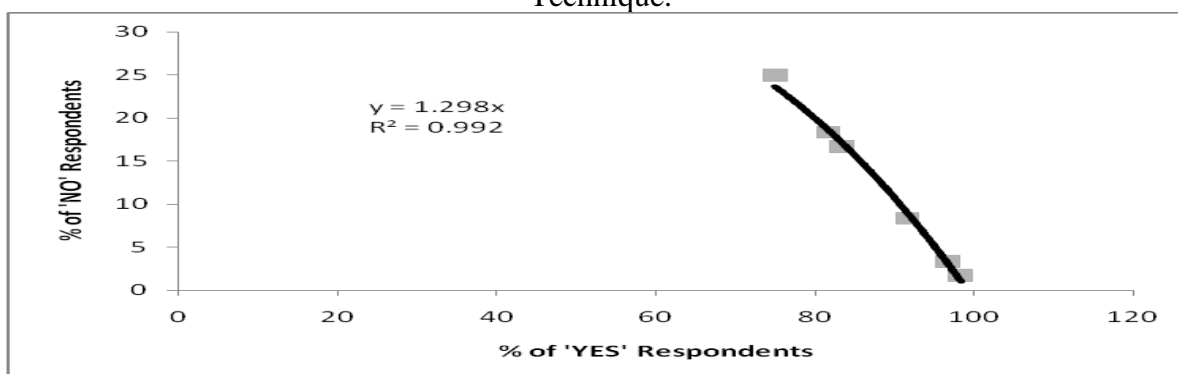


Figure 8: Correlation Graphical Representation of the NO/YES Respondents of the Preventative, Monitoring and Control Techniques

4.0 DISCUSSIONS

Figure 3 depicts a cone bar chart of the respondents for the main causes of marine pollution. **Table 1** values were utilized to derive the cone bar chart and it was found that the number responded YES is higher than the NO respondents. This illustrates further that the main causes of pollution like ship plying on the waterways pollutes the waterways and the micro – organisms found in the ballast tank also pollutes the waterways.

Figure 4 illustrates the correlation graphical representation of the percentage of the NO/YES respondents of the main causes of marine pollution. The **Table 2** values were utilized to derive the correlation curve. Using Excel Software Program, R^2 is 0.999 for the respondents for the main causes of pollution and according to statistical data; R^2 requires assurance level of 0.500 to have 95%. Since 0.500 is less than 0.999, this implies that this graph can be utilized to ascertain

the issue discussed (Lipson and Sheth, 2007). It also illustrates that the main causes of marine pollution is well known and that the preventative measures is required.

Figure 5 depicts a cone bar chart of the result of respondents for the effects of marine pollution to human health. The **Table 3** values were used to derive the cone bar chart and the chart revealed that the effect of marine pollution to human health ranges from development of cancerous diseases which have YES respondents of 40 to the obstruction of fishing operation coupled with its effect to economic activities of the host communities with YES respondents of 60 comparable to the NO respondents is well known and it need urgent proactive measures to control it.

Figure 6 shows the correlation graphical representation of the percentage of the NO /YES respondents of the effect of marine pollution to human health. The **Table 4** values were used to get the correlation curve. Using Excel Software Program, R^2 is 0.988 for the respondents for the effect of marine pollution to human health and according to statistical data; R^2 requires assurance level of 0.500 to have 95%. Since 0.500 is less than 0.988, this implies that this graph can be utilized to confirm that marine pollution really affects human health (Lipson and Sheth, 2007). Therefore, preventative measures in order to debar it are required.

Figure 7 depicts cone bar chart of respondents for the preventative, monitoring, and control technique. The values in **Table 5** were utilized to get the chart. The chart shows that the number of YES respondents is greater than the number of NO respondents signaling that there is preventative, monitoring and control measures put in place. The marine pollution may have occurred due to the poor implementation of the IMO laws enacted for various types of Marine Pollutions and lack of reception equipment facilities at our various seaports.

Figure 8 illustrates the correlation graphical representation of the NO/YES respondents of the preventative, monitoring, and control techniques. The **Figure 8** was derived from the values of **Table 6**. Applying Excel Software Program, R^2 is 0.992 for the respondents for the preventative, monitoring, and control technique and according to statistical data; R^2 requires assurance level of 0.500 to have 95%. Since 0.500 is less than 0.992, this implies that this graph can be utilized to confirm the aforementioned technique (Lipson and Sheth, 2007). This also shows that stringent measure to ensure strict compliance to the IMO laws enacted is needed.

5.0 CONCLUSION

The assessment of the causes of ship generated marine pollution in Nigeria coastal waterways has been studied utilizing a dependable questionnaire data based approach. The results obtained from dependable Excel Software Program analysis shows that the issue discussed is true. This proves that the ship plying the Nigeria coastal waterways really pollutes the waterways. Therefore, the need for proper implementation of the IMO laws enacted at the respective conventions for various classes of marine pollutions is needed

ACKNOWLEDGEMENTS

The authors wish to acknowledge the support of NIMASA and NPA staff of the Apapa branch for their immense supply of information and assistance.

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APPENDIX I

MARINE POLLUTION 73/78 CONVENTION ANNEXES (Wikipedia, 2020)

Annex	Title	Entry into Force	Number of Contracting Parties/ States	Percentage (%) of the World Tonnage
I	Prevention of Pollution by Oil and Oily Water	2 nd October, 1983		
II	Control of Pollution by Noxious Liquid Substances in Bulk	6 th April, 1987		
III	Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form	1 st July, 1992	138	97.59
IV	Pollution by Sewage from Ships	27 th September, 2003		
V	Pollution by Garbage from Ships	31 st December, 1998		
VI	Prevention of Air Pollution From Ships	19 th May, 2005	72	94.70

ABBREVIATIONS USED

1. MMMHQ Modifier, Modifier, Headword, Qualifier
2. SPC Subject, Predicate, Complement\
3. SPA Subject, Predicate, Adjunct
4. SPCA Subject, Predicate Complement, Adjunct

The above abbreviations are used in systemic linguistics as Butler C.S (1985) shows.

Figure 1. Page 65