



Assessment of Microplastics in Road Dust and Their Human Health Impacts: A Review

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Article's Information	Abstract
Received: 18.03.2025 Accepted: 02.06.2025 Published: 15.03.2026	Microplastics (MPs), which are resistant to degradation in the environment, have been identified in air, dust, soil, and water samples throughout the world. This review aims to represent the assessment of microplastics in road dust and their impacts on human health. The study considered available data from journals, books, and reports published within the last twenty years on MPs in road dust. Tire wear, textiles, waste disposal, road markings, building materials, and packaging material, these are the leading sources of microplastics in road dust. To identify the MPs in road dust, microscope, FT-IR, Raman spectroscopy, GC-MS, and SEM-EDX were used. The dominant polymers in road dust were PP, PE, PVC, and PET. This review found the MPs deposition rates varied from 22 to 3.43×10^6 MPs/m ² /day, which significantly depends on population density and traffic intensity. However, the MPs abundance in road dust ranged from 0.068 to 20.16 particles/g. Consequently, an average of 1063 and 3223 microplastic particles are ingested per year by adults and children, respectively, which may cause numerous human health problems such as gastrointestinal disorders, immune system disruption, respiratory issues, cancer, etc. Hence, all types of plastics should be collected, and enhanced recycling could be a solution to control microplastic pollution from road dust.

Keywords:

Bio-accumulation,
Food chain,
Inhalation,
Microplastics,
Pollution,
Road dust

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1. Introduction

Microplastics (MPs) are small plastic particles (<5 mm) produced by the decomposition of plastic trash [1, 2]. Microplastics (MPs) are persistent in nature due to their chemical composition. This chemical stability makes them resistant to environmental degradation processes like oxidation, hydrolysis, and microbial action. While sunlight and mechanical actions can break larger plastics into smaller fragments, these processes do not fully degrade the material [3, 4]. Instead, they result in microplastics, which persist for decades or longer. Once released, MPs remain in ecosystems for an extended period, posing ongoing risks to biodiversity and ecosystem health. Microplastics can accumulate in the food chain, affecting organisms from plankton to humans. MPs can act as pollutant carriers in the ecosystem [5-8]. MPs, which carry chemicals and contaminants, have been identified in air, dust, water, and soil, posing a danger to human health and the environment. MPs are produced by both

point and non-point pollution sources. Point sources account for 37.3% of microplastics, while nonpoint sources account for 62.7%. Urban road dust in a non-point source of MPs. Urban roads play a crucial role in our daily lives, and are among the first environments to experience contamination from a variety of toxic pollutants due to human activities [9-11]. Microplastics (MPs) in road dust primarily arise from terrestrial sources, such as vehicle traffic and litter [10, 12], which are classified as primary sources, or from atmospheric deposition, considered a secondary source [13]. A research conducted in Germany and Sri Lanka has revealed significant amounts of MPs in road dust originating from tire wear, waste dumping, industrial emissions, and commercial and household activities [12, 14]. Moreover, polymer-enhanced bitumen and road marking materials have been identified as additional contributors to MP pollution in road dust. A study by Kitahara and Nakata (2020) highlights road markings as a substantial source of MPs in

urban road dust in Japan [15]. Human activities significantly impact the occurrence of microplastics in the air [16]. Research by Dris et al. (2016) in Paris, fibers are reported in most atmospheric fallout at urban and suburban locations [17]. Similarly, Zhou et al. (2018) identified airborne MPs, including fibers, fragments, films, and foams of various colors, in Yantai, a coastal city in China's Shandong Province [18]. Due to their small size and lightweight nature, these MPs can easily become bioavailable through inhalation or accidental ingestion, which causes human health risks [8]. Microplastics in road dust was reported globally, including Australia [19-21], Japan, Nepal, and Vietnam [22], China [23], Iran [16, 24], India [25], Germany [26], and Sweden [27]. These studies utilized either count-based or mass-based approaches to identify and quantify MPs. Count-based methods were predominant, employing methods such as FTIR [19, 22], Raman microscopy [25], and stereo microscopy [21]. A smaller number of studies used mass-based methods, relying on pyrolysis–gas chromatography-mass spectrometry (GC/MS with a pyrolysis unit) to analyze polymer-specific pyrolysis products [20, 26]. This study searched for data on road dust associated microplastic contamination from different peer-reviewed Journals, books, newspapers, and reports published within the last twenty years using multiple search engines such as Google scholar, ResearchGate, PubMed, JSTOR, Microsoft Academic, ScienceDirect, Scopus, Web of Science, etc., searched by the keywords of the theme. Consequently this study aims to represent the scenario of microplastic contamination from road dust, emphasizing sources, characterization, and impacts on human health.

2. Sources of MPs in Urban Road Dust

Polyethylene is primarily utilized in producing packaging films, garbage and grocery bags, wire and cable insulation, agricultural mulch, bottles, toys, and household items. It is also commonly used in making trays, fruit juice containers, milk cartons, crates, and various food packaging materials [28]. Polypropylene is an excellent material for packaging due to its strength, barrier properties, low cost, and optical clarity. Its low moisture transmission makes

it ideal for food packaging, while blow-molding techniques are used to create bottles, pots, and crates. It is also popular for thin-walled food containers, translucent household items, furniture, toys, and luggage [29]. Polyethylene terephthalate is widely used for packaging of food and beverage due to its strength, hygiene, lightweight nature, and ability to retain freshness. It is commonly used for water and soda bottles, food containers for cakes, fruits, and salads, as well as retail packaging for cosmetics, razors, and toys. PET is also found in containers for peanut butter, shampoo, salad dressings, and even in products like carpets, clothing, and sleeping bags [30]. Microplastics from polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET) can mix with urban road dust through various mechanisms viz: wear and tear of plastic products, improper disposal and littering, road and vehicle sources, atmospheric deposition, household activities, industrial and manufacturing processes, resuspension of contaminated soil, fragmentation of plastic waste. Urban building materials may significantly contribute to the presence of PDAP in road dust through processes like abrasion, fragmentation, and eventual incorporation into the dust [15, 31]. Additionally, PMMA used in road marking paint may degrade and fragment into smaller particles with increased traffic activity. The link between traffic density and microplastic concentrations suggests that acrylic resins found in MPs samples likely originate from the decaying of road marking paints. Similarly, PVC, often used in sidewalk road markings, can break down into microplastics over time due to wear from traffic. These particles may be transported onto roadways and become part of road dust [15]. Moreover, abrasion and fragmentation of vehicle tyres and road wear contribute to microplastics in road dust. These microplastic particles accumulate in urban road dust, raising concerns about their potential health and ecological impacts. Therefore, from the discussion of various researchers, this review finds out that, tire ware, textile, waste disposal, road markings, building materials, and packaging materials are the principal sources of microplastics in road dust (Figure 1).

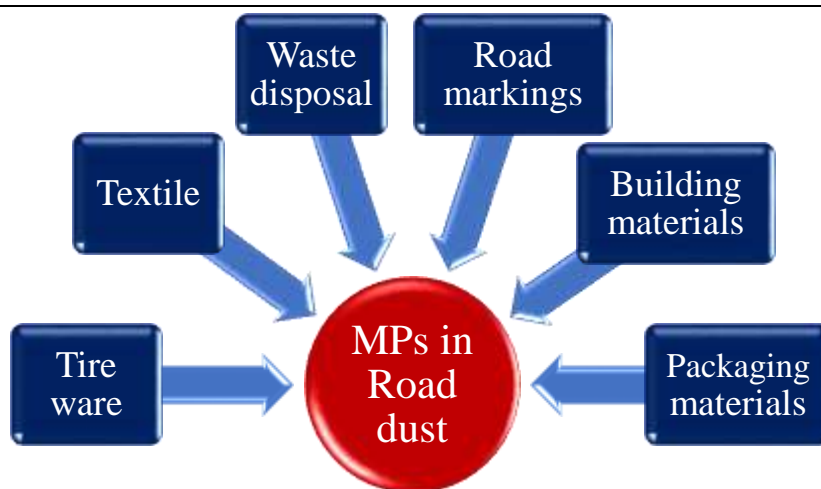


Figure 1: Sources of MPs in road dust

3. Analytical Procedure of Microplastics in Road Dust

Analysis of microplastics in dust samples involves several analytical techniques to identify, quantify, and characterize the microplastic particles (Table 1). Common methods are:

3.1. Sample Collection and Preparation

Three types of sampling methods are applied for collecting dust samples, i.e. surface sampling, passive sampling, and direct sampling. For direct sampling air dust collector is used. In surface sampling dust is collected from surfaces using brush and dustpan, vacuum cleaners, adhesive tapes, or wipes [32]. Outdoor or indoor deposited dust is collected with glass petri dish or beaker is called passive sampling [33].

3.2. Chemical Extraction

Digestion or solvent extraction process removes organic matter without affecting plastic particles. For the digestion process common reagents including hydrogen peroxide or potassium hydroxide are used [15, 66]. In solvent Extraction, dissolves specific components of dust to isolate microplastics for further analysis [34].

3.3. MPs Separation

Density Separation and filtration are used to separate MPs. Dust is mixed with a high-density solution (e.g., sodium chloride or zinc chloride) to separate lighter plastic particles from heavier materials [35]. Then the supernatant is filtered to isolate microplastic particles with vacuum filtration [66].

3.4. Visual identification

A stereomicroscope is used to visually identify and manually sort microplastics based on size, shape, and color (Figure 2) [15, 33]. Dyes like Nile Red bind to hydrophobic microplastic surfaces, making them easier to detect under fluorescence microscopy [3].

3.5. Spectroscopic and Other Techniques

Fourier-Transform Infrared (FTIR) Spectroscopy identifies the polymeric composition by analyzing the chemical functional groups in the particles [15, 33]. Raman Spectroscopy provides in-depth molecular insights to verify the identity of smaller microplastics [2]. Pyrolysis-Gas Chromatography/Mass Spectrometry (Py-GC/MS) breaks down the material into its chemical components through heat, allowing polymer identification [36]. Thermogravimetric Analysis (TGA) assesses thermal stability and composition to differentiate between plastics and other materials [37]. Scanning Electron Microscopy (SEM) examines surface morphology and size of microplastics with high-resolution imaging [2, 32]. Energy-Dispersive X-Ray Spectroscopy (EDS) is used alongside SEM to analyze elemental composition, aiding in polymer identification [2, 32]. Gravimetric Analysis measures the total weight of microplastics in a dust sample after isolation, providing quantitative data [38]. Laser Diffraction or Dynamic Light Scattering (DLS) determines the size distribution of microplastic particles in dust samples [36, 39]. These tests can be combined for a comprehensive analysis of microplastics in dust, providing insights into their composition, sources, and potential impacts.

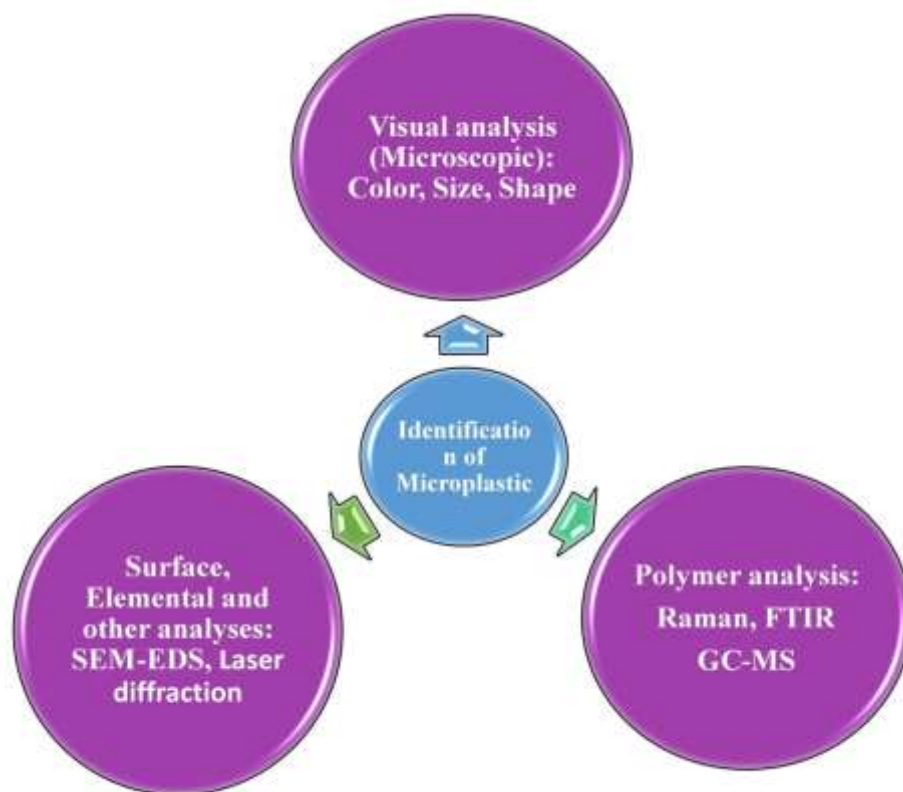


Figure 2: Identification of microplastic

4. Assessment of Microplastics in Road Dust

4.1. Color of Microplastics in Road Dust

Several researchers observed the colors of MPs using stereomicroscope [24, 40-42]. The presence of black, red, blue, yellow, green, white, and clear fibers was noted. Furthermore, the study showed semi-bleached fibers, suggesting environmental degradation. Toha et al. (2024) reported most of the fibers are red (40%), with colorless fibers at 30%, black at 25%, sky at 2%, orange at 2%, and blue at 1%. The most common color of fragment-type microplastics was blue at 35%, with black following closely at 30%, green and colorless microplastics each accounted for 10%, while yellow also represented 10%, brown made up 3%, and orange constituted 2% [41]. Abbasi et al. (2017) found the colors of MPs are red/pink 56.21%, black/gray 20.20%, white/transparent 11.9%, yellow/orange 3.9%, and blue/green 7.77% [24]. Yang et al., (2023) found white/transparent (21.5%), orange/yellow (9.2%), red/pink (13.2%), blue/green (15.9%), brown (6.2%), and black/grey (34%) [42]. It was found that, red, white/colorless, and blue were the dominant colors of MPs found in road dust.

4.2. Investigated Size of Microplastics in Road Dust

Plastic particles, which size is less than 5 mm are microplastics. Morioka et al. (2023) categorized microplastics (MPs) into four size ranges: 250–850 μm , 125–250 μm , 7.0–125 μm , and 1.1–7.0 μm (Table 2) [36]. Jenner et al. (2021) observed a correlation between increasing particle concentration with decreasing particle size (5–250 μm , 250–500 μm , 501–1000 μm , and 1001–5000 μm accounted for 59%, 18%, 13%, 10%, respectively) [43]. Bhat (2024) identified MPs in deposited dust samples ranging from 197–2104 μm , 131–2659 μm , 67–2534 μm , and 84–1590 μm respectively in four different classrooms with average size 120–2222 μm [44]. Yang et al., 2023 reported MPs sizes ranging from 250-500 μm were dominant (24.70%) and MPs size >1000 μm , 500-1000 μm , 100-250 μm , and <100 μm were found 23.30%, 19.10%, 16.30% and 16.60% respectively [42].

4.3. Shapes of Microplastics

Table 3 presents a comparative summary of microplastic shapes identified in environmental samples from various cities worldwide, these shapes include fragmented pieces, fibers, films, spheres,

tire wear particles (TWPs), microbeads, and foam. Fragmented plastics were prevalent in road dust from Nanjing (62.4%) and Melbourne (60%) and also significant in Varanasi (42%) [13, 32, 33]. Fibers were the most abundant in indoor dust in the Humber region (90%) and Dhaka's road dust (70.26%) [41, 43]. Films contributed moderately across most locations, with a notable 18% in Varanasi [32]. Yang et al., 2023 reported that fragment (38.50%) and fiber (25.10%) were the dominant shapes of MPs found in road dust [42]. In industrial regions, microplastics primarily took the form of fragments. Fiber MPs are originated from textiles and synthetic fabrics. Films are mainly derived from packaging materials [66]. Abbasi et al. (2017) also discovered shiny microplastic films in road dust samples collected from Bushehr City, Iran, and indicated that these microplastic films originated from packaging materials [24]. Different urban environments exhibit varying distributions of microplastic shapes, likely due to local pollution sources, population density, and waste management practices.

4.4. Polymeric Compositions of Microplastics in Road Dust

Several researchers found polyethylene (PE), polypropylene (PP), poly diallyl phthalate (PDAP), polyvinyl chloride (PVC), polymethyl methacrylate (PMMA), polyester (PES), polyvinyl alcohol (PVAc), polyethylene terephthalate (PET), polystyrene (PS), polyamide (PA), rubber etc. MPs in urban road dust samples (Table 4). Among these PE, PP, PVC, and PET are dominating MPs found in urban road dust samples in different cities based on land use category [1, 15, 20, 36, 43, 66]. This review found the abundance of PE, PP, PVC, and PET ranged from 3% - 53.79%, 4% - 42%, 7% - 29%, and 15% - 55% respectively (see Table 4).

4.5. Abundance of Microplastics in Road Dust

Several studies reported the quantity of MPs in road dust in different cities (Table 5). The review found

the abundance of microplastics in road dust varied from 0.068 to 20.16 particles/g and the highest abundance of 88 to 605 MPs per 30 g was found in street dust of Tehran, Iran [45]. Kitahara and Nakata (2020) observed that, among the three cities Kumamoto, Okinawa, and Tokyo in Japan, the microplastics in the road dust sample are higher in Tokyo city [15]. O'Brien et al. (2021) found that, in the city area, the abundance of MPs in road dust is higher than that in the other land use-based areas (Rural, Residential, Industrial, Traffic) in South East Queensland, Australia [20]. Vehicular and population density were the most influential factors that contributed to the MPs abundance.

4.6. Deposition Rates of MPs

The deposition rate of microplastics (MPs) is the number of MPs that settle on a surface (such as land or indoor environments) over a given time period, it is usually measured in particles per square meter per day (particles/m²/day). The rate might vary greatly based on factors including location, source proximity, weather, and human activity (Table 6). Islam et al. (2024a) indicated that the deposition rates ranged from 7.52×10^3 MPs/m²/day to 66.29×10^3 MPs/m²/day, with an average deposition rate of 34×10^3 MPs/m²/day recorded in the indoor environment of Dhaka city [47]. Another researcher Islam et al. (2024b) estimated the deposition rate ranged from 1.11×10^6 - 5.78×10^6 MPs/m²/day and the average value was 3.43×10^6 MPs/m²/day [40]. Zhang et al. (2020) reported the MPs deposition rate was 9.9×10^3 MPs/m²/d 1.8×10^3 MPs/m²/d, and 1.5×10^3 MPs/m²/d in the dormitory, office, corridor respectively in Shanghai, China [23]. Jenner et al. (2021) found household average deposition rate 1414 MPs/m²/day ± 1022 (mean \pm SD) [43]. This review found the deposition of MPs varied from 22 to 3.43×10^6 MPs/m²/day (Table 6). Population density and traffic intensity significantly contribute to the deposition Rate of MPs.

Table 1: Characterization methods of Microplastics in urban road dust

Study area	Sample type	Sampler	Analysis method	Major Finding	Reference
Sydney, Australia	Indoor dust	Passive sampling (petri dish)	Stereomicroscope, fluorescent microscope, micro-FTIR spectroscopy	Polyester, polystyrene, polyethylene, polyacrylic, polyamide, and fibers were found in greater abundance	[33]
Goyang city, South Korea	Road dust	Sweeping	Stereoscopic microscope, Raman spectroscopy, FTIR spectroscopy, SEM, EDX	MPs concentration increased in road dust with the increasing of drying period	[2]
Varanasi City, India	Street dust	Brush and pan	Binocular microscopy, fluorescence microscopy, SEM, EDX, FTIR spectroscopy	Polypropylene, polyvinyl chloride, polyethylene, polyethylene terephthalate, polyester, and polystyrene MPs found	[32]
Australia	Road dust	-	Nile red (NR) fluorescence microscopy	The NR staining method introduced in this study can effectively distinguish between MPs as small as 1 µm and other non-plastic materials found in road dust	[3]
Tokyo, Okinawa, Kumamoto, Japan	Road dust	Brush and dustpan	Stereomicroscope, FTIR spectroscopy	The large population and high traffic congestion in Tokyo might lead to a higher concentration of MPs in road dust compared to other cities	[15]
Kusatsu city, Japan	Surface road dust	Cordless stick vacuum	Pyrolysis-gas chromatography-mass spectrometry, Laser Diffraction	This study reported the occurrence of various MP particles in surface road dust with the range of 1.1–850 µm	[36]
Chennai Metropolitan City, India	Street dust	Brush and pan	Nile Red staining and fluorescent microscopy	This report marks the first detection of microplastics in street dust gathered from a city in India.	[25]

Table 2: Investigated size of Microplastics in Road Dust

Study area	Sample type	Size of Microplastics	Reference
Kusatsu, Shiga, Japan	Road dust	1.1 μm –850 μm	[36]
Humber region, United Kingdom	Indoor deposited Dust	5 μm –250 μm (59%) 250 μm –5000 μm (41%)	[43]
Eskisehir, Turkey	Indoor deposited Dust	120 μm –2222 μm	[44]
Shenzhen City, Guangdong Province, China	Road dust	933.4 μm –4889.8 μm	[1]
Varanasi City, India	Street dust	<1mm	[32]
Goyang city, South Korea	Road dust	200 μm –2000 μm	[2]
Bushehr city, Iran	Street dust	100 μm –5000 μm	[24]

Table 3: Shapes of Microplastics in Road Dust

Study area	Sample type	Shape of Microplastics							Ref.
		Fragment	Fiber	Film	Sphere	TWP	Microbeads	Foam	
Varanasi City, India	Street dust	42%	33%	18%	7%	-	-	-	[32]
Melbourn, Australia	Road dust	60%	21%	8%	-	-	11%	-	[66]
Humber region, United Kingdom	Indoor deposited Dust	8%	90%	1%	1%	-	-	-	[43]
Nanjing City, China	Road dust	62.4%	12.7%	1.2%	-	23.7%	-	-	[61]
Dhaka city, Bangladesh	Road dust	26.12%	70.26%	1.32%	-	-	0.66%	1.58%	[41]

5. Impacts on Human Health:

Microplastics possess a large surface area and hydrophobic characteristics that enable them to attract and release environmental pollutants [5, 6]. Weathering processes can enhance contaminant uptake by increasing the microplastics' surface area and polarity [5, 6]. Although aquatic plastic pollution is extensively studied, understanding of microplastic (MP) pollution in the air remains limited. Due to their small size and low density, microplastics can be transported into the atmosphere and carried by wind [48]. Airborne microplastics differ from those found in other ecosystems as they can be inhaled directly and consistently, which may pose health risks to humans [7, 8]. Prata et al. (2018) estimated that humans could inhale 26 to 130 airborne microplastics per day, while Liu et al. (2019) reported that citizens in Shanghai likely inhale around 21 microplastics daily from outdoor environments [8, 49]. Dehghani et al., 2017 reported that average of 1063 and 3223 microplastic particles is ingested per year by adults and children,

respectively [45]. Plastic particles are present in the air and can be inhaled by humans, potentially causing harmful effects on the respiratory system as well as other bodily systems [50, 51]. Inhaling or ingesting microplastics can lead to particle toxicity in tissues, while the harmful chemicals and microorganisms attached to the microplastics may trigger inflammation and infections [4]. Bioaccumulation of MPs in the cells and tissues of living organisms, poses risks of chronic biological effects and potential health issues for humans, such as gastrointestinal disorders, immune system disruption, respiratory issues, cancer, infertility, and chromosomal alterations (Figure 3) [52-55]. Plastics consist of monomers, dyes, additives, and other components, many of which are toxic [8]. Unreacted monomers and harmful chemicals in plastics, and can pose health risks. Certain plastics, including polyvinyl chloride (PVC), polystyrene (PS), and polycarbonate (PC) have been found to release toxic compounds linked to reproductive toxicity, mutagenicity, and cancer [56]. PVC particles containing additives can induce more severe

inflammation compared to those without additives [57]. In addition, various research studies demonstrate that microplastics have the ability to absorb and concentrate contaminants like heavy metals, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs), raising public concerns due to their widespread presence and potential as mutagens and carcinogens [58, 59]. Airborne microplastics can capture various contaminants from the air, including polycyclic aromatic hydrocarbons (PAHs) and transition metals originating from traffic emissions [7]. Acting as carriers and protective agents, microplastics can transport and shield organisms over long distances in the atmosphere. Consequently, inhaling or ingesting microplastics can lead to particle toxicity within tissues, while the toxic substances and microorganisms adhered to microplastics may trigger inflammation and infections. Recent

research has revealed that atmospheric microplastics raising concerns about their potential to contaminate ecosystems through deposition or cause health issues upon inhalation. Airborne microplastics may contribute to airway and interstitial lung diseases through mechanisms such as dust overload, oxidative stress, translocation, and gene mutation. These conditions are often observed as occupational diseases in industries handling flock, synthetic textiles, or PVC. However, even at low environmental concentrations, microplastics may play a role in the development of cardiovascular and respiratory diseases within the general population [8, 53-55, 60, 62-64]. Dong et al. (2020) demonstrated that polystyrene microplastics can trigger inflammatory and cytotoxic effects in human lung epithelial BEAS-2B cells by promoting the generation of reactive oxygen species (ROS) [65].

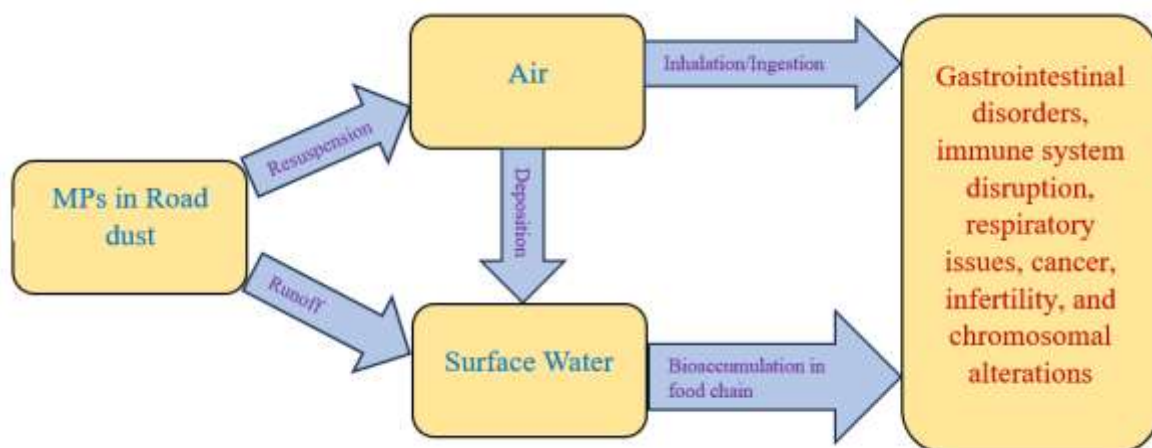


Figure 3: Human health impact of MPs in road dust

Table 4: Polymer compositions of microplastics in road dust

Study area	Sample type	Polymeric compositions of MPs in road dust													Reference
		PDAP	PVC	PMMA	PE	PES	PVAc	PP	PET	PS	PA	Rubber	Others		
Kumamoto, Japan	Road dust	23%	13%	12%	8%	7%	5%	-	-	-	-	-	32%	[15]	
Okinawa, Japan	Road dust	7%	7%	12%	29%	8%	-	5%	-	-	-	-	32%	[15]	
Tokyo, Japan	Road dust	7%	14%	12%	7%	15%	5%	-	-	-	-	-	40%	[15]	
South East Queensland, Australia	Road dust	-	29%	7.6%	21%	-	-	10%	29%	1.1%	-	-	2.9%	[20]	
Shenzhen City, Guangdong Province, China	Road dust	-	-	-	53.79%	-	-	10.9%	-	6.55%	7.85%	9.63%	11.27%	[1]	
Melbourn, Australia	Road dust (Industrial)	-	10%	-	18%	-	-	42%	15%	7%	-	8%	-	[66]	
Melbourn, Australia	Road dust (Residential)	-	-	-	15%	-	-	22%	55%	8%	-	-	-	[66]	
Melbourn, Australia	Road dust (Commercial)	-	8%	-	34%	-	-	25%	20%	5%	-	8%	-	[66]	
Humber region, United Kingdom	Indoor deposited Dust	-	-	3%	3%	-	-	4%	63%	-	6%	-	21%	[43]	

Table 5: Abundance of Microplastics in road dust

Study area	Sample type	Abundance of Microplastics	Ref.
Kumamoto, Japan	Road dust	96±85 pieces/kg	[15]
Okinawa, Japan	Road dust	68±77 pieces/kg	[15]
Tokyo, Japan	Road dust	230±50 pieces/kg	[15]
Chennai city, India	Street dust	227.94 ± 89.82 particles/100g	[25]
South East Queensland, Australia	Road dust (Rural Residential)	0.80 ± 0.49 mg/g	[20]
South East Queensland, Australia	Road dust (Rural location)	0.53 ± 0.16 mg/g	[20]
South East Queensland, Australia	Road dust (Residential)	0.68 ± 0.20 mg/g	[20]
South East Queensland, Australia	Road dust (Traffic)	1.2 ± 0.70 mg/g	[20]
South East Queensland, Australia	Road dust (Industrial)	2.4 ± 0.55 mg/g	[20]
South East Queensland, Australia	Road dust (City)	5.9 ± 3.1 mg/g	[20]
Shenzhen City, Guangdong Province, China	Road dust	0.33 - 3.64 g m ⁻²	[1]
Dhaka city, Bangladesh	Street dust (Industrial)	17.33 MP particles/g	[46]
Dhaka city, Bangladesh	Street dust (Residential)	13.99 MP particles/g	[46]
Tehran, Iran	Street dusts	88 to 605 microplastics per 30 g	[45]

Table 6: Deposition rates of MPs

Study area	Sample type	Deposition rate	Ref.
Dhaka, Bangladesh	Indoor deposited dust	34 × 10 ³ MPs/m ² /day	[40]
Shanghai, China	Indoor deposited dust	Dormitory 9.9 × 10 ³ MPs/m ² /d, office 1.8 × 10 ³ MPs/m ² /d and corridor 1.5 × 10 ³ MPs/m ² /d	[23]
Dhaka, Bangladesh	Outdoor deposited Dust	3.43×10 ⁶ MPs/m ² /day	[47]
Humber region, United Kingdom	Indoor deposited Dust	1414 MPs/m ² /day ± 1022 (mean ± SD)	[43]
Sydney, Australia	Indoor deposited Dust	22 to 6169 fibers/m ² /day	[33]

6. Conclusions

Microplastics, an emerging contaminant worldwide, have been identified in road dust in higher abundance. Tire wear, textiles, waste disposal, road markings, building materials, and packaging materials are the major sources of microplastics in road dust. Characterization of microplastics involves several analytical methods, including stereomicroscopy, fluorescent microscopy, FT-IR spectroscopy, Raman spectroscopy, GC-MS spectroscopy, SEM-EDX, etc. MPs are of different colors, sizes, shapes, origins, and chemical compositions. It is found that red, white/colorless, and blue were the dominant colors of MPs found in road dust. Fragments are the dominant shapes of microplastics found in road dust in industrial areas, whereas fibers originated from textiles and synthetic fabrics, and films are mainly derived from packaging materials. Polymeric compositions of MPs in road, dust were polypropylene (PP), polyethylene (PE), polyester (PES), polystyrene (PS), polyamide

(PA), polyethylene terephthalate (PET), polyvinyl chloride (PVC), polyacrylic, rubber, etc. This review found the abundance of PE, PP, PVC, and PET in road dust ranged from 3% to 53.79%, 4% to 42%, 7% to 29%, and 15% to 55%, respectively. The abundance of MPs in road dust varied from 0.068 to 20.16 particles/g. Moreover, this review found the MPs deposition rates varied from 22 to 3.43×10⁶ MPs/m²/day, which significantly depended on population density and traffic intensity. However, an average of 1063 and 3223 microplastic particles are ingested per year by adults and children, respectively, which may cause numerous human health problems such as gastrointestinal disorders, immune system disruption, respiratory issues, cancer, infertility, chromosomal alterations, etc. Therefore, caution must be taken in disposing and or throwing plastics, and measures taken to control and immediately stop it, additionally measures should be taken to collect all types of plastics, and thus, enhanced recycling of plastic materials could

be a solution to control microplastic pollution from road dust.

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