



The Impact of awareness about environmental hazards caused by plastic pollution, on the attitude towards governmental ban on single use plastic products among adults in the Indian City Chennai and its suburbs

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Abstract

Single use plastic products are cheap, easily available everywhere and easy to use which has made it very popular among the people in all the strata of the society. But nearly all of it are discarded within 24 hours of its use in an irresponsible manner which has resulted in these products becoming the biggest threat to the environment and biodiversity. Creating awareness about the hazards of plastic pollution does not seem to curtail the use of single use plastic products or the way it is discarded. Now many governing bodies have resorted to banning the production sale and use of plastic products which are highly dangerous to the environment. This study aimed at understanding the relationship between awareness about plastic pollution and attitude towards the governmental ban on single use plastic products among the adult residents of Chennai and its suburbs. 172 adults 77 male and 95 females selected through random sampling method took part in the study. The data was collected using a questionnaire developed for the purpose and analyzed using data analysis component of MS office 2013. The results showed that there is significant relationship between the level of awareness about plastic pollution and the nature of attitude people towards stringent actions of the government to safe guard the environment.

Key words: Plastic Pollution, Single Use Plastic Product, Awareness, Attitude, Environmental Hazard

Introduction

The invention of plastic which was considered as a viable alternative to wood, metal and other biodegradable materials, a product which can minimize the use of fast depleting natural resources and a solution to the safe guard the environment of its bio-diversity. But now the same plastic became the biggest threat to the environment. The ease of production and durability of the product which was considered as a boon had led to its indiscriminate production in all forms. Now the plastic products has

become an inseparable part of everyday life. Human beings have developed dependency on these plastic products to the extent that even after they understand the harmful effect of plastic they find it difficult to avoid unnecessary use of it every day in some form or other. Today the pollution created by discarded plastic materials is becoming the key challenge for everyone who is working towards protecting the environment.

In the past 65 years, the annual production of plastics increased nearly 200-fold to 381 million tons in 2015 which is roughly equivalent to the mass of two-thirds of the world population. Today the maximum quantity of trash in our water bodies especially oceans, is the non-biodegradable plastic. The same is the case with land also. The plastic pollution is fast becoming an unmanageable environmental crisis. This crisis has developed primarily due to irresponsible discarding of single use plastic materials.

Single-use plastics, are mostly the ones which are disposed usually after their one time usage after which they are either thrown away or recycled. These include grocery carry bags, food packaging containers, water and other beverage bottles, straws, storage containers, disposable cups and cutlery. Packaging is the largest single sector in which plastic use is rampant in India. Plastic packaging is mostly single-use, especially in business-to-consumer applications, and a majority of it is discarded immediately after its use is over at the most within the same year it is produced.

According to a recent report by International Coastal Cleanup Report 2017 the most common finds during international coastal cleanups are, in order of magnitude, cigarette butts, plastic beverage bottles, plastic bottle caps, food wrappers, plastic grocery bags, plastic lids, straws and stirrers, glass beverage bottles, other kinds of plastic bags, and foam take-away containers (International Coastal Cleanup Report 2017). Single-use plastics in general was the highest find both in terms of volume and products. If this be the case in coastal region then the possibility of finding plastic waste in inland can be either equal or higher. According to Geyer Et al in 2015, plastic packaging waste accounted for 47% of the plastic waste generated globally, with half of that appearing to come from Asia (Geyer Et al 2017) and according to recent estimates, 79% of the plastic waste ever produced now sits in landfills, dumps or in the environment, while about 12% has been incinerated and only 9% has been recycled (Geyer Et al 2017).

Plastic bags and foamed plastic products seem to be perceived by governments as the most problematic single-use plastics, given their easily observable presence in

the environment, such as windblown bags clinging onto fences or trees or floating in rivers (UNEP 2018).

Plastics pose significant hazards to wildlife both on land and in the ocean. Indiscriminately discarded of plastic materials, particularly plastic bags, have been found in the respiratory passages and stomachs of hundreds of different species. Plastic bags in the ocean are often ingested by turtle's whales and dolphins who mistake them for food. There are some researches which suggest that evidence that the toxic chemicals added during the manufacturing of plastics transfer from the ingested plastic into the animals' tissues, eventually entering the food chain and humans as well. When plastic breaks down into micro plastic particles, it becomes even more difficult to detect and remove from the open oceans.

Poor waste management systems by civic bodies also play an important role to play. The major drawback in India is the lack of scientifically designed disposal units for the disposal of municipal solid waste. The biodegradable and non-biodegradable materials are not even segregated before it is dumped in the dump yard. The dump yards are usually open spaces where either is gets buried or left as it is. Such dumping practice is common in India, which can be due to the lack of awareness in the people who are involved in disposing these waste, the lack of availability of land which can be used to discard the enormous amount of wastes generated from our households and surrounding areas, lack of willingness to invest in build scientifically designed dump yards and sometimes due to lethargic attitude of the private contractors engaged in clearing the waste. If the solid waste is dumped at the current rate, 1,240 hectares of land would be required every year as a landfill site (Illangaovan et al, 2018) In India, solid waste generation per capita varies from 0.17 kg/person/day in small towns to roughly 0.62 kg/person/day in mega cities (Kumar Et al, 2009). Most of the single use plastic discarded in the open place be it dump yards of other places after a period of time degrades into its smaller components which gradually penetrates into the soil and the water table, ultimately making its way towards the food chain and causing massive health hazards. Some organizations and civic bodies has taken measures to improve the waste management system by providing separate bins for non-biodegradable waste and organic waste. But all these are limited to the urban sector. Moreover strict compliance is never monitored which has limited the success rate of such programs.

One of the best ways to contribute to environmental preservation is to reduce the use of single use plastic products. While the unscientific approach towards waste

management has its own role in making single use plastics an environmental hazard the Irresponsible individual behavior also is the other major reason for Single-use plastics ending up littering the environment. While the lack of awareness about the hazardous nature of plastic does have a role, the callous approach by people who are have all the knowledge about the impact of plastic on the environment seem to be disheartening. A number of individuals, NGOs and government organizations have been taking various initiatives in creating awareness about the harmful effects of Plastic. The print, television and social media have also taken proactive measures to spread awareness of plastic pollution among the public. Some civic bodies in Tamilnadu had even announced the incentive schemes for collecting the plastic waste. The Maraimalar nagar Municipality in the suburbs of Chennai in 2012 had announce an incentive scheme where 1 gram gold coin was given to anyone who collect 125 kg of plastic bags below 40 microns (Manikandan.K 2013). In an initiative by the Tiruchirappalli corporation residents who are appropriately segregating the domestic trash by separating the degradable and non-degradable wastes were asked to send a picture of their waste collection strategy to the civic body's official WhatsApp account and the best one person was chosen every week and a gold coin was rewarded to them. But there is no data related to the success of such schemes in creating awareness or limiting the pollution by single use plastics

Creating social awareness and education can help in shaping a positive the consumer behavior and encourage eco-friendly approach the transformation can only be gradual. The longstanding habituated behavior of spontaneous choice for single use plastic materials cannot be changed by brief stand-alone training programs or awareness campaigns consistent positive reinforcement for judicious responsible use of plastic, curtailing waste generation and prevention of littering can help in the long run. But for immediate result stringent measures to curb the use of plastic along with the latter approach can only produce the best results. Possible legal solutions in this context could include the introducing charge for plastic bags, encouraging the use of alternative bags, imposing special taxes on their use, organizing awareness programs in schools and community centers, adding the topic on the harm done to the environment by single use plastic products in the curriculum, providing mass awareness program through the media regarding the use of plastic bags and effective ways of disposing plastic bags.

Observing the alarming rate at which the plastic waste is accumulating and the rapidity at which the damage to the eco system is happening many governments have

adopted stringent measures to curb the exploitation of single use plastics. Some of the measures include partial to complete ban on single use plastics, levy on producers, suppliers retailers and consumers and even stringent punishment producing specific and using some of the single use plastic material. Many states in India have also adopted such measures to curtail the menace caused by single use plastic products. One the most recent state in India which has adopted such stringent measures is the state of Tamilnadu. The ban which came into existence from January 1st 2019 was initially welcomed by a good percentage of population. But as they began to experience the practical difficulties associated with the limitations of the use of single use plastics which they had been habituated to. In a study by Jayaraman et al on the use of plastic bags, which are solid waste disposal and food safety It was established that consumers were unperturbed by public campaigns against the use of plastic bags and the government did not have any effect on reducing the use of plastic bags to parcel hot edible items (Jayaraman et al. (2011).

Eco-friendly behavior, which is necessary to reduce carbon dioxide emission, is the individual's support of bans imposed by authorities or retailers to reduce the use of plastic bags and any innovative approaches that are adopted (Bamberg et al. 2003; Heath and Gifford 2002) and consumers who are environmentally conscious and feel the social pressure, tend to reduce the use of plastic bags and switch to using cloth bags. (Erkan Arı et al 2017)

Aim and significance of the current study

The aim of the current study is to verify whether there is any relationship between the level of awareness about the hazards of single use plastics and the attitude towards plastic ban among the adult married members of the family who usually rely on single use plastic products in their day to day life extensively.

There have been very limited studies related to the attitude of people towards strong measures by the government to protect the environment. Proper studies related to attitude of the people can only help in determining the effective ways in which such measures can be implemented and also make the people themselves as partners in the move there by achieving the real objective of such moves. Such studies also help in understanding the presence of any negative attitude among the public towards such move which can lead to resistance that can create hurdle in the implementation. If any negative attitude is found to be present then sufficient intervention programs can also be planned and executed to ensure to generate full support and participation of the public.

Materials and Methods

Since the present investigation is aimed to study the relationship between awareness about plastic pollution and attitude towards ban on single use plastic products it is of correlation type. The sample consisted of all adult population in Chennai who have been habituated to use single use plastic products especially plastic bags for every day purchases. The participants (172 individuals; 77men and 95 women) among the adult person in the family who had the primary responsibility for purchasing every day requirements of the family, were chosen using random sampling method.

The data was collected using questionnaire, developed for the purpose. It has 3 parts. The first part was demographic data. The second part had 6 questions to assess the awareness about the nature of hazards pollution caused by single use plastic and the third part had 6 questions to assess the attitude towards governmental ban on single use plastic. The responses were assessed using a 4 point scale with 4 points if the response is “A Lot” 3 points for “A fair amount” 2 points for “very little” and 1 point for “practically nothing”. The content was analyzed by experts for validity and necessary changes done before the questionnaire was administered to the public

A Tamil version of the questionnaire which was verified by experts in for content validity was also used to avoid response bias in data to avoid limitations that arise due to language fluency. The Tamil version was also administered to a small sample of 10 people who are comfortable with using both English and Tamil and the responses analyzed for reliability before it was administered to the whole population. The data collected was then statistically analyzed using MS Office 2013 data analysis pack in which t test was used to check for any differences in the population variables associated and Pearson’s correlation coefficient was used to verify the impact of awareness levels on attitude towards governmental ban.

Results

The analysis of data collected was done using T test two tailed with unequal means. With related to awareness the T statistical value for difference of means among male and female subjects is $t=-0.7$ $P>0.05$. The T value between the subjects in young adulthood and middle adulthood on awareness is $t=2.3$ $P<0.05$. The T value between subjects who have not completed graduation and who have qualified with graduation or above it on awareness is $t= 3.71$, $P<0.01$. The T Value between subjects who are employed and the subjects who are either unemployed or housewives on awareness is $t=-1.4$ $P>0.05$. The T value between subjects from lower middle class

and those from middle class and above on awareness is $t=2.78, P<0.01$. The T Value between subjects from nuclear family and joint family on awareness is $t=2.11, P<0.05$. The T value between the subjects residing in urban Chennai and those residing in sub-urban Chennai on awareness is $t=1.15, p>0.05$.

The analysis of data related to attitude of the subjects towards ban imposed by Tamilnadu governments on single use plastic products of less than 0.40 microns done using T test two tailed with unequal means shows that the T statistical value for difference of means among male and female subjects is $t=1.35, P>0.05$. The T value between the subjects in young adulthood and middle adulthood on attitude is $t=-0.98, P>0.05$. The T value between subjects who have not completed graduation and those who have qualified with graduation or above it on attitude is $t=-0.65, P>0.05$. The T Value between subjects who are employed and the subjects who are either unemployed or homemakers on attitude is $t=-0.3, P>0.05$. The T value between subjects from lower middle class and those from middle class and above on attitude is $t=-0.165, P>0.05$. The T Value between subjects from nuclear family and joint family on attitude is $t=2.33, P<0.05$. The T value between the subjects residing in urban Chennai and those residing in sub-urban Chennai on attitude is $t=0.72, p>0.05$.

The correlation r value between Awareness and attitude among male population is $r=0.64, p<0.001$ and females is $r=0.20, P>0.05$. Among the sample whose aged fall in the young adulthood $r=0.24, P<0.05$ and for those whose age fall under middle adulthood $r=0.56, p<0.001$. The correlation between awareness and attitude among samples who have not completed their graduation $r=0.67, P<0.001$ while the same among the sample who have graduation or higher the $r=0.36, p<0.001$. Among the employed population the $r=0.52, p<0.001$ and among the unemployed and homemakers $r=0.16, p>0.05$.

Among the people from lower middle class the $r=0.51, p<0.001$ and among the sample from middle class and above the $r=0.39, p<0.001$. Among the subjects from the nuclear family $r=0.28, p<0.001$ and among the subjects from joint family $r=0.63, p<0.001$. The correlation among the subjects who are the residents of urban Chennai $r=0.34, p<0.001$ and among the participants from suburban Chennai $r=0.56, p<0.001$.

The correlation r values between awareness levels on the attitude towards governments ban on single use plastic products is $r=0.405, P<0.001$. The T statistical value between levels of awareness and the attitude is $t=1.175, p>0.05$.

Table 1 shows the difference of means between various variables of the sample population analyzed using T test two tailed with unequal means

		N	% (frequency)	Mean Score	Awareness		Attitude		
					T statistical value	P value	Mean Score	T Statistical value	P value
GENDER	MALE	77	44.77	21.20	-0.7	0.84	20.23	1.35	0.18
	FEMALE	95	55.23	22			19.88		
Age	18 to 39	76	44.19	21.75	2.3	0.02	19.89	-0.98	0.32
	40 & above	96	55.81	21.02			20.15		
Education	Below graduation	47	27.33	22.34	3.71	0.003	19.91	-0.65	0.513
	Graduation & Above	125	72.67	20.96			20.08		
Employment	Employed	118	68.60	21	-1.4	0.16	19.98	-0.3	0.76
	Unemployed & Homemakers	54	31.40	21.5			20.06		
Socio Economic Status	Lower Middle class	113	65.70	21.66	2.78	0.006	19.89	-0.165	0.1
	Middle class & Upper middle class	59	34.30	20.72			20.32		
Family	Nuclear	106	61.63	21.63	2.11	0.03	20.26	2.33	0.02
	Joint	66	38.37	20.87			19.68		
Residence	Urban	113	65.70	21.48	1.15	0.25	20.10	0.72	0.47
	Sub Urban	59	34.30	21.06			19.91		

Table 2 showing the correlation between Awareness about the environmental hazards caused by single use plastic products and Attitude towards governmental ban on plastic products based on various variables among the sample

		N	%	r	p
GENDER	MALE	77	44.77	0.64	0.00
	FEMALE	95	55.23	0.20	0.06
Age	18 to 39	76	44.19	0.24	0.04
	40 & above	96	55.81	0.56	0.00
Education	Below graduation	47	27.33	0.67	0.00
	Graduation & Above	125	72.67	0.36	0.00
Employment	Employed	118	68.60	0.52	0.00
	Unemployed &Homemakers	54	31.40	0.16	0.24
Socio Economic Status	Lower Middle class	113	65.70	0.51	0.00
	Middle class & Upper middle class	59	34.30	0.39	0.00
Family	Nuclear	106	61.63	0.28	0.00
	Joint	66	38.37	0.63	0.00
Residence	Urban	113	65.70	0.34	0.00
	Sub Urban	59	34.30	0.56	0.00

Table 3 showing the correlation between awareness of environmental hazard caused by single use plastic materials and attitude towards governmental ban on some of these materials and the differences in the means of awareness and attitude among the total sample population.

	N	r	P		N	t	
Correlation between Awareness and attitude	172	0.405	0.0001	Difference in Awareness and attitude	172	1.175	1.58

Discussion

The results show there is no significant difference among the male and female subjects in the awareness about the dangers posed by single use plastic products and Attitude towards governmental ban. The subjects in their early adult hood have significantly higher awareness about the harm caused to the environment by these plastic products mean 21.75 when compared to the subjects in their middle adulthood mean 21.02. This may be due to the access to various awareness related information

in the media specifically the social media for the former when compared to latter. But there is no significant difference in their attitude towards the ban. This may be due to the general tendencies in most of the middle adulthood population to accept any decisions by the governmental decisions. The results also show the subjects there is significant difference in the awareness levels of subjects who have not completed graduation and the subjects who are graduates and above with the latter having higher awareness mean score 22.34 compared to the former 20.96. But there is no significant difference in their attitude towards the ban. This does suggest that the people who are more educated give lesser value to awareness related informations even though they are willing to accept the government's decision. There is no significant difference in the awareness levels and attitude among the subjects irrespective of whether they are employed and unemployed. The results also show that the subjects from lower socio economic status mean 21.66 have significantly higher awareness about harm caused by single use plastics when compared to the subjects from middle class and upper class mean 20.72 again suggesting that possibility of the most of the people from middle and upper middle class having sluggish attitude towards to social issues. But here again there is no significant difference in their attitude towards the ban. The results of the responses from the subjects from nuclear family and those from joint family show that that the former has significantly higher awareness mean 21.63 and positive attitude mean 20.26 towards ban compared to the latter Awareness Mean 20.87 attitude mean 19.68. This suggests that in nuclear families since the number of people are less and normally tending to be in a closed group there is consistency in the way of thinking among the members. But in a joint family system since the number of members are high and the members of all age group are present there can be variation in the ways of thinking among these members which could influence the attitude of the subject. There is no difference in the awareness and attitude of the subjects irrespective of whether they reside in the urban pockets or suburbs of Chennai. But when comparing the scores of the group as a whole there it is seen that there is no difference in the Awareness levels and attitude towards governmental ban on single use plastic products suggesting that level of awareness has an impact on the attitude of the population as a whole.

The impact of awareness about the hazards caused by single use plastic products to the environment on the attitude towards government's decision to ban the use of many of such products analyzed using Pearson's correlation coefficient show that in irrespective of variances there is significant impact of awareness levels on the

attitude of the population. In contrast this among people who are unemployed or function as home makers there is no significant impact of awareness on attitude towards the ban. A brief interview with these respondents after analysis of the data provided the following possible reasons for the result. Since they are already habituated to carrying bags while they go for purchases they don't worry about the need for single use plastic bags. The frequency with which they have food or beverages outside is less, so the need and use of disposable plastic products are such as plastic cups and glasses is less. One more reason they expressed was that they themselves are experiencing the difficulty of disposing the discarded single use plastic materials like the plastic bags which accumulates as thrash at home which by itself is frustrating to them. The other factor may be that the awareness measures a failed to reach them or they may not be giving importance to it to avoid feeling guilty whenever they try to dispose it off in an irresponsible manner. The data of the overall group does show the awareness levels of negative consequences have significant impact on the attitude people develop towards any of decisions associated with it.

Conclusion

The population residing in the city and suburbs of Chennai have high awareness about the dangers to the environment caused by single use products and they also have a positive attitude towards the initiative taken by the government of Tamilnadu to impose a ban on various single use plastic products to safe guard the environment. This positive attitude they had developed Inspite of some of the practical difficulties they experience in their day to life is because of the high level of awareness about what damage these products can cause to the environment in the long run. At the same time the people who do not use such plastic products in their everyday life extensively also have a positive attitude towards the ban and the level of awareness does not affect their attitude. So if the government takes adequate measures to create awareness before taking any rigorous measures to save the environment there are high possibilities that the people support the move and adhere to it without much resistance.

Limitations in the study

The sample represented only the population who are residing in and around Chennai. It does not include the population from tier II cities or the rural areas. So it cannot be taken as representative sample of the awareness levels and attitude towards plastic ban of the whole of Tamilnadu.

Suggestions for further study

The study can be conducted pan state and pan India with a large sample from all tier I, tier 2 cities and rural population. Study can also be conducted on student population on the same factors either within a geographical area or pan country

Conflict of interest.

The authors do not have any conflict of interest in conducting the study and publishing the results. The motive was to understand whether creating awareness can be helpful in implementing getting support for stringent measures adopted by government bodies to preserve the environment

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