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Review

Human health risks of waste incinerators: a narrative review of studies on municipal, hazardous and medical waste incineration

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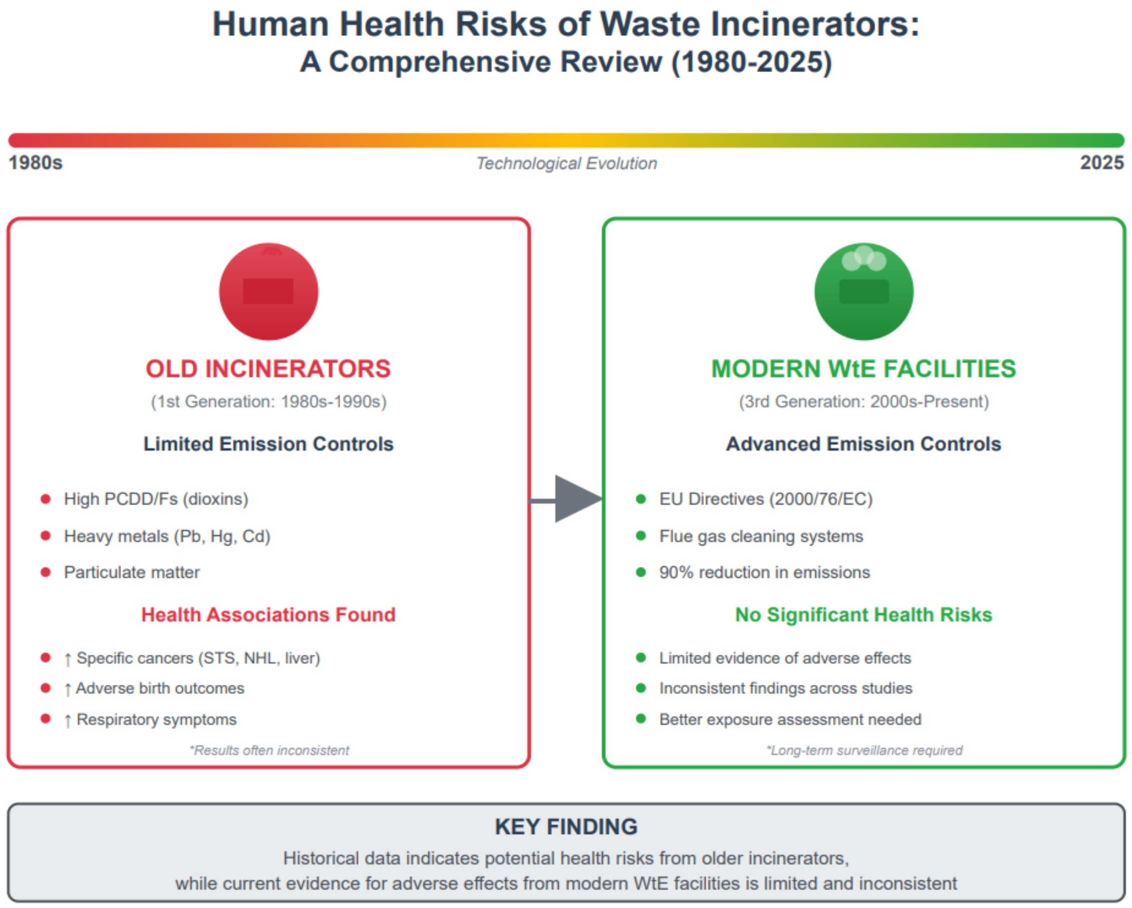
Graphical Abstract



Highlights:

- Modern incinerators show reduced health risks *vs.* older, high-emission plants.
- Old incinerators linked to cancer/reproductive risks; modern tech lowers exposure.
- Long-term monitoring needed to confirm safety of advanced waste-to-energy plants.

Human health risks of waste incinerators: a narrative review of studies on municipal, hazardous and medical waste incineration

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Abstract: This narrative review synthesizes evidence on human health risks linked to emissions from municipal, hazardous and medical waste incinerators up to August 2025. For the search of information, the databases PubMed, Scopus, Web of Science, and Google Scholar were used. The analysis reveals meaningful differences in health outcomes depending on the age and emission control technology of facilities. Evidence from older, high-emission incinerators indicates elevated cancer risks, particularly for soft tissue sarcoma, non-Hodgkin's lymphoma, and respiratory cancers in exposed communities. The evidence for adverse reproductive outcomes, including birth defects and adverse birth outcomes, is limited and inconsistent. Respiratory disease and symptoms have been reported in some populations living near older incinerators. Workers at incineration facilities show consistent evidence of elevated exposure to carcinogenic compounds. In contrast, studies on modern waste-to-energy plants with advanced emission controls show substantially diminished or limited health risks. However, the evidence base for newer facilities remains relatively small, and long-term health effects are not yet fully established. Major methodological limitations include crude exposure assessment (reliance on residential proximity), inadequate control for confounding factors, ecological study designs, and heterogeneity in study methods. This review highlights the critical importance of technological advancement in reducing health risks, while underscoring the need for continued surveillance, especially in regions with aging infrastructure or inadequate regulatory oversight.

Keywords: waste incineration; health risks; environmental exposure; emission control technology

1. Introduction

In recent decades, global solid waste generation has been increasing at a considerable rate, due to population growth, urbanization, and changing consumption patterns [1–3]. Waste incineration, particularly in the form of waste-to-energy (WtE) plants, has emerged as an important element of integrated waste management strategies in many countries [4–8]. When compared to landfilling, incineration reduces the volume of waste by approximately 90% and harnesses energy from the combustion process [7,8]. However, waste incineration also generates emissions that include particulate matter (PM), nitrogen oxides (NOx), sulfur dioxide (SO2), acid gases, carbon monoxide (CO), heavy metals (such as lead, cadmium, and mercury), and persistent organic pollutants (POPs), including polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs) [9–13].

Despite the advantages, waste incineration has been a subject of intense public debate and scientific scrutiny, primarily because of concerns regarding emissions of toxic pollutants and their potential impacts on human health [14]. Particularly contentious are emissions of dioxins, furans, and heavy metals, all of which are classified as persistent, bioaccumulative, and toxic substances [11,12,15]. PM and acid gases are also of concern, given their well-documented effects on respiratory and cardiovascular systems [15]. These environmental contaminants can reach human populations through multiple exposure pathways, including inhalation of air pollutants and ingestion of contaminated food and water, raising concerns about potential health effects in communities living near such facilities.

The potential for these emissions to affect the health of communities near incinerators and facility workers has prompted numerous epidemiological studies over the past four decades [16–19]. These investigations have examined a broad spectrum of health outcomes, including cancer, reproductive effects, congenital anomalies, and respiratory diseases. However, findings have often been inconsistent, with some studies reporting associations between proximity to incinerators and adverse health outcomes, while others have found no such associations [16,18].

Specific long-term monitoring studies conducted in certain regions like Catalonia, Spain, have demonstrated that environmental pollution levels (air, soil, vegetation, and human biomonitoring) around modern incinerators have remained stable and well below regulatory limits [20–22]. However, the geographic scope of epidemiological research has been strongly imbalanced, with most studies conducted in Europe and North America, while data from other regions remain scarce.

The present review aims to provide a contemporary synthesis of studies focused on the human health risks of waste incineration, uniquely integrating over four decades of epidemiological evidence with the parallel evolution of incineration technology and regulatory frameworks. The review encompasses studies on municipal solid waste incinerators (MSWIs), hazardous waste incinerators (HWIs), and medical waste incinerators (MWIs), while critically examining how technological advances and regulatory changes have influenced the health risk profile of these facilities over time.

2. Methods

For the search of information, the databases PubMed, Scopus, Web of Science, and Google Scholar were used. The search was performed using combinations of keywords such as "waste incineration," "incinerator," "municipal solid waste," "hazardous waste," "medical waste," "health effects," "health risks," "cancer," "birth outcomes," "reproductive health," "respiratory," "epidemiology," and "exposure." The literature search covered studies published from the 1980s up to August 2025. Although this review follows a narrative rather than systematic review approach, it was conducted in accordance with key principles of transparency and comprehensiveness inspired by the PRISMA framework. The evaluation of the evidence emphasizes modern epidemiological principles, focusing on effect sizes, statistical precision, dose-response relationships, and risk of bias assessment, rather than relying solely on dichotomous statistical significance testing.

Studies were included if they: (1) investigated health outcomes in human populations, (2) examined exposure to emissions from waste incineration facilities, and (3) were published in peer-reviewed journals. Both epidemiological studies (ecological, case-control, cohort) and occupational health studies were included. Studies were categorized by type of waste incineration facility (municipal, hazardous, or medical) and by the technological stage of the incinerators studied. Technological stages were defined based on key regulatory milestones, primarily distinguishing between facilities operating before and after the implementation of stringent emission standards such as the European Union's Waste Incineration Directive (Directive 2000/76/EC), which came into force in 2000 and mandated advanced emission control technologies. "Older" or "first-generation" incinerators typically refer to facilities predating such regulations, while "modern" or "third-generation" plants refer to facilities designed and operated under contemporary emission standards.

3. Results

3.1. Overview of studies

Most epidemiological studies have examined health effects associated with MSWIs, with fewer studies addressing HWIs and MWIs. The bulk of the research has been conducted in Europe and North America, as illustrated in Figure 1, which shows the global geographic distribution of studies included in this review. This geographic concentration highlights a notable research gap in other regions, particularly in Asia, Africa, and Latin America. A flowchart of the literature search and study selection process is shown in Figure 2.

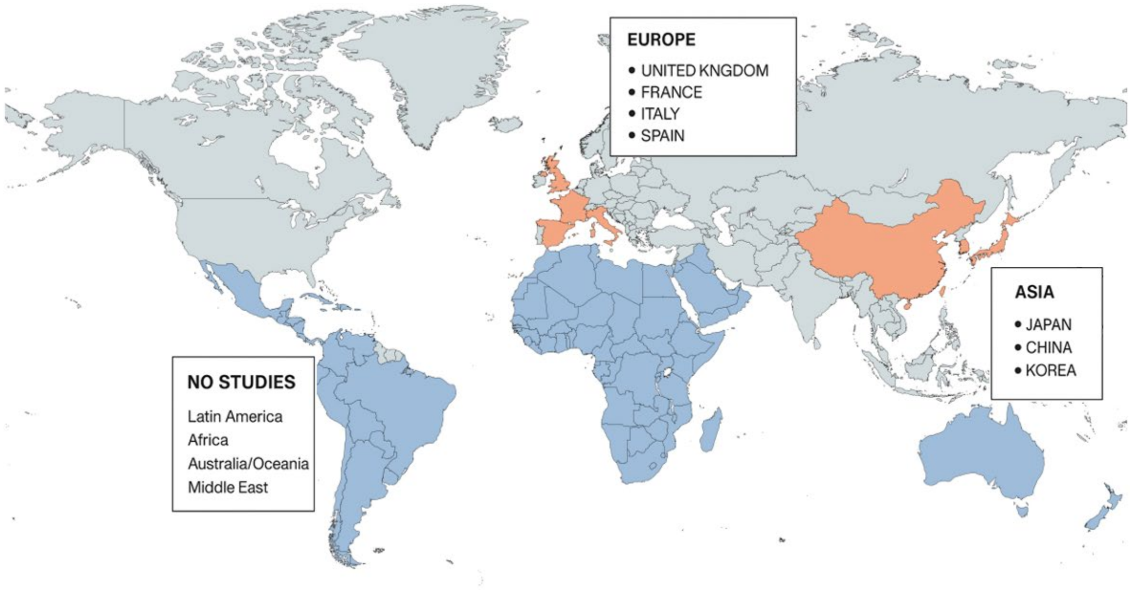

Figure 1. Global distribution of epidemiological studies on waste incinerators included in this review, by country and study count. The map illustrates a pronounced concentration of research in Europe (especially UK, France, Italy, Spain) and North America, with limited representation in Asia (Japan, China, Korea) and absence of studies from Latin America, Africa (1 study in Egypt), Australia/Oceania, and the Middle East.

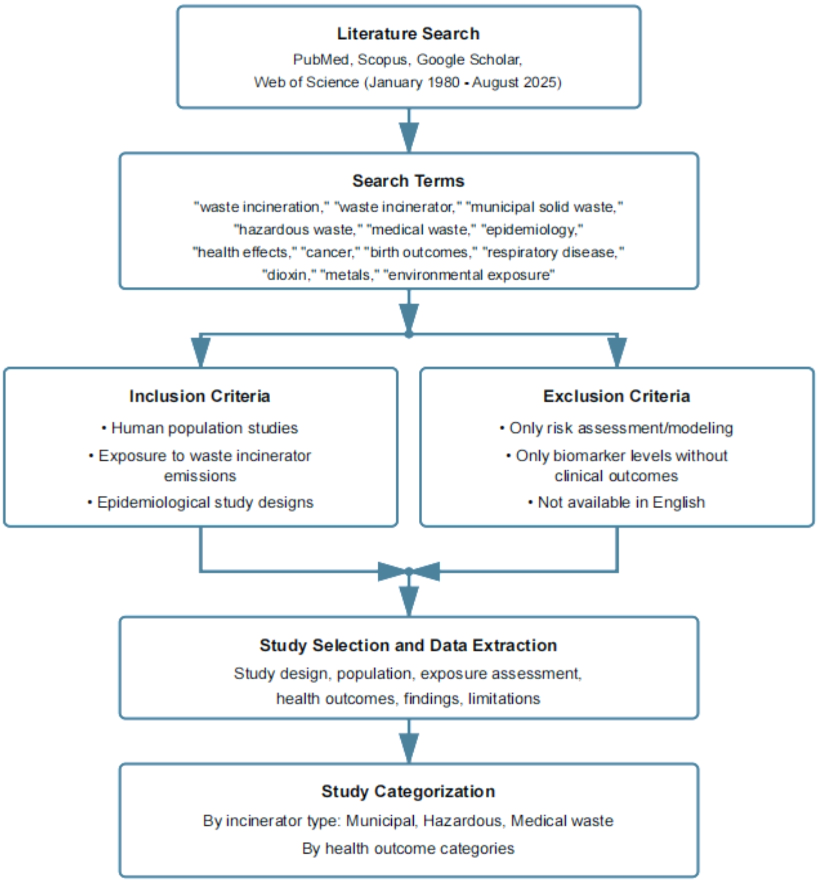

Figure 2. Flowchart of the literature search and study selection methodology, showing databases, search terms and inclusion/exclusion criteria used in this narrative review.

3.2. MSWIs

3.2.1. Cancer outcomes

The link between incinerator emissions and cancer risk has been the most intensely studied and contentious issue in waste incineration epidemiology. Severalecological and case-control studies conducted primarilyin the United Kingdom, Italy, Spain and France, reportedelevated risks of certain cancers in populations livingnear MsWIs [23–31]. A large study by Elliott *et al.* [26,27] examining cancer incidence near 72 municipal solid waste incinerators in Great Britain found small increases in risk for stomach cancer, colorectal cancer, and liver cancer near older incinerators, though the authors noted that these associations could not be conclusively attributed to incinerator emissions due to potential confounding by socioeconomic factors. Similarly, a large Japanese study by Tango *et al.* [32] examining 110 facilities found elevated associations for some cancers. Studies from France [29] and Italy [30], including a smaller study by Biggeri *et al.* examining specific lung cancer cases, reported associations between proximity to incinerators and elevated risks of soft tissue sarcoma (STS) and non-Hodgkin's lymphoma (NHL). In a systematic review and meta-analysis, Baek *et al.* [33] found pooled relative risks of 1.06 for all cancers combined, with higher risks observed for specific cancer types such as STS and NHL in studies of older facilities.

However, it is important to note that most of these positive associations come from studies of older incinerators with less stringent emission controls. Studies examining more recent, technologically advanced facilities have generally not found meaningful excess cancer risks [23]. A recent systematic review by Freni-Sterrantino *et al.* [23] concluded that evidence from modern MSWIs operating under strict regulatory standards does not support an association with increased cancer incidence. Nonetheless, the authors emphasized that long-term follow-up and continued surveillance remain important, especially given the latency period for many cancers [34].

3.2.2. Reproductive and developmental outcomes

The potential for incinerator pollutants to affect reproductive health is another area of major concern. Several studies have investigated associations between proximity to MSWIs and adverse birth outcomes, such as low birth weight, preterm birth, and congenital anomalies [34–39]. A systematic review by Ashworth *et al.* [36] identified [25] studies on this topic and reported that while some studies found associations with congenital anomalies, particularly neural tube defects and heart defects, the evidence was inconsistent and limited by methodological weaknesses. A more recent systematic review and meta-analysis by Parkes *et al.* [37] examined 26 studies and found no consistent evidence for associations between residential proximity to MSWIs and adverse birth or neonatal outcomes, once methodological quality was taken into account.

Studies from England [34], China [38,40], Italy [39], France [41], and Japan [42] have produced mixed findings, with some reporting elevated risks and others finding no associations. It is noteworthy that most studies reporting positive associations were conducted on older incinerators. Studies of modern facilities with advanced emission controls have not consistently found associations with reproductive outcomes [37,39].

3.2.3. Respiratory outcomes

While pollutants such as PM and acid gases are well-known respiratory irritants, epidemiological evidence linking incinerator emissions specifically to respiratory disease and symptoms is less robust than the evidence for cancer. A few studies have reported associations between living near MSWIs and respiratory symptoms such as cough, wheezing, and shortness of breath [43,44]. However, these studies have often been limited by small sample sizes, lack of objective measures of respiratory function, and insufficient control for confounding factors such as air pollution from other sources or smoking. Overall, the evidence for clinically respiratory adverse effects from modern MSWIs is weak and inconsistent. The above findings on MSWIs are summarized in Table 1.

Table 1. Municipal waste incineration: summary of key epidemiological/ecological studies.

Study	Design	Population	Exposure Assessment	Main Health Outcomes	Key Findings	Limitations
Elliott *et al.* (1996)	Ecological	14 million people, 72 MSWIs, Great Britain	Distance-based (0–7.5 km)	Cancer incidence	37% excess liver cancer < 1 km; significant decline with distance for all cancers, stomach, colorectal, liver, lung	Ecological design, misclassification of liver cancer
Biggeri *et al.* (1996)	Case-control	37 STS cases, 171 controls, Mantua, Italy	GPS positioning, distance from industrial incinerator	Soft tissue sarcoma	OR 31.4 (95% CI: 5.6–176.1) within 2 km	Small numbers, single site
Viel *et al.* (2000)	Spatial analysis	Doubs region, France	Spatial scan statistics around MSWI	Soft tissue sarcoma, NHL	SIR 1.44 STS, 1.27 NHL in clusters near high-emission incinerator	Ecological design, high emission facility
Tango *et al.* (2004)	Ecological	225,215 births, MSWIs in Japan	Distance-based (0–10 km)	Birth outcomes	Peak-decline risk for infant deaths and infant deaths with malformations	Ecological design, limited exposure assessment
Cordier *et al.* (2004)	Case-control	304 cases, 226 controls, France	ADMS3 atmospheric modeling	Urinary tract birth defects	OR 2.95 (95% CI: 1.47–5.92) for dioxin exposure above median	Participation bias, single outcome
Miyake *et al.* (2005)	Cross-sectional	children schools, Japan	Distance to nearest MSWI	Respiratory symptoms	Increased wheeze, headache, stomach ache, fatigue closer to incinerators	Ecological design, potential confounding

Abbreviations: MSWI = Municipal Solid Waste Incinerator; STS = Soft Tissue Sarcoma; NHL = Non-Hodgkin's Lymphoma; SIR = Standardized Incidence Ratio; OR = Odds Ratio; CI = Confidence Interval.

3.3. HWIs

Research on HWIs has been much less extensive than that performed on MSWIs, likely reflecting the smaller number of such facilities and their more restricted locations [45–47]. HWIs are designed to handle industrial and chemical wastes, which may contain higher concentrations of toxic metals and organic compounds than municipal waste. Consequently, potential emissions of dioxins, furans, and heavy metals are of particular concern [45,48]. The study of health effects associated with hazardous waste incineration has produced divergent findings. Studies conducted in Catalonia, Spain, around a HWI demonstrated that long-term environmental monitoring of air, soil, vegetation, and biological samples (blood and adipose tissue) showed pollutant levels within or below regulatory thresholds, with no notable health effects in nearby residents [45–50]. In contrast, older reviews and studies from other locations [51–53] have raised concerns regarding potential health risks, though these were often based on facilities with less stringent emission controls. A study in Italy [53] found an association between proximity to a HWI and risk of soft tissue sarcoma, while a South Korean study [54] reported elevated risks of certain cancers. However, these findings have not been consistently replicated. A review by Pleus and Kelly [55,56] concluded that the evidence for health effects from HWIs is limited and inconsistent, with many studies suffering from methodological shortcomings [56,57]. The studies on HWIs are summarized in Table 2.

Table 2. Hazardous waste incineration: summary of key epidemiological studies.

Study	Design	Population	Exposure Assessment	Main Health Outcomes	Key Findings	Limitations
Comba *et al.* (2003)	Case-control	STS cases, controls, Mantua, Italy	Distance from hazardous waste incinerator	Soft tissue sarcoma	OR 31.4 (95% CI: 5.6–176.1) within 2 km	Small sample size, single site
Zambon *et al.* (2007)	Case-control	sarcoma cases, controls, Venice, Italy	ISCLT3 atmospheric modeling	Sarcoma risk	OR 3.3 (95% CI: 1.24–8.76) highest exposure group	Exposure modeling uncertainty
García-Pérez *et al.* (2013)	Ecological	Cancer cases, Spanish towns	Distance from hazardous waste facilities	Cancer mortality	Elevated risks for several cancer types near facilities	Ecological design, multiple comparisons
Benedetti *et al.* (2020)	Case-control	Sarcoma cases 1999–2014, Italy	Proximity to industrial incinerator	Soft tissue sarcoma	Continued excess risk in updated analysis	Limited to single region

Abbreviations: STS = Soft Tissue Sarcoma; OR = Odds Ratio; CI = Confidence Interval.

3.4. MWIs

Epidemiological data on communities near MWIs is extremely scarce in the scientific literature. This scarcity reflects several factors: MWIs are typically smaller-scale facilities compared to municipal or hazardous waste incinerators, they are often located within hospital complexes or medical centers rather than as standalone facilities in residential areas, and regulatory attention has historically focused more on occupational rather than community exposures. The primary concern relates to the combustion of materials containing polyvinyl chloride (PVC), which can generate dioxins and furans [58,59]. However, community-based epidemiological studies specifically examining health outcomes in populations near MWIs are notably absent from the literature. A study conducted in Egypt [60] examined dermatological morbidity among workers and nearby residents of a medical waste incinerator, reporting elevated dermatological conditions among exposed individuals, although this remains one of the few community studies available. Given the lack of robust community-based evidence, most available data on MWI health effects comes from occupational studies of workers, which are discussed separately in Section 3.5.

3.5. Occupational studies

Workers at incineration facilities represent a highly exposed group to contaminants released from the combustion process. Several studies have measured elevated levels of dioxins, furans, heavy metals, and other pollutants in the blood or urine of incinerator workers [61–67]. Studies from various countries [61–63] have reported increased cancer mortality or morbidity among workers, particularly for lung cancer and other respiratory cancers. Biomonitoring studies conducted in Spain [64–67] demonstrated that workers at MSWIs and HWIs had higher body burdens of dioxins and metals compared to the general population, although levels typically remained below thresholds associated with overt toxicity.

The health outcomes reported in occupational studies have been inconsistent, reflecting variations in exposure levels, use of personal protective equipment, and facility technology. Modern facilities with improved emission controls and workplace safety measures appear to pose lower risks to workers, but long-term follow-up studies are still needed to fully characterize occupational health risks [68]. The studies on MWIs are summarized in Table 3.

Table 3. Medical waste incineration: summary of key epidemiological studies.

Study	Design	Population	Exposure Assessment	Main Health Outcomes	Key Findings	Limitations
Gustavsson *et al.* (1989, 1993)	Cohort	176 workers, Swedish MSWI	Occupational exposure	Mortality	SMR lung cancer, SMR ischemic heart disease (30+ years employment)	Limited to workers, small sample
Rapiti *et al.* (1997)	Cohort	532 male workers, Rome	Occupational exposure	Mortality	Overall SMR 71, lung cancer SMR 55 (NS)	Healthy worker effect possible
Maître *et al.* (2003)	Cross-sectional	29 MSWI workers, 17 controls	Air and biological monitoring	Exposure biomarkers	10–100× higher particle and metal exposure in workers	Cross-sectional design, exposure only
WHO (2024)	Review	Global assessment	Literature review	Multiple health outcomes	Dioxin, furan, heavy metal emissions pose health risks	Review/guideline document

Abbreviations: MSWI = Municipal Solid Waste Incinerator; SMR = Standardized Mortality Ratio; NS = Not Significant.

4. Discussion

This review highlights a complex and heterogeneous body of evidence regarding the health risks associated with waste incineration. The interpretation of this evidence is highly contingent on the technological stage of the incinerators studied, the methodological rigor of the epidemiological investigations, and the specific health endpoints examined.

4.1. The overarching influence of technological evolution

A central theme emerging from this review is the paradigm shift in incineration technology. The evidence unequivocally demonstrates that the health risk profile of waste incineration is not static but has evolved dramatically alongside technological advancements and increasingly stringent regulatory frameworks. For example, emissions of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) from modern waste-to-energy plants equipped with advanced flue gas treatment systems can be more than two orders of magnitude (> 100-fold) lower than emissions from older, uncontrolled incinerators [9,20]. Studies examining older, “first-generation” or “second-generation” incinerators with limited emission controls have generally reported more consistent evidence of health risks, particularly for cancer [26,29–31]. In contrast, research on modern “third-generation” facilities with advanced air pollution control technologies has yielded more reassuring findings.

However, the body of evidence on “third-generation” waste-to-energy plants, operating under the stringent emission standards enacted in the early 2000s (such as the EU Waste Incineration Directive of 2000), remains relatively limited. Most of the epidemiological literature pertains to facilities that were constructed or operated prior to these regulatory reforms [24,37]. While the available evidence suggests substantially diminished health risks from modern facilities, this does not mean “zero risk,” and long-term surveillance remains essential to fully characterize potential health impacts.

Systematic reviews focusing on these modern plants have generally concluded that there is little to no evidence for health risks when advanced emission controls are in place and facilities operate in compliance with current regulatory standards [20,24,69]. Nonetheless, it must be acknowledged that the evidence base for these newer facilities is still developing, and conclusions must be considered provisional until more long-term data become available.

4.2. Persistent methodological challenges

Despite the volume of research, the interpretation of the evidence is constrained by several key methodological issues that pervade much of the literature. It is important to emphasize that modern epidemiological interpretation should focus on effect sizes, their statistical precision, evidence of dose-response relationships, and careful assessment of risk of bias, rather than relying solely on dichotomous statistical significance testing, which can be misleading.

4.2.1. Exposure assessment

The main limitation of most studies is that they use residential proximity as a crude measure of exposure, without direct measurement of pollutant concentrations or consideration of individual exposure pathways. Proximity-based exposure metrics assume that individuals living closer to incinerators have higher exposures, but this assumption may not hold in all contexts, particularly when incinerators are equipped with modern emission controls and when other sources of pollution are present. More sophisticated exposure assessment methods, such as atmospheric dispersion modeling, biomonitoring, or the use of environmental measurements, have been employed in only a minority of studies [15–17,20–22,50].

4.2.2. Confounding

Communities living near industrial facilities in general, and incinerators in particular, often have different socioeconomic profiles, smoking rates, occupational exposures, and baseline health risks compared to the general population. Many studies have inadequately adjusted for these confounding factors, making it difficult to isolate the specific contribution of incinerator emissions to observed health outcomes.

4.2.3. Ecological issues

Many of the key studies, especially older ones, used an ecological design, which examines associations at the population or area level rather than at the individual level. While ecological studies can be useful for generating hypotheses, they are prone to the "ecological fallacy," whereby associations observed at the group level do not necessarily reflect associations at the individual level.

4.2.4. Study design heterogeneity

The reviewed literature demonstrates a clear lack of homogeneity in study designs, making direct comparisons and meta-analyses challenging. Studies vary widely in their definitions of "exposure," in the health outcomes assessed, in the length of follow-up, and in their statistical approaches.

4.3. Future research directions

While modern waste-to-energy plants appear to pose lower health risks, notable research gaps remain. Future studies should prioritize the use of more refined exposure assessment methods, such as biomonitoring coupled with advanced atmospheric dispersion modeling, to better characterize the exposure profiles of populations living near incinerators. Additionally, there is a pressing need for long-term cohort studies with individual-level data and comprehensive adjustment for potential confounders.

Furthermore, research should expand beyond the conventional endpoints of cancer and birth outcomes to include other health domains such as immune function, endocrine disruption, neurodevelopment, and cardiovascular effects, given that many of the pollutants emitted by incinerators have known or suspected effects in these areas. The geographic bias in the existing literature is also critical. Thus, the lack of data from developing regions is particularly concerning because waste composition, incineration technology, and regulatory enforcement may differ substantially from high-income countries, potentially leading to different health impact profiles. Research investment in these underrepresented regions is urgently needed. Future studies should aim to characterize these complex mixtures and explore their potential synergistic or antagonistic effects [70].

Finally, there is ongoing debate regarding the fundamental concept of "safe limits" for carcinogenic substances. While regulatory agencies set emission thresholds based on risk assessments, it is important to recognize that even low-level exposures to carcinogens may carry some degree of risk, albeit small. This underscores the importance of the precautionary principle and the need for continued technological improvements and vigilant monitoring [71].

4.4. Limitations of this review

Before discussing limitations, it is important to acknowledge the key strengths of this review. This work provides a broad temporal scope spanning over four decades of epidemiological research, uniquely integrating the evolution of incineration technology and regulatory frameworks with health risk assessments. The review critically appraises methodological challenges across studies and synthesizes evidence from multiple waste incineration types (municipal, hazardous, and medical), providing a comprehensive perspective on this complex public health issue.

This review has some limitations that should be acknowledged. While the review followed a structured search strategy inspired by PRISMA principles, it does not constitute a formal systematic review. The heterogeneity of study designs, exposure definitions, and outcome measures across studies precluded meta-analytic synthesis. Additionally, the geographic distribution of the reviewed studies is heavily skewed toward Europe and North America, limiting the generalizability of findings to other regions where waste management practices and regulatory environments may differ substantially.

5. Conclusions

Although the body of epidemiological research on waste incineration remains limited, it highlights the importance of distinguishing between historical risks from older facilities and the substantially lower risks associated with modern waste-to-energy plants.

Cancer Risks: Evidence from older incinerators with high emissions indicates an increased risk for soft tissue sarcoma, non-Hodgkin' s lymphoma, and possibly lung and liver cancers in exposed populations. Modern facilities with advanced controls show substantially diminished cancer risks, though long-term data remain limited.

Reproductive Effects: The evidence for adverse reproductive outcomes is limited and inconsistent. No clear pattern emerges, and studies of modern facilities have not confirmed associations.

Respiratory Effects: There is inconsistent and weak evidence for clinically respiratory effects from modern MSWIs.

Occupational Risks: Incinerator workers represent a high-risk group with consistent evidence of elevated exposure to toxic substances. Health surveillance and protective measures are essential for this population.

Modern Incinerators: The consensus from the most recent literature is that modern waste-to-energy plants, operating under stringent emission standards, pose substantially lower health risks compared to older facilities. However, the evidence base remains limited, and continued surveillance is necessary.

Methodological Considerations: The establishment of health risks from waste incinerators requires robust epidemiological methods, including refined exposure assessment, adequate control for confounding, and sufficient follow-up periods. Many studies in the literature suffer from methodological limitations that weaken causal inferences.

Although data from modern facilities are generally reassuring, the precautionary principle underscores the need for ongoing vigilance. Long-term epidemiological surveillance should include detailed facility characterization (emission levels, operational practices), follow-up periods long enough to capture cancer latency, and assessment of health effects from complex chemical mixtures rather than single pollutants. Future research should prioritize well-designed cohort studies with refined exposure assessment and comprehensive confounder control. There is also a pressing need for studies in regions outside Europe and North America, where most of the current research has been conducted, to ensure that findings are globally representative.

From a policy perspective, it is crucial that risk communication efforts clearly distinguish between historical risks from older, poorly controlled incinerators and the current evidence on modern facilities. Effective and transparent risk communication is essential to address public concerns, distinguishing between historical risks and the current state of evidence for modern, well-regulated facilities. Public health authorities must balance the need to acknowledge uncertainties with the imperative to provide evidence-based guidance to communities.

Conflicts of interest

José L. Domingo holds the position of Advisory Board Member for *International Journal of Environmental Epidemiology* and has not peer reviewed or made any editorial decisions for this paper.

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