Letter to Editor

Open dumping and open burning of urban waste in developing-world cities: an under-recognized public health threat

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Dear Editor,

Cities across the developing world are generating municipal solid waste faster than their institutions can manage it, and the resulting open dumpsites and open burning have become a quietly worsening public health problem. This letter argues that open dumping and open burning of urban waste should be treated as a preventive public health priority rather than a municipal engineering afterthought. It draws on the One Health framework, which recognizes that human, animal, and environmental health are inseparable.

Three practices need to be kept apart, because their exposure pathways differ. Open dumping is the uncontrolled disposal of waste on land without engineering safeguards; it is associated mainly with contamination of soil and water, breeding of disease vectors, and direct contact by residents and waste workers. Open burning is the combustion of waste in the open without emission controls; its principal pathway is inhalation of airborne pollutants. Controlled disposal, such as an engineered sanitary landfill with liner, leachate, and gas management, is a separate category and is not treated here as equivalent to either practice. Dumping and burning often occur at the same site, so their pathways can overlap, but this letter considers them separately.[2]

The scale of the problem

New and rapidly expanding cities in low- and middle-income countries generate hundreds to thousands of tonnes of waste every day. This volume is rising each year with population growth, rising incomes, and a shift toward disposable goods.[1] Globally, municipal solid waste generation is projected to grow from 2.1 billion tonnes in 2023 to 3.8 billion tonnes by 2050.[2] Separately, in 2020 an estimated 38% of global municipal solid waste, about 810 million tonnes, was uncontrolled, meaning that it was dumped in the environment or openly burned; if current practices continue, this uncontrolled fraction could almost double to 1.6 billion tonnes a year by 2050.[2] These global figures refer to different baseline years and should not be combined as if they described the same year, and the uncontrolled share is not confined to urban dumpsites or to developing countries, although the burden falls disproportionately where collection and disposal infrastructure is weakest. National sanitation campaigns have improved collection and awareness, but

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scientific processing and safe disposal still lag. Engineered sanitary landfills (controlled disposal) and open dumps are often conflated, yet open dumpsites in many low- and middle-income cities receive unsegregated waste—food scraps, plastics, biomedical refuse, e-waste, and hazardous material mixed together, untreated and unsafeguarded. As the organic fraction decomposes anaerobically, it releases methane, worsening climate change and raising fire and explosion risks [2].

Direct health impacts on nearby communities and waste workers

Odour is among the most visible nuisances for residents living near dumpsites, and has been reported to accompany headache, nausea, disturbed sleep, and psychological distress. Beyond nuisance, open dumping creates exposure pathways whose supporting evidence differs in strength. Standing waste and rotting organic matter can provide breeding sites for mosquitoes, flies, and rodents and attract stray animals, and these are recognized carriers or hosts of pathogens that cause dengue, malaria, leptospirosis, and various enteric infections.[3] These pathways make transmission plausible, but breeding sites alone do not demonstrate that dumpsites cause excess disease in nearby communities. Observational studies from India and other rapidly urbanizing countries have reported associations between living or working near landfills and dumpsites and respiratory symptoms, skin conditions, gastrointestinal illness, and allergic reactions, compared with living farther away.[4] Such designs are generally vulnerable to confounding by socioeconomic status and other local exposures, and cannot by themselves establish that the dumpsite caused these outcomes.

Waste pickers and other workers at dumpsites are likely to face prolonged exposure to biological and chemical hazards, often without safety equipment, formal recognition, or access to healthcare.

Water contamination from leachate

Leachate, the liquid that seeps from decomposing waste, can carry pathogens, heavy metals, ammonia, and persistent organic pollutants. Where dumpsites lack proper lining, this liquid can migrate into groundwater and nearby surface water.[2] In the rainy season in many tropical and subtropical cities, runoff from overflowing dumps can mix into stormwater drains and irrigation channels, creating a plausible pathway for waterborne infections such as diarrhoeal disease, typhoid, cholera, and viral hepatitis downstream; whether this translates into outbreaks at a given site needs to be established by local investigation. A study of an unlined landfill in Delhi, India, found elevated concentrations of several physicochemical parameters and metals, and the presence of faecal coliforms, in groundwater near the site, consistent with leachate influence on groundwater quality.[5] Such findings demonstrate contamination, not a health outcome: linking them to disease would require data on how the water is used and on the health of those exposed.

Open burning and air quality

Open burning is a distinct exposure route from dumping, because the main pathway is inhalation of combustion products. When mixed waste is set alight, it releases fine particulate matter (PM2.5), dioxins, furans, volatile organic compounds, and heavy metals into the air. Long-term exposure to ambient PM2.5 is an established risk factor for chronic respiratory and cardiovascular disease and for adverse pregnancy outcomes.[6] Evidence on health effects specific to the mixture released by waste burning, including dioxins and furans, is less direct. One global modelling study estimated that chronic exposure to ambient PM2.5 from the open combustion of domestic waste was attributable to roughly 270,000 premature adult deaths per year

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worldwide.[7] This is a model-based global estimate of mortality attributable to ambient PM2.5 from open burning of domestic waste, not a count of deaths around urban dumpsites, and it is not restricted to cities in developing countries. Children, older adults, and people with existing health conditions are generally considered more susceptible to the health effects of air pollution.

Emerging and compounding risks

Newer problems are stacking on top of the old ones. Poorly managed plastic waste is a recognized source of microplastic contamination in soil and water systems, and pharmaceutical waste entering the environment has been identified as one potential contributor to antimicrobial resistance, although the human health consequences of these exposures are still being characterized.[8] Both illustrate the principle captured by the One Health framework: human, animal, and environmental health are not separate problems, and waste management sits squarely at their intersection.

Where the gap lies

On paper, most developing countries already have reasonably strong regulatory tools: laws requiring source segregation, decentralized processing, composting, recycling, bio-methanation, and properly engineered landfills.[9] The gap is not in the policy; it is in execution. Patchy infrastructure, tight municipal budgets, weak enforcement, and limited public buy-in all stand in the way.

Recommendations

Closing this gap will take coordinated investment across several fronts:

1. **Source segregation and material recovery** – Expand household-level segregation programs, and invest in material recovery facilities and decentralized composting, especially in fast-growing peri-urban areas.

2. **Engineered disposal infrastructure** – Replace open dumps with properly engineered, lined sanitary landfills (controlled disposal), and phase out open burning by expanding accessible collection alternatives.

3. **Environmental and health monitoring** – Establish routine monitoring of groundwater and air quality near waste sites, paired with health surveillance in the communities that live closest to them.

4. **Protection for informal waste workers** – Formalize and protect informal waste pickers through safety equipment, healthcare access, and legal recognition, rather than displacing them.

5. **Cross-sectoral governance** – Bring community medicine specialists, environmental scientists, municipal officials, urban planners, and policymakers to the same table, backed by sustained funding and genuine community involvement.

Conclusion

The open dumps and waste fires ringing so many of the developing world's cities are not simply an eyesore. They represent a slow-building public health threat, and every year of inaction risks adding to the burden of infectious disease, chronic illness, environmental damage, and healthcare costs. The strength of evidence differs across these outcomes, but the evidence summarized here is sufficient to justify precautionary action while better local exposure and health data are gathered. What is missing is sustained investment and the political will to act on it.

Conflicts of interest:

The author declares that there is no conflict of interest..

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