
A STUDY ON THE CAUSES AND EFFECTS OF MARINE POLLUTION

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ABSTRACT

Nowadays the ocean is undergoing numerous environmental issues that ultimately lead to marine pollution. Marine pollution is a very serious threat to the environment that most of the countries of the world encounter. One of the major causes of marine pollution is considered to be Aquatic littering. The misleading use of the marine environment has an extreme impact on marine life and ecosystems. Moreover, the total amount of debris and toxins discharged by human beings is incredibly increasing day by day in today's world. Most of the waste produced on land is either unconsciously or intentionally discharged into the oceans. Marine pollution and aquatic debris can destroy the oceans and entirely wipe out the marine creatures. The main objective of the study is to know the effects of marine pollution. The researcher has followed the empirical research method using a convenient sampling method. The size of the sample taken for the study was 200. The dependent variables are causes of marine pollution, effects of marine pollution, awareness about aquatic degradation and the independent variables are age, gender and educational qualification. The research tools used here are pie charts and complex bar charts. The researcher concluded that the impacts of marine pollution are a serious threat not only to humans but also to each and every fauna and flora in the marine ecosystem. Governments of every country should come up with an alternative planning of resources for the disposal of the wastes and other aspects in order to maintain the prosperous lives of aquatic living beings.

Keywords: Marine pollution, Ocean debris, Plastic swarms, Oil spills, Waste disposal

INTRODUCTION:

Marine pollution is one of the growing concerns in today's world. Our ocean is being overflowed with two major types of pollution, chemicals and wastes. Chemical contamination or nutrient pollution is a major concern for health, environmental, and economic reasons. This pollution occurs because of human activities, especially the use of fertiliser on farm lands, which lead to the runoff of chemicals into water bodies that eventually flow into the ocean. The increased dumping of chemicals, such as phosphorus, nitrogen and other organics, in the ocean promotes the algal growth, which can be dangerous to wildlife and humans. Marine trash is composed of all manufactured products (i.e) the plastic that ends up in the ocean. Littering in and around the shores, heavy storm winds, and improper waste management all contribute to the accumulation of such debris. Over 80 percent of debris comes from the sources on land. Most common types of marine debris include various kinds of plastic materials like beverage bottles and cans, shopping bags along with food wrappers, and fishing gear. Because of their long lasting nature, plastic wastes are particularly problematic as a contaminant as they can take hundreds of years to decompose. This trash poses a serious problem to both humans and marine ecosystems. Marine creatures often get tangled into such debris and sometimes injured and some marine creatures mistakenly consider these wastes like plastic bags as food and eat them. Small organisms in the ocean feed on tiny bits of broken-down plastic, called microplastic, and absorb the chemical factors from the plastic into their biological system. The traces of such micro plastics can be seen in the planktons and other microorganisms of marine ecosystems. When small organisms that feed on microplastics are eaten by larger species, the toxins also get transferred to them. This leads to microplastic pollution migrating up the food chain and indirectly getting part of the food that humans eat regularly.

The effective solution for marine pollution includes Ocean cleanup and prevention. Disposable products and single- use plastic are largely used in today's society, from food bags to shipping packaging to plastic bottles. Changing society's approach to plastic use will be an economically gruelling process. Cleanup, on the other hand, may be ineffective for some wastes. Many types of debris which contain plastics don't float, they will get accumulated in the ocean floor. Plastic wastes that do float tend to collect in large "patches" in ocean ringlets. The Pacific Garbage Patch is one illustration of an ocean gyre between California and Hawaii in an area of about 1.6 million square kilometres, although its size isn't yet fixed. These patches are substantially like small islands of trash and, as the National Oceanic and Atmospheric Administration says, they are more like "minute microplastic pepper swirling around an ocean soup". Marine

plastics are choking the lives of our oceans, the International Union for Conservation of Nature (IUCN) revealing that over 8 million tons of plastic end up in the oceans every year, having a destructive effect on marine life, mortal health as well as climate change impacts. The top 5 countries with highest marine pollution:

S. NO	LIST OF COUNTRIES	AMOUNT OF PLASTIC DISPOSED IN THE OCEAN (IN KGS)
1.	India	126.5 million kg
2.	China	over 70.7 million kg
3.	Indonesia	56.333 million kg
4.	Brazil	38 million kg
5.	Thailand	22.8 million kg

Source:ciwem.org

AIM:

The aim of the research is to find out the realisation of causes and effects of marine pollution among the public.

OBJECTIVES:

- To find the realisation of cause of marine pollution among the people
- To examine the realisation of critical consequences of marine pollution among the respondents.
- To find the solution to mitigate marine pollution with the aid of public opinions.

LITERATURE REVIEW

Satir T (2008) the author has analysed Shipping moves over 80% of the world's commodities and transfers approximately 3–5 billion tons of ballast water internationally each year. This paper provides 10 dangerous ballast water organisms in the oceans. The author analysed

different solutions for prevention of ship ballast water pollution for our region. **Yen-Chuang Chang (2010)** The author has discussed the historical background, structure and enforcement of the '2009 Hong Kong International Convention on the Safe and Environmentally Sound Recycling of Ships.' The Convention also controls the communication and exchange of information procedures, establishes a reporting system to be used upon the completion of recycling, and outlines an auditing system for detecting violations. The Convention, however, also contains some deficiencies. This paper concludes that these deficiencies will influence the final acceptance of this Convention by the international communities and organisations. **D. E. Onwuegbuchunam (2017)** This paper authors have mentioned that the ship generated waste control services and provision of waste reception facilities. The author collected the samples from randomly selected ships at berths in various seaport locations. **Michael Tsimplis (2017)** The author has stated through this research that the shipping industry played a leading role in the development of the new law, and in several circumstances overtook the international legal negotiations by establishing innovative schemes. Apart from the impact on the marine environment, shipping affects the atmospheric environment through engine emissions of harmful gasses and particles. **Francis K Wiese (2003)** The results show that Oiling rates correlative with weather patterns and degree of the regional murre hunt, indicate that outlawed marketing of oil might occur year round, and show that it's crucial to assess all potential environmental and anthropogenetic factors influencing the amount of fresh and oiled dead birds found on beaches before inferring trends in oiling rates over time. **John Bywater (1995)** The analysis is based on government response on pollution from ships, the Marine Pollution control Unit (MPCU) is the competent national authority for discharging the Secretary of State for Transport responsibility for pollution from ships under the prevention of Oil Pollution Act 1971 and succeeding legislation covering alternative venturous substances. **Shangao Xiong (2015)** This research is about historical trends about marine ship-source oil spill incidents. The author analysed the oil spills incidents from 1990 to 2010 in China and provided an overview of China's management in response to marine oil spills from ships. **Paul V Horsman (2005)** The author has Researched the content of ships' waste analysed on two cargo ships. The results show a large quantity of unnecessary garbage pollution by ships. The disposal at sea of plastic materials, and of all garbage except food waste in certain special areas, is against the Inter-Governmental Marine consultative Organization (IMCO) 1973 laws. Ships are ignoring these laws. the garbage will be a hazard to man and wildlife, apart from being aesthetically unpleasent. it's suggested that more responsibility be put with the shipping firms, owners and suppliers to prevent this pollution. **M. Srinivasa Reddy (2006)** This study aimed to assess the

accumulation of tiny plastic junk in the seashore sediments of the world's largest ship-breaking yard at Alang-Sosiya, India. Small plastic fragments were collected by flotation and separated according to their basic polymer type under a microscope, and subsequently identified by FT-IR spectroscopy as polyurethane, nylon, polystyrene, polyester and glass wool. Overall, there were on average 81 mg of small plastic fragments per kg of sediment. The delineated plastic fragments are believed to have resulted directly from the ship-breaking activities at the site.

Alam, M.W Xiangmin (2005) The research is about After the permanent demarcation of maritime boundary with Myanmar and India, the Bangladesh government has emphasized on development of marine resources for enhancing its economy. As of now, Bangladesh has no ocean governance or policy to protect the marine resources from any contamination. This paper provides a comprehensive policy framework for marine pollution control in Bangladesh with the extensive analysis of national and international legislation.

Bhagwan N (2015) This paper reports the impact of oil spills and aquatic pollution on the coastal ecosystem of Goa. The analysis included the factors responsible for degrading the marine ecosystem of the Goan coastline. This had a huge impact on Goa's economy through a decline in tourism revenue. The government must adopt necessary preventive measures to restore Goa beaches and the surrounding coastal areas.

Alexander M. Goulielmos (2000) Presents the status of public policy on protecting ports and ships and describes Greek law and practice regarding combating ship fires. The author believes that a neglected topic is the protection of the port sea environment, a problem which made ESPO (European Sea Ports Organizations) create a code of practice for protecting the port environment.

Julián Blascoa (2014) has analyzed the working of the Large ships, particularly container ships, tankers, bulk carriers and cruise ships as significant individual contributors to air pollution. Emissions from ships are mentioned explicitly in the list of pressures and impacts that should be reduced or minimized to maintain or obtain a good ecological status. Research focuses on the quantitative and qualitative determination of pollutant emissions from ships and their distribution and fate.

Anbuselvan N (2018) this study investigates the distribution of heavy metals (Fe, Cd, Co, Cr, Cu, Ni, zinc and Pb) in the surface sediments on the Coromandel Coast of Bay of Bengal as an indicator of marine pollution. The heavy metal concentration in the study area is closely related to grain size and organic matter. However, sediments are found to be extremely contaminated with relation to Cd and lead. correlational analysis reveals that the accumulation of those heavy metals in the shelf sediments because of thanks to anthropogenic inputs from the adjacent area.

Federico Demaria (2010) The researcher states that More than 80% of international trade in goods by volume is carried by sea. he shipping business constitutes a key part in the

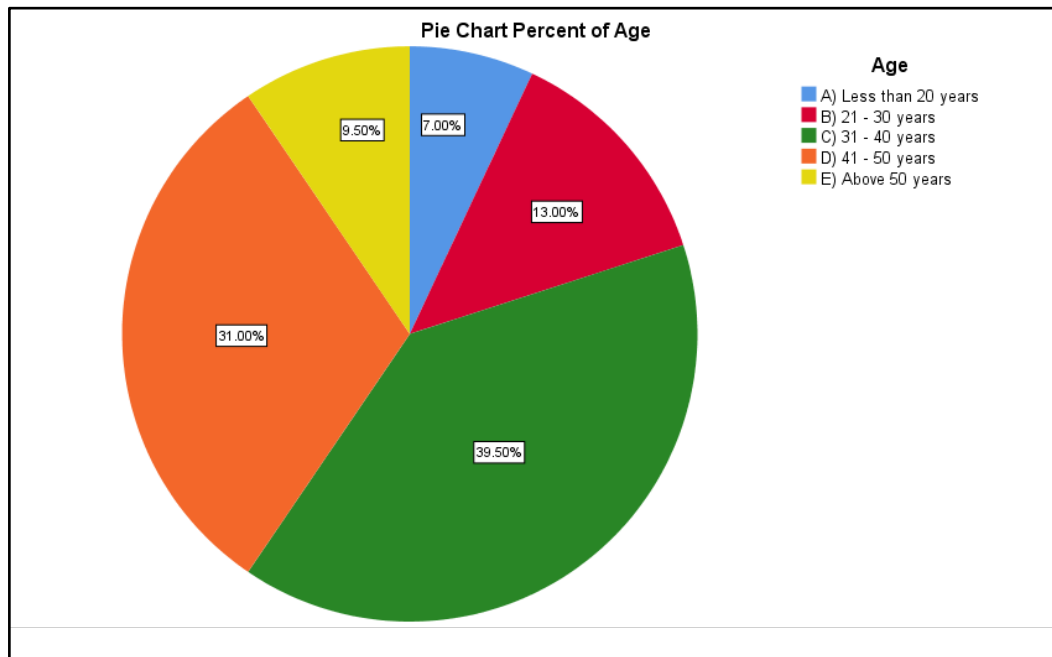
infrastructure of the world's social metabolism. Ocean-going ships are owned and used for their trade by developed countries however are often destroyed, along with their but materials, in developing countries. **Suman Barua (2018)** This research summarizes the current state of knowledge on the environmental exposure of hazardous materials from SBRI, to evaluate the risks related to the dismantling of EOL ships on open beaches. The economic dynamics behind open beaching, and allocation of responsibility for hazards related to it, are discussed, so as to come up with policy and legal recommendations to mitigate the environmental damage stemming from this business. **MD Nurul Amin (2017)** The research has mentioned people practicing open defecation in south Asia. As a result, a lot of human waste containing nutrients such as nitrogen (N) and phosphorus (P) enter rivers. Rivers transport these nutrients to coastal waters, which leads to marine pollution. . R. S. Kara in Environmental sensitivity mapping and risk assessment for oil spill along the Chennai Coast in India (May 2016) A scenario-based risk assessment and sensitivity indexing were performed for the Chennai coast by integrating a coastal resource system and an oil spill trajectory model. The results of sensitivity mapping and therefore the risk assessment results will facilitate organizations take measures to combat oil spills in a very timely manner. **Zakir Ali Ansari (2002)** The research is about Short and long term effects of a “M V Sea Transporter” a grounded ship which caused fuel oil spill on meiofauna of a sandy beach of central West Coast of India were investigated. As a result , it has been found that the presence of other environmental factors acting strongly, the effects of oil on meiofauna was strong but of a temporary nature. **Saima Naz (2021)** The research is based on Four oil spill events over the Indian Ocean including Sharjah, Mubarak Village, chennai and Al Khiran are analyzed using Sentinel-1 satellite data. The author concludes that SAR based oil spill detection is a cost-effective technique and can be utilised for mapping of oil spills.

METHODOLOGY:

The method used here was the empirical method. The sampling method used here was the convenient sampling method and the sample size was 200. The sampling frame was set within Chennai, Tamil Nadu. The dependent variables are the causes of marine pollution, effects of marine pollution, awareness about aquatic degradation and the independent variables are age, gender, educational qualification, salary and occupation. The research tools used here are simple bar charts and correlation tests .

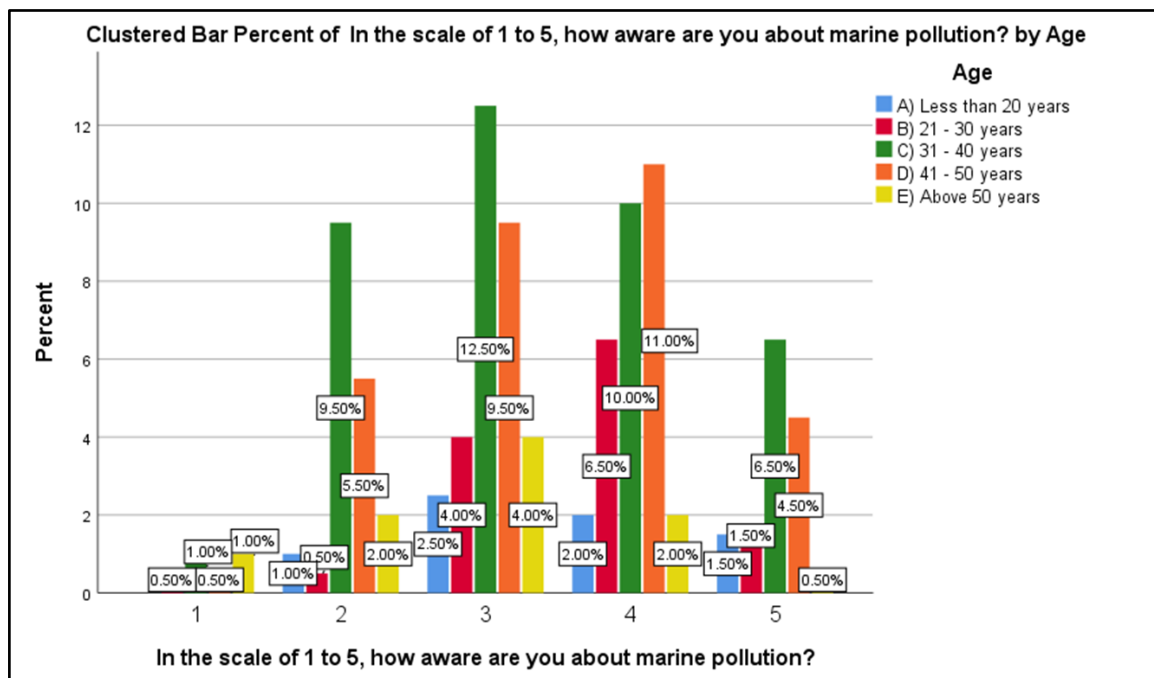
ANALYSIS:

FIGURE - 1



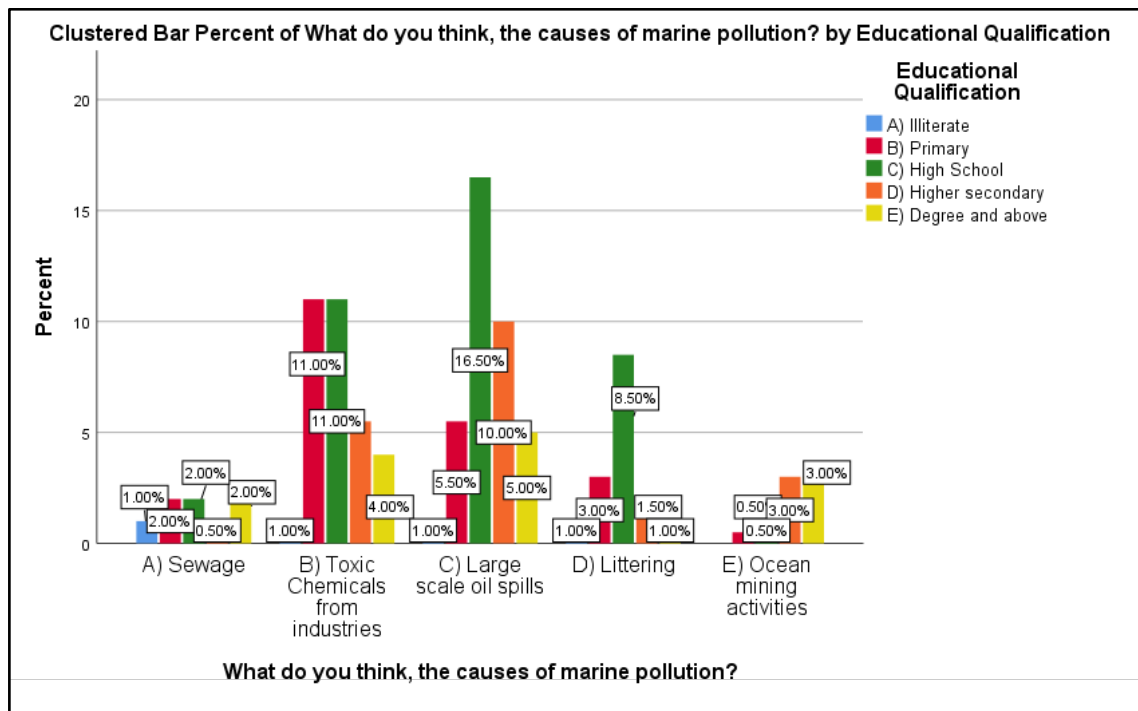
LEGEND: Figure 1 , shows the age distribution of the survey respondents.

FIGURE -2



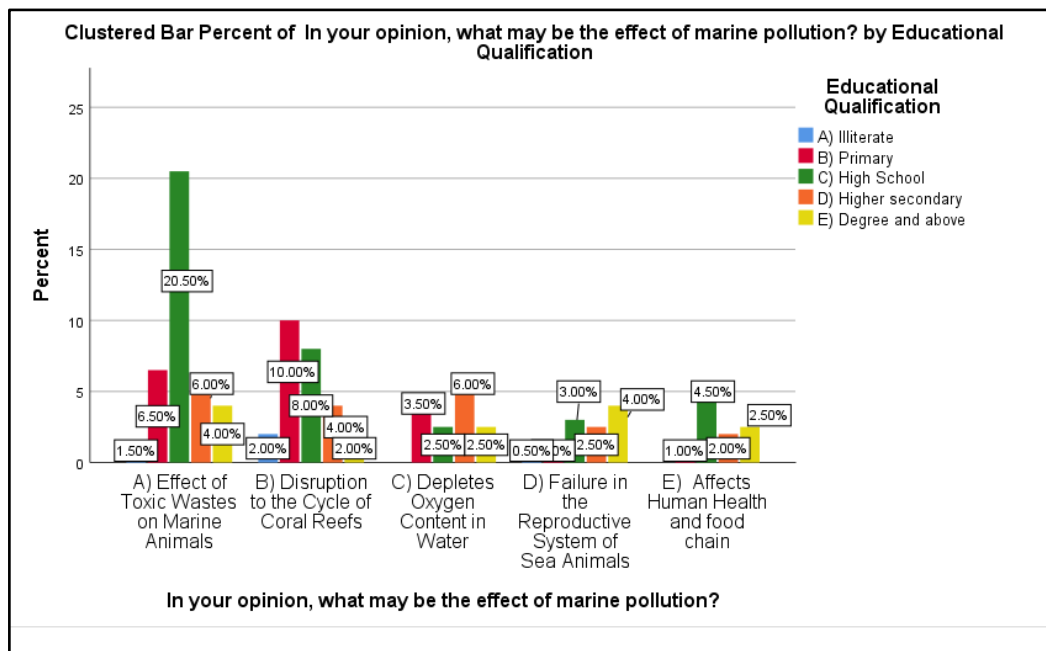
LEGEND: Figure 2, shows the opinion of survey respondents on how aware they are about marine pollution.

FIGURE - 3



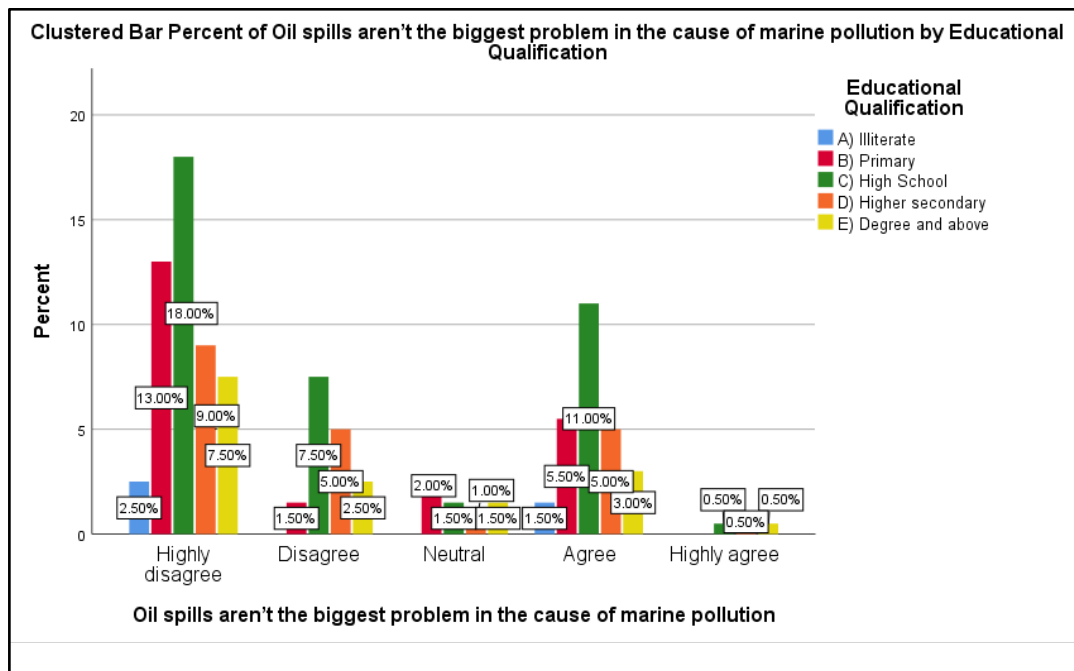
LEGEND: Figure 3, shows the opinions of survey respondents on the causes of marine pollution based on educational qualifications.

FIGURE - 4



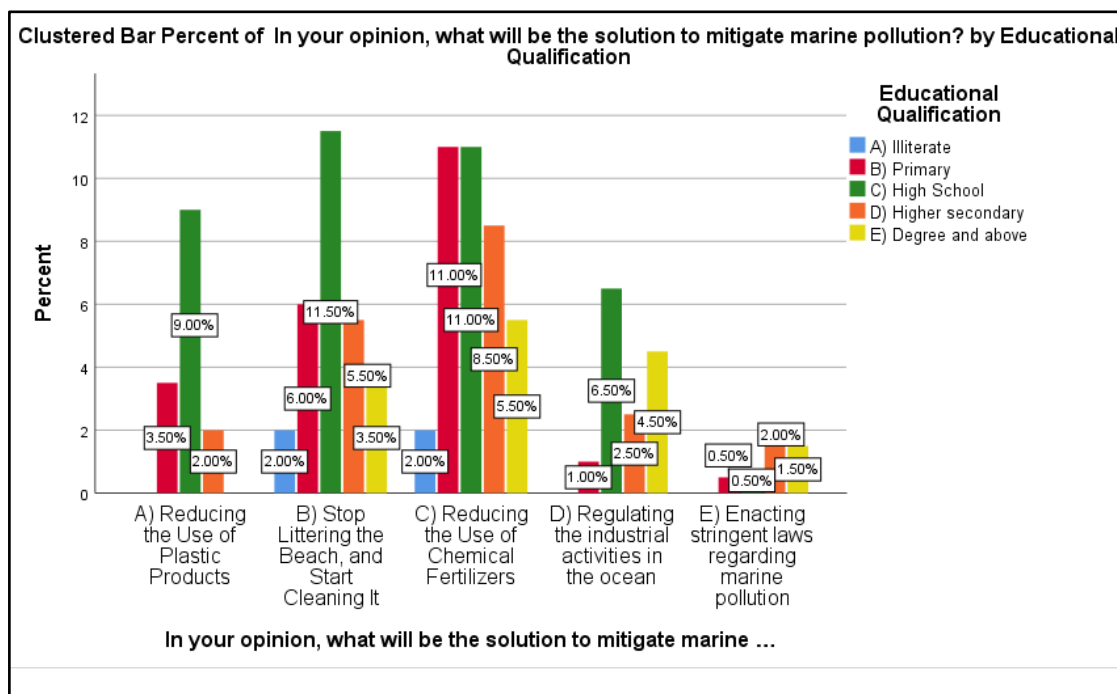
LEGEND: Figure 4, shows the opinion of survey respondents on the effects of marine pollution based on educational qualification.

FIGURE - 5



LEGEND: Figure 5, shows the opinions of survey respondents on whether oil spills are the biggest problem in the cause of marine pollution or not based on educational qualification.

FIGURE - 6



LEGEND: Figure 6, shows the survey respondents' opinion on the solution to mitigate marine pollution based on educational qualification.

RESULT:

In **Figure 1** it shows the responses of different age groups. In this the highest responses from the age category of 31-40 years have responded to the questionnaires at large. In **Figure 2** it shows the responses from the different age groups for the questionnaire regarding the awareness about marine pollution. In this the highest responses from the age category of 31-40 years have responded as 3, which is Neutral. In **Figure 3** it shows the responses based on educational qualification for the questionnaire regarding the major cause for marine pollution. In this the highest responses from the category of High school have responded as Large scale oil spills. In **Figure 4** it shows the responses based on educational qualification for the questionnaire regarding the major effect of marine pollution. In this the highest responses from the category of High school have responded as Effects of toxic waste on marine animals. In **Figure 5** it shows the responses based on educational qualification for the questionnaire that the oil spills are not the biggest problem for marine pollution. In this the highest responses from the category of High school have responded as Highly disagree. In **Figure 6** it shows the responses based on educational qualification for the questionnaire regarding the solution to mitigate marine pollution. In this the highest responses from the category of High school have responded as Stop littering on beach and start cleaning it.

DISCUSSION:

The respondents from the different age category have expressed their view regarding the awareness about marine pollution. In this the highest responses from the age order of 31- 40 times have responded as 3, which is Neutral. As the repliers are having lower knowledge regarding the causes and effects of marine pollution which not only have adverse impact on marine creatures but also have an impact on the human body. This made the respondents to respond as 3 which is considered as Neutral opinion regarding the awareness level about marine pollution (**Figure 2**). The respondents from the different education qualifications have expressed their view regarding the major cause for marine pollution. In this the highest responses from the category of High school have responded as Large scale oil spills. Oil spills on the surface of the seas and ocean is very dangerous to many aquatic creatures because it prevents passing of sufficient quantities of sunlight into the ocean and it also reduces the level of oxygen level in the ocean . Crude oils have an adverse impact in losing the waterproofing properties of feathers and fur, which affects the animals coated with oil to die from critical diseases like hypothermia. This made the respondents to respond to oil spills as a major cause

for marine pollution (**Figure 3**). The respondents from the different education qualifications have expressed their view regarding the major effect of marine pollution. In this the highest responses from the category of High school have responded as Effects of toxic waste on marine animals. The poisonous waste materials released in the form of pesticides, fertilisers, and other chemicals used on farms had an adverse impact on the marine animals as it polluted the nearby rivers which flows to the ocean. It can be a risk for loss of marine life in bays and estuaries which leads to the creation of dead zones. When one organism is affected due to the toxic waste materials it can also end up in destroying an entire food chain of submarine life. This made the respondents respond to effects due to toxic waste on marine animals as a major effect on marine pollution (**Figure 4**). The respondents from the different education qualifications have expressed their view regarding the questionnaire that the oil spills aren't the biggest problem for marine pollution. In this the highest responses from the category of High school have responded as Highly disagree. Oil destroys the separating capability of fur-bearing mammals, such as sea otters, and the water repellency of a bird's feathers, therefore exposing these creatures to the harsh elements. The birds and mammals will die from hypothermia by losing the ability to repel water and insulate from the cold water. Oil spill can also lead to damage of the food chain which includes human food resources. This made the respondents to respond as highly disagree to the statement that the oil spills aren't the biggest problem for marine pollution (**Figure 5**). The respondents from the different education qualifications have expressed their view regarding the solution to mitigate marine pollution. In this the highest responses from the category of High school have responded as Stop littering on beach and start cleaning it. The mentality should come to every individual who are living in earth that the earth isn't only meant to be used by the human beings there are other species which are extinct and going to be extinct due to the activities of them, so to protect the environment and to maintain the ecosystem the people should stop littering the waste materials on beach mainly the plastic materials and it should be cleaned at regular intervals to protect the environment from marine pollution (**Figure 6**).

LIMITATIONS:

The sampling method followed in this study is a convenient sampling method. The study is unable to collect data sufficiently due to the reduced geographical arena. Since the study is restricted to the territory within Tamil Nadu and therefore the conclusion derived by average is not perfectly accurate. Since the study collected responses from the general public at large, the findings are mostly based on generalised opinion rather than legal or scientific background.

CONCLUSION:

Based on the study, it can be concluded that many respondents are aware about the problems of marine pollution. It can be also concluded that large scale oil spills are the ultimate cause of marine pollution followed by toxic chemical discharges from the industries. Survey respondents have opined that the effect of toxic waste on marine mammals is the vile impact of marine pollution and many respondents opined that reduction in the use of chemical fertilisers will be the solution to mitigate marine pollution followed by stoppage of littering in and around the seashore. At last, the study concludes that there is a strong need to implement policies and action plans to control marine pollution and to protect marine resources in order to maintain a sustainable ecosystem.

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