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HCFI Dr KK Aggarwal Research Fund

HCFI Round Table Expert Zoom Meeting on "Solid Waste Management"

31st July, 2021 (11 am-12 noon)

Key points of HCFI Expert Round Table

- Solid waste commonly includes trash and garbage consisting of everyday items. Municipal solid waste includes highly decomposable items like foods, trash, old appliances, paper, glass, etc.
- The volume of waste generation in India has been increasing rapidly over the last few years.
- The 2014 Planning Commission report by the Task Force on waste to energy estimated that urban India will generate around 2,76,342 tonnes/day of waste by 2021; 4,50,132 tonnes/day by 2031 and 11,95,000 tonnes/day by 2050.
- Waste management rules in India include the Solid Waste Management Rules, 2016; Construction and Demolition Waste Management Rules, 2016; Plastic Waste Management Rules, 2016 and amendments; Biomedical Waste Management Rules, 2016; Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and e-Waste Management Rules, 2016.
- With a rapid growth in population, the annual waste generation is expected to increase by 70%, from 2.01 billion tonnes in 2016 to 3.40 billion tonnes in 2050.
- Growth of the urban population directly leads to increase in waste generation. The rapidly increasing population generates solid waste that is much more than that can be effectively handled by the urban local bodies (ULBs).
- Maharashtra generates the highest amount of solid waste at 22,080 metric tonnes (MT)/day, while Sikkim generates the lowest at 89 MT/day.
- Among the UTs, Delhi generates the highest amount of solid waste at 10,500 MT/day.
- Overall, Daman and Diu is the lowest waste generator in India.
- Improper management of solid waste is a risk to the environment and public health because of unsafe disposal, which produces dangerous gases and leachates, microbial decomposition, and climate conditions.
- ULBs are entrusted with the responsibility to keep the cities and towns clean. But they are unable to do so because of inadequate infrastructure, poor institutional capacity, financial constraints and lack of political will.
- All available landfill sites in India are already exhausted.
- Though there are several legislations and policies to regulate waste disposal, they have failed to achieve their objectives due to lack of awareness amongst the stakeholders as well as poor enforcement by the regulatory authorities.
- Solid waste can be categorized into three: Biodegradable waste or organic waste, recyclable waste and inert waste (dirt, etc.). The percentage of wet biodegradable waste is high (52%), followed by the inert and nonbiodegradable waste (31%); recyclable waste constitutes 17% of total waste.
- The Municipal Solid Wastes (Management and Handling) Rules, 2000 were modified and notified as Solid Waste Management Rules, 2016.
- These rules are applicable to: (i) Every urban local body (Mega city to Panchayat level); (ii) outgrowths in urban agglomerations; (iii) census towns as declared by the Registrar General and Census Commissioner of India; (iv) notified areas; (v) notified industrial townships; (vi) areas under the control of Indian Railways; (vii) airports/airbases; (viii) ports and harbors; (ix) defense establishments; (x) special economic zones; (xi) State and Central government organizations; (xii) places of pilgrims; (xiii) religious and historical importance as may be notified by respective State government from time to time; and (xiv) every domestic, institutional, commercial and any other nonresidential solid waste generator situated in the areas.
- Every household is a waste generator; street vendors, event organizers, resident welfare associations (RWAs) and market associations, gated communities, hotels, restaurants, malls, offices and institutions, etc., are also considered waste generators.
- Section 4 of the Rules has clearly defined the roles and duties of waste generators and authorities. To describe a few, it is the duty of waste generators

to segregate waste and hand over the segregated waste to the authorized waste collectors.

- Environment Ministry has to constitute a Central Monitoring Committee to monitor waste management every year; Ministry of Urban Development has to frame a national policy on solid waste management, provide technical guidelines, financial support, training to local bodies, etc.
- The Central Pollution Control Board (CPCB) shall coordinate with Directory of State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) for monitoring and annual reports, formulation of standards, review new technologies, prepare guidelines for buffer zones restricting from residential, commercial and construction activities areas, and inter-state movement of waste.
- Manufacturers/brand owners shall facilitate collecting back wastes of their products and provide pouch for packaging sanitary wastes, etc.
- Industry (cement, power plant, etc.) shall use refuse-derived fuel (RDF) within 100 km.
- A key aspect of efficient solid waste management is waste segregation. Dry waste should be sent for recycling and reuse, while wet waste from the kitchen can be used for composting.
- It is mandatory for waste generators to segregate their waste in color-coded bins (blue for dry waste and green for wet waste) for proper recovery, reuse and recycling.
- The 2016 Solid Waste Management Rules also mandate door-to-door collection of segregated waste; waste generators are required to pay a "user fee" to the waste collectors.
- Around 96% of wards across India have achieved 100% door-to-door waste collection as of January 2020.
- Recycling is the process of transforming segregated solid waste or raw material for producing new product. Reusable and recyclable waste comprises ~20% of total waste.
- The recyclable material is usually collected by ragpickers and kabariwalas, which reduces the volume of solid waste and also saves costs of collection, transportation and disposal.
- Setting up facilities with adequate space for sorting of recyclable materials is the responsibility of local authorities.
- The rules prohibit waste generators from throwing, burning solid waste in open public spaces, in drains or water bodies. There is a provision for "spot fine" for littering and nonsegregation.
- The processing technologies used in India are composting, recycling, refuse-derived fuel, incineration, pyrolysis, waste-to-wealth and waste-to-energy.
- Nonrecyclable waste with calorific value of ≥1,500 kcal/kg shall not be disposed of on landfills and shall only be utilized for generating energy (waste to energy plants) either through refuse derived fuel or by giving away as feed stock for preparing refuse derived fuel. High calorific wastes shall be used for co-processing in cement or thermal power plants.
- There is a time frame for the implementation of the Solid Waste Management Rules: Landfill Identification (1 year), Procurement of waste processing facilities (2 years), Ensure segregation of waste (2 years), Cities up to 1 million population (2 years), Million plus cities (3 years), Setting up sanitary landfills (3 years) and Bioremediation/capping of old landfills (5 years).
- The waste pickers do not have legal status and protection and are not capable of enforcing systems in waste collection and segregation.
- Institutional and financial issues must be addressed on priority.
- Citizen participation needs to be promoted; community awareness and change in attitudes towards solid waste and their disposal can improve the system in India.
- On the basis of the Solid Waste Management Rules, the Delhi government has notified the Solid Waste Management By-laws in 2018, which also have provision for user fee including penalties for violation of the By-laws.
- Delhi has five local bodies: New Delhi Municipal Council (NDMC), Delhi Cantonment Board (DCB), North Delhi Municipal Corporation, South Delhi Municipal Corporation and the East Delhi Municipal Corporation.
- Delhi has a population of around 2 crores. East Delhi has a very high population density. Delhi also has heterogeneous pattern of settlements.
- Solid waste management is done at the ward level, zone and then local body.
- Major activities in solid waste management include segregation, primary collection, secondary storage, secondary transportation, processing and

finally disposal. Processing can be decentralized waste processing, centralized waste processing (composting, waste to energy), etc.

- Twin bin system has been started in Delhi. After collection, the waste is taken to the decentralized processing facility or the landfill. All garbage collection vehicles have GPS and they are monitored with daily reporting. Information, education and communication (IEC) activities towards behavior change are ongoing.
- Day sweeping is also a part of solid waste management; 80% is manual and the remaining 20% is done mechanically.
- There are 20 composting plants in Delhi for processing of wet waste. Aerobic composting takes 15 days in these plants.
- There are 10 biomethanation plants in Delhi with capacity of 5 tonnes each. Here, the wet waste is converted to biogas, which is then used for electricity generation.
- An integrated facility is being developed in East Delhi in collaboration with National Thermal Power Corporation (NTPC), which will have waste to energy plant, biomethanation plant, and inert waste processing unit. By 2023, Delhi will be able to process 100% of solid waste.
- An integrated facility already exists at Narela-Bawana plant. Ghazipur plant is based on RDF.
- Delhi has four existing landfills: Ghazipur, Okhla, Bhalswa and Narela-Bawana. Three have exhausted their capacity in 2002. Remediation of landfill was started in 2009. But not much work has been done on this. Following an order of National Green Tribunal (NGT) in 2019, remediation work has started in these three landfills. Dry waste like plastic is sent to waste to energy plants; soil type waste is used for roadside filling and filling of low lying areas.
- Challenges that are coming up are enforcement of segregation at source despite Bhagidari workshops; decentralized waste processing due to nonavailability of suitable and sufficient land, uncontrolled and unplanned development without civic infrastructure, multiple agencies, procedure of environmental clearance is cumbersome and NIMBY syndrome.
- Every individual has to fulfil his responsibility to solid waste management to make it a success.
- Concept of waste management can be added in the school curriculum to educate the children. Schools should have small units of solid waste management in their campus.
- There is a need to study small corporations/ bodies who are doing good work in solid waste management for their innovative ideas (concept of positive deviance).
- Cooperative societies should be encouraged to have these micro waste management units, totally sponsored by the government.
- Perishable waste should be managed at the source itself, but it is not happening.

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(Based on presentations by Dr Anil Kumar, Director-HCFI; Ex-Director-Environment Dept., Delhi Govt. & Mr Pradeep Khandelwal, Retd. Chief Engineer, East Delhi Municipal Corporation)

Empagliflozin Gets a New Indication

The US Food and Drug Administration (FDA) has expanded the indication for empagliflozin to treat heart failure with reduced ejection fraction (HFrEF) to reduce the risk of cardiovascular death and hospitalization for heart failure. The dose for which empagliflozin has received approval is 10 mg once daily dose. It can be started in adults with HFrEF with an estimated glomerular filtration rate (eGFR) as low as 20 mL/min/1.73 m^2.

This approval is based on the findings of the EMPEROR-Reduced trial published in the *New England Journal of Medicine* last year in which empagliflozin was found to reduce the risk of cardiovascular death or hospitalization for heart failure among HFrEF patients with diabetes or without diabetes.

Empagliflozin is a sodium-glucose cotransporter-2 (SGLT2) inhibitor and in 2014, it was approved as an adjunct to diet and exercise to improve glycemic control in patients with type 2 diabetes. But it is not indicated for persons with type 1 diabetes or diabetic ketoacidosis. In 2016, following publication of the landmark EMPA-REG OUTCOME trial, empagliflozin was FDA-approved to prevent cardiovascular death in adults with type 2 diabetes and heart disease.

Empagliflozin is contraindicated in cases of hypersensitivity to empagliflozin or any of its excipients and also in patients on dialysis.

(*Source: Medpage Today August 18, 2021; European Pharmaceutical Review, August 19, 2021*)

COVID-19 Surveillance Must also Include Asymptomatic Infections

More than one-third of patients with coronavirus disease 2019 (COVID-19) are asymptomatic, according to a systematic review and meta-analysis of studies reporting laboratory-confirmed infections. Children were more likely to have asymptomatic infections compared to the elderly, while persons with comorbid conditions had greater propensity to be symptomatic.

Researchers from the Yale School of Public Health reviewed data from more than 350 studies, which were published between January 1, 2020 and April 2, 2021. Two separate meta-analyses were conducted. For the study, *silent infections* were defined as laboratory-confirmed COVID-19 cases that did not exhibit any clinical symptoms at the time of testing. *Asymptomatic infections* were those that continued to exhibit no clinical symptoms during at least 7 days of follow-up after testing. *Presymptomatic cases* were persons who developed clinical symptoms after initial testing.

In the first meta-analysis, which included all studies with duration of follow-up sufficient to identify asymptomatic infections, 35.1% infections were found to be truly asymptomatic, i.e., they never became clinically symptomatic. The second meta-analysis, which included studies that identified asymptomatic cases at the time of testing and also conducted follow-up to distinguish the presymptomatic stage from asymptomatic infections, the percentage of asymptomatic infections was estimated to be nearly 37%.

Around 42.8% infections had no symptoms at the time of testing; this group included both the asymptomatic and presymptomatic infections. The prevalence of asymptomatic infections was lower in the elderly compared to children; 19.7% vs. 46.7%, respectively. Compared to persons with no underlying medical condition, those with comorbidities were much less likely to be asymptomatic.

It is not enough to search for and isolate the symptomatic cases. The true prevalence of infection cannot be estimated if asymptomatic cases are discounted. And, people do not come forward to test themselves, if they have no symptoms.

Evidence has shown that persons with asymptomatic COVID-19 too can transmit the infection. Effective control of the pandemic therefore requires identification of asymptomatic infections also.

India is slowly unlocking and with the imminent reopening of schools and colleges, there is a risk of them becoming super-spreaders as this study has shown high prevalence of asymptomatic infections in the younger age group. A focus on detection of symptomatic cases will miss the asymptomatic cases with the consequence that the infection will continue to silently spread in the community. Greater vigilance is required.

Until herd immunity develops and everybody eligible is vaccinated against COVID-19, it is through measures such as wearing masks, physical distancing, hand hygiene, avoiding crowded public places and targeted testing that one can protect themselves, and if infected, reduce the risk of transmission to the community.

(*Source: Medscape August 13, 2021 & PNAS August 24, 2021;118(34):*e2109229118)

Diagnostic Features of Vaccine-induced Immune Thrombocytopenia and Thrombosis

A new UK prospective study of 220 confirmed cases of vaccine-induced immune thrombocytopenia and thrombosis (VITT) after having the first dose of the Oxford-AstraZeneca vaccine published in the *New England Journal of Medicine*, August 11, 2021, has identified five diagnostic criteria that are indicative of definite VITT:

- Time of presentation after vaccination (5-30 days and not before, or ≤42 days in patients having isolated deep-vein thrombosis or pulmonary embolism)
- Low platelet count (<1,50,000/cu mm)
- Established thrombosis
- Very elevated D-dimer
- Detection of antiplatelet factor 4 antibodies.

If all these criteria are fulfilled, VITT is confirmed. If one is not met, the diagnosis is probable, if two are not met, then the diagnosis is possible and if ≥3 are not met then it is unlikely to be VITT and there could an alternative diagnosis. While the overall mortality was 23%, in patients with very low platelet counts (<30,000/cu mm) and intracranial hemorrhage following thrombosis, the mortality increased to 73%... (*NEJM, Medscape*).

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