PLASTIC POLLUTION AND DENGUE FEVER IN KOLKATA AND IT'S SURROUNDING AREAS

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Abstract: ***Plastic is the general term for wide range of synthetic or semi-synthetic polymerization products. The versatility of plastics had led its use in almost everything we use today. Various types of plastic polymers are widely used throughout the world for variety of useful purposes. Plastic waste is a major environmental and public health problem in India, particularly in the urban areas also rural areas. Plastic shopping or carrier bags are one of the main sources of plastic waste in our country or West Bengal. In addition, plastics take many years (20-1000) to degrade and hence pose a disposal challenge for controlling the plastic wastage effective monitoring and provide various guideline there is also a need for better education and awareness around plastic waste.***

The biggest current problem with the conventional plastics is the associated environmental concerns, including non-biodegradability, release of toxic pollutants, litter and impacts on landfill as a result of the production and disposal of plastic waste. Dengue is the most rapidly spreading mosquito-borne viral disease in Kolkata and surrounding area by the plastic cup and others uses. Awareness should be created among the community to reduce the plastic uses for better environment.

Key Words: Plastic Pollution, Dengue, Municipal Waste, Plastic Waste Management

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(I) **INTRODUCTION:** Plastic is now a regular material that is being used on a daily basis. Plastic is everywhere either in the form of food containers, financial transactions (Debit/ Credit Cards, plastic money), storage bag, stationary items, electronic products and every item that a human being can think of plastic as a product is now like a regular feature of manufacturing, consumption, and service activities. During its manufacture, many hazardous chemicals are emitted that can lead to dreadful diseases in human as well as other animals. Ethylene oxide, xylene and benzene are some of the chemical toxins present in plastic, which can have hazardous effects on the environment. Dengue is the most rapidly spreading mosquito-borne viral disease in Kolkata and surrounding areas with the uses of plastic cup and others plastic materials. In India approximately, 12 million tonnes plastic products are consumed every year, which is expected to rise further. Plastic polloution is the accumulation of plastic products in the wildlife, wildlife habitat and humans. Plastics that act as pollutants are categorized into micro, meso, macro debris, based on size.

(II) **STUDY AREA:** Kolkata is the capital of the Indian State of West Bengal. Located on the east bank of the Hooghly River, it is the principal commercial, cultural and educational centre of east India, while the port of Kolkata is India's operating port and its sole major riverine port. The city is widely regarded as the "cultural capital" of India, and is also nicknamed the "City of Joy".

(III) **OBJECTIVE OF THE STUDY:** The present study has been undertaken with the specific objectives which as following:

(a) To examine the plastic pollution and its effect on Kolkata and its surrounding areas.
(b) To assess influence of plastic on air, land and water quality of Kolkata megacity.
(c) To retrieve relationship between plastic uses and Dengue (mosquito-borne viral disease) disease.
(d) To suggest alternative bio-degradable elements for uses.

(IV) **METHODOLOGY:** This study is based on secondary data. Census data collected from the census office, Govt. of India. Various type of maps provided by NATMO office. Literature review done by searching internet and from many reports of the Govt. of West Bengal.

(V) **RESULTS AND DISCUSSION:**

(A) **Physical background of the study area:**

Kolkata is located over the "Bengal basin", a pericratonic tertiary basin. Bengal basin comprises three structural units: shelf or platform in the west; central hinge and deep basinal part in the east and south-east. Kolkata is located atop the western part of the hinge zone.

Kolkata is situated on the lower Gangetic Delta of eastern India. The city's elevation is 1.5 – 9 m. Much of the city was originally a wetland that was reclaimed over the decades to accommodate a burgeoning population.

Kolkata is subject to a tropical wet-and-dry climate that is designated AW under the Koppen climate classification.

(B) **Plastic:** Plastics are typically organic polymers of high molecular mass and often contain other substances. They are usually synthetic, most commonly derived from petrochemicals, however, an array of variants are made from renewable materials such as polylactic acid from corn or cellulosics from cotton linters.

- USES OF PLASTICS:
  Plastics are widely used in:
  - Packaging industry
  - Construction industry
  - Disposable cutlery
  - Storage, etc.

- CAUSES FOR MORE PLASTICS USE:
  - As plastic is less expensive, it is overused.
  - In developed economies, about a third of plastic is used in packaging and roughly the same in building in application such as piping, plumbing or vinyl siding.
  - Other uses include automobiles (up to 20% plastic), furniture, and toys.
  - Plastics have many uses in the medical field.

- PLASTIC POLLUTION: Plastic pollution is the accumulation of plastic products in the environment that adversely affects wildlife, wildlife habitat and humans.

(C) **Plastic Pollution in Kolkata and Its Surrounding Areas:** In India approximately, 12 million tonnes plastic products are consumed every year, which is expected to rise further. As per study conducted by CPCB in collaboration with CIPET, Ahmedabad on Qualification and Chracterisation of Plastic Waste Generation in 60 major cities (2010-12) in the country, the percentage of plastic wastes present in the municipal solid waste (MSW) of the cities is ranging from 3.10% to 12.47%.

A NEERI 2009 study mentions the percentage of plastic and 'others', which include synthetic material or material resistant to biodegradation for Kolkata and Howrah are 0.65% and 3% in MSW of Kolkata and Howrah. Appropriate identification of plastic wastes by the rag pickers is also a challenging task.

■ COMPOSITION OF MUNICIPAL WASTE (KMA):

The composition of municipal waste appears to be largely constant in terms of constituents, with percentages varying between smaller and larger towns. A broad understanding of the blended mix observed within the towns of KMA would be as follows:

Table – 1 : Physical composition and Chemical parameters of waste sampled in KMA

Physical Parameters (all values in % by weight)		Chemical Parameters	
Biodegradable	41.0	pH	7.31
Green coconut shells	4.95	Organic Carbon %	19.58
Paper	3.18	Moisture %	42.84
Plastic	0.65	K_2O%	0.40
Metals	0.66	P_2O_5%	0.57
Glass and Crockery	0.58	N%	0.55
Spen coal/wood embers	8.08	C/N Ratio	35.6
Inert *	37.9	Calorific Value K Cal/Kg	549.32
Others **	3.0	Loss on Ignition %	35.24

* Inert includes mud/earth, street sweeping and waste from construction and polymers etc.

** Others include synthetic material.

Source: NEERI, 2009

□ PLASTIC CARRY BAGS

Status of use of plastic carry bags and impact of imposition of Bags: M/s Toxicslink conducted a study in Kolkata to review the status of implementation of ban on use of plastic carry bags (less than 40μ thickness) as per Plastic Waste Management Rules 2011. The sample size was 940 people (630 consumers and 310 vendors) from different parts of the city. The distribution of vendors in survey was as follows:

- 54% of the vendors and 58% of the consumers interviewed during the survey were using plastic bags with thickness of less than 40 microns.
- Milk booth and small food joints were the largest users of thinner plastic carry bags (100% and 82% respectively) followed by the fish and poultry shops (69%), vegetable and fruit shop (67%) and medicine shops (65%).
- The survey also attempted to find out the awareness of the citizens about disposal practices and 56% of consumers reported that plastic carry bags are thrown in to bins. 35% of consumers reuse the bags and only 10% has mentioned that it is given to registered recyclers.

(D) DENGUE DISEASE:

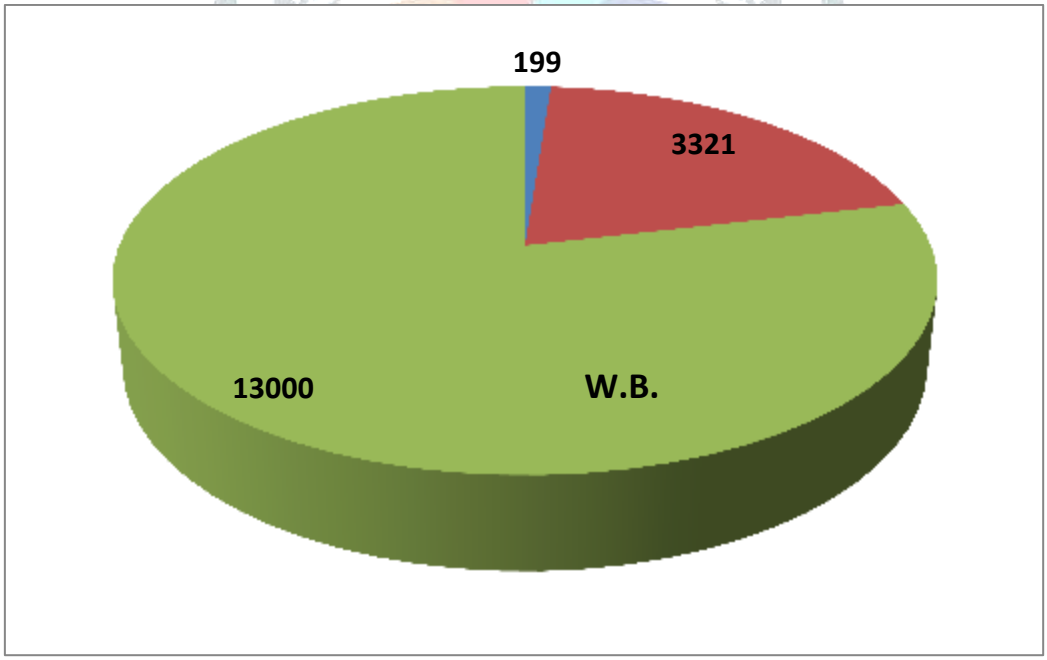
Dengue is the most rapidly spreading mosquito-borne viral disease of mankind, with a 30 fold increase in global incidence over the last five decades. It is a major public health concern throughout the tropical and subtropical regions of the world. Almost half of the world's population lives in countries where dengue is endemic.

☐ DENGUE DISEASE IN KOLKATA AND ITS SURROUNDING AREA:

Kolkata and its surrounding area are suffering from dengue by plastic and others environmental pollutions. Kolkata dengue numbers increased 199 in 2011 to as high as 3321 in a year 2012 (Times of India). Fresh figures of the dengue outbreak in West Bengal reveal that over 13000 people have been affected by the vector-borne disease in the state in the year 2017. We have reports of 30 deaths, State Director of Health Services, B.R. Satpathy, told 'The Hindu'. Out of the 30 deaths, six were reported from the Kolkata Municipal Corporation (KMC) area and two from Bidhannagar Municipal Corporation (BMC) area.

Table – 2: Dengue affected people in Kolkata and West Bengal

Year	Dengue affected people
2011	199
2012	3321
2017	13000 (W.B.)



(E) PLASTIC WASTE MANAGEMENT AND GOVERNMENT POLICY:

The West Bengal Pollution Control Board has issued notifications under Recycled Plastic Manufacture and Usage Rules 1999, Vide no. 3401-46L/WPB-2003 (Part – 1) dated 7.03.2006, for restricting use of plastic in different locations like Sundarban, hilly region of Darjeeling, Coastal Zone, entire Siliguri Subdivision, forest areas, Visva Bharati, Santiniketan and following 39 heritage sites:

1.	Indian Botanical Garden, Shibpore	21.	Eden Garden, Kolkata
2.	Zoological Garden, Kolkata	22.	Nehru Children Museum, Kolkata
3.	Subhas Sarobar, Kolkata	23.	Birla Industrial and Technological Museum, Kolkata
4.	Rabindra Sarobar, Kolkata		
5.	Victoria Memorial Hall, Kolkata	24.	Barrackpore Gandhi Ghat, Barrackpore
6.	National Library, Kolkata	25.	New Digha Paryatan Kendra, Hooghly

7.	Bandel Church, Bandel	26.	Soakhal Energy Park, Hooghly
8.	Belurmath, Belur	27.	Energy Education Park, Kolkata
9.	Hazarduari Palace, Murshidabad	28.	Citizen Park, Kolkata
10.	Millennium Park, Kolkata	29.	Deshapriya Park, Kolkata
11.	Strand Road	30.	Padmapukur, Kolkata
12.	Chhuti Amusement Park	31.	Allen Park, Kolkata
13.	KMDA Park, Chandernagore	32.	Macpherson Square, Kolkata
14.	Banabitan, Salt Lake	33.	Victoria Park, Kolkata
15.	Science City Complex, Kolkata	34.	Leonard Square, Kolkata
16.	Nicco Park, Kolkata	35.	College Square, Kolkata
17.	Nalban Boating Complex, Kolkata	36.	Hedua, Kolkta
18.	Swabhumi, Kolkata	37.	Deshbandhu Park, Kolkata
19.	Indian Museum, Kolkata	38.	Shraddhananda Park, Kolkata
20.	Birla Planetarium, Kolkata	39.	Tala Park

There is a lack of comprehensive awareness campaign for solid waste management vis-à-vis Plastic Waste Management. State Government has taken initiatives to aware all the stakeholders in the Urban Local Bodies through the District Administration. ICT based awareness and management tools have been developed through Mission Nirmal Bangla.

- TECHNOLOGIES FOR PLASTIC WASTE MANAGEMENT:

Currently worldwide accepted technology used for the plastic disposal is incineration, though it is not preferred option in India because it releases toxic gases like chlorinated dioxins and furans, raising several environmental issues. The descriptions of technologies are mentioned below:

(a) Utilization of plastic waste in Road Construction. Ex:- Polymer – Bitumen Road.
(b) Co-processing of plastic waste as Alternative Fuel and Raw Material in cement kilns and power plants.
(c) Conversion of plastic waste into liquid RDF (Oil).
(d) Plastic bottles and bags be turned into tiles.

(F) CONCLUSION:

Behaviour change is the key for success. We now need people to rethink why they are producing so much plastic waste in the primary place. We only consider what we buy, use and throwaway. We need to think about whether we really need some things in the primary place and be more selective about what and how much we consume. We will encourage urban businesses to eco-design their products and packaging. There is also a need for better education and awareness around plastic waste and dengue fever.

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