

Circular Economy Challenges in Plastic Supply Chains: Public Awareness of Environmental and Health Risks in Malaysia & Indonesia

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Abstract— Plastic supply chains have enabled global manufacturing and trade efficiency, yet weak end-of-life management and uneven adoption of circular economy practices have created significant environmental and public health challenges. In Southeast Asia, regulatory gaps and limited waste recovery infrastructure have allowed transboundary plastic waste flows, informal recycling, and open dumping to become embedded in supply chain end-of-life processes. These practices expose communities to toxic emissions, contaminated food chains, and degraded ecosystems, making public awareness a critical factor in driving behavioural and policy responses. This study investigates public awareness of health and environmental risks associated with plastic waste dumping in Malaysia and Indonesia. Using a qualitative research design, data were collected from 162 respondents through an online survey assessing awareness, media exposure, perceived personal health risks, attitudes toward economic trade-offs, and behavioural intentions. The analysis is guided by the Health Belief Model, Risk Perception Theory, Knowledge–Attitude–Behaviour framework, and Theory of Planned Behaviour to explain how perceptions and social contexts influence environmental decision-making. Thematic and empathy mapping reveal widespread concern regarding respiratory illness, chronic disease risks, environmental degradation, and food contamination. Findings indicate that while general awareness of plastic waste hazards is high, gaps remain in understanding specific health impacts and in

translating concern into sustained behavioural action. Media exposure and perceived personal risk emerge as key drivers of pro-environmental intentions, while limited trust in enforcement institutions constrains public expectations of regulatory effectiveness. The study contributes to supply chain and circular economy literature by highlighting how failures in plastic end-of-life governance manifest as community health risks and by demonstrating the importance of public perception in supporting circular transition policies. The findings provide evidence to inform targeted education initiatives, stronger enforcement mechanisms, and community engagement strategies, supporting regional implementation of global plastic governance initiatives, including the United Nations Global Plastics Treaty.

Keywords— Plastic Waste Dumping, Environmental Health Risks, Public Awareness and Perception, Transboundary Pollution, Health Belief and Risk Perception Models

1. Introduction

Plastic has become an essential material within modern supply chains, supporting manufacturing efficiency, product innovation, and global trade. The plastic supply chain extends from raw material extraction and polymer production to product manufacturing, distribution, consumption, and end-of-life processing. Over recent decades, plastic production has increased sharply, but waste

management systems have not developed at the same pace, creating structural weaknesses at the disposal and recovery stages [34]. These weaknesses have allowed large volumes of plastic waste to leak from formal waste management channels into informal recycling, open dumping, and uncontrolled burning practices. Transboundary movements of plastic waste have further reshaped global supply chain flows, linking high-consumption economies with disposal and processing sites in lower-income countries. In response to these challenges, the circular economy has emerged as a guiding framework to redesign plastic supply chains toward reuse, recycling, and material recovery, rather than linear “take–make–dispose” models. Circular economy strategies promote closed-loop material systems, extended producer responsibility, and sustainable product design to reduce environmental impacts and dependence on virgin resources [41]. However, the adoption of circular practices remains uneven across regions due to regulatory gaps, financial limitations, and weak enforcement capacity. Where circular systems are insufficient, illegal imports,

informal recycling networks, and plastic waste dumping become embedded within the end-of-life stage of the supply chain. Within this broader plastic supply chain and circular economy context, the issue of plastic waste dumping in Southeast Asia represents a critical environmental and public health concern. The background of the study discusses the impacts on how Malaysia and Indonesia have become major destinations for imported plastic and mixed waste from wealthier countries. Weaknesses in regulation, enforcement and waste management infrastructure have allowed illegal importation, open dumping and informal recycling practices to proliferate [21].

Plastic waste has become a transboundary environmental and public-health issue in Southeast Asia based on the evolution of the global plastic trade (Figure 1). Plastic production has sharply increased over the last 70 years. In 1950, the world produced just two million tonnes. It now produces over 450 million tonnes [31]. Only 9 percent of it is recycled, and one study predicts that global emissions from plastic production could triple by 2050 [4].

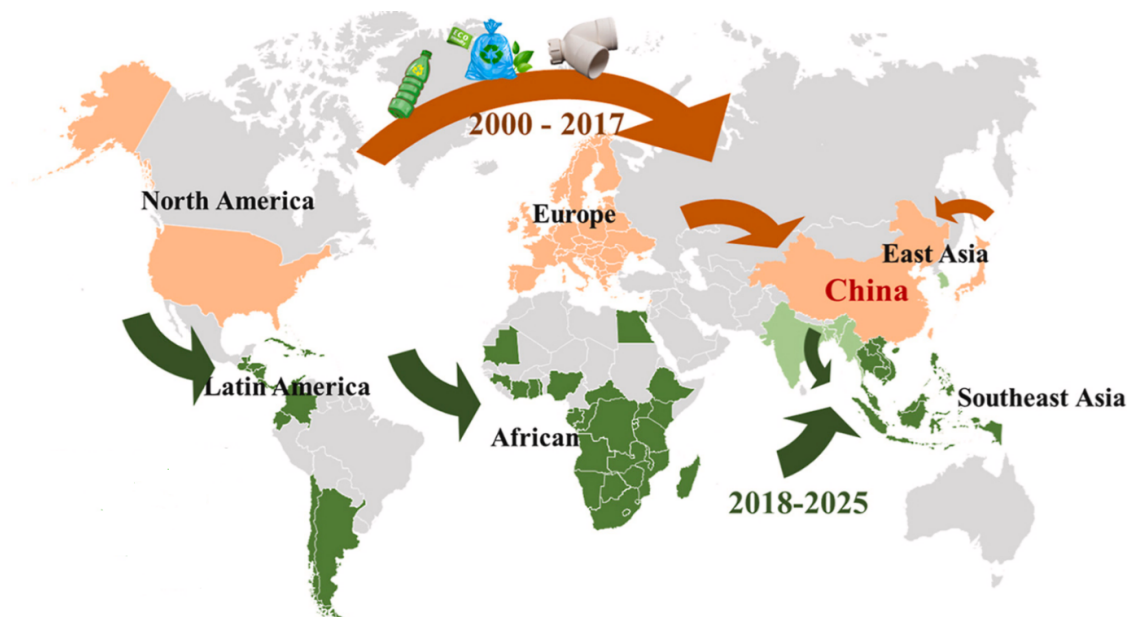


Figure 1. Evolution of global plastic waste trade flows from 2000 to 2020 and its predicted trade sinks in 2030

Source: [21]

Unsustainable solid waste management (SWM) practices, exacerbated by rapid urbanization and financial and institutional limitations, negatively impact public health and environmental sustainability [1]. Open-air burning and low-technology recycling (and improper disposal) lead

to release of toxic by-products. Volatile Organic Compounds (VOCs), dioxins, heavy metals and persistent organic pollutants that contaminate air, soil and water, pose direct health risks to nearby communities and there is a lack of detailed data of open burning practices [30]. In Indonesia,

investigative reporting has documented the extreme end of this problem, where plastic waste is being used as fuel in small food processing operations, contaminating food items (e.g., tofu), despite regulations intended to prevent such practices [35]. Due to the large population in Indonesia, the administrative enforcement of food safety is limited by enforcement funding; lack of community knowledge and awareness towards food safety; lack of competent food inspectors; and lack of coordination between food safety administrative bodies [29]. Further research in Indonesia has identified factors such as rapid urbanization, industrialization, and intensive agriculture that have led to serious environmental degradation and impact on public health and the need to create sustainable solutions to improve public health outcomes [9].

Public awareness and perception of these risks are crucial [11], where awareness influences household behaviour (e.g., waste segregation, avoidance of contaminated products), which then applies civic pressure on authorities and calls for support of policy measures (e.g., stricter import controls).

1.1. Problem Statement

Despite national and regional policies, illegal imports and informal handling of plastic waste persist, undermining public health and the environment. Global plastics waste is an issue of ever-increasing urgency. Britain's exports of plastic waste to developing countries have soared by 84% in the first half of 2025 compared with last year [37]. Estimates suggest some 79% of plastic waste is dumped into the environment, where it is likely to have devastating effects on ecosystems and human health [13]. In 2024, more than 35,000 tons of plastic waste from the US was shipped to Malaysia, which received more discarded plastic from rich nations than any other developing country. But it was only in June 2025, that Malaysian leaders effectively banned future shipments [26].

Communities may be unaware or under-informed about the specific health risks associated with plastic waste burning and open dumping. The open burning of plastic wastes is a practice that is happening widely across the globe, toxic to human and environmental health and is often an overlooked aspect of plastic pollution

[25]. Informal recycling (e.g., VOCs, dioxins, heavy metals) and contaminated foodstuffs enter local food systems occasionally. To secure local production, polluted water may be used for food production, processing and consumption, which might jeopardize human health [20].

Weak enforcement, deceptive import declarations and economic incentives for informal recyclers create a gap between policy and practice. Enforcement gaps, lack of standardized regulations, and insufficient international cooperation form major obstacles to effective plastic waste management [14].

There is limited comparative data on the level of awareness and behavioural intentions among the general public in Malaysia vs Indonesia. How media exposure, perceived personal risk, and attitudes toward the waste trade shape awareness has seen limited research. Public awareness about microplastic's behavioural aspects has been limited with only 54.2% of the respondents having heard of the term microplastics [27].

Without systematic data on awareness and the variables that influence it, policy design and public-education campaigns cannot be optimally targeted. Despite initiatives such as waste sorting at source, recycling programs, and public awareness campaigns, the Jakarta Government's efforts are hampered by inadequate infrastructure, limited public participation, and insufficient funding [33]. In Malaysia, uncollected or poorly disposed-of plastic ends up in waterways, ultimately reaching the ocean. Every day, the equivalent of 2,000 garbage trucks full of plastic are dumped into the world's oceans, rivers, and lakes [39]. The plastic debris poses a significant threat to marine ecosystems and animals can become entangled in plastic waste, or they may ingest harmful microplastics, tiny plastic fragments. Plastic debris also disrupts natural habitats, impacting the variety of life in the ecosystems in the east Coast of Peninsula Malaysia [17].

Therefore, the aim of this research is to determine public awareness of the health and environmental risks of plastic-waste dumping in Malaysia and Indonesia and to examine the factors associated with that awareness. This study aims to measure and explain awareness among residents of Malaysia

and Indonesia about the hazards and “pitfalls” of being a dumping ground for plastic waste.

1.2 Plastic Waste in Southeast Asia: A Convergence of Trade, Health, Behaviour, and Justice

Plastic waste dumping in Southeast Asia is not only an environmental crisis but also a complex socio-political and public health challenge. The region has become a major recipient of transboundary plastic and e-waste flows, often facilitated by weak port controls and mis-declared shipments, leading to illegal recycling and open burning practices. These activities have severe health consequences, including respiratory illnesses, cancer risks, and contamination of food and water sources. Public responses to these threats are shaped by risk perception, media exposure, and trust in institutions, which influence environmental behaviour and protective actions. Moreover, the burden of plastic pollution disproportionately affects low-income communities and informal workers, raising concerns of environmental justice and highlighting the socio-economic drivers that complicate policy enforcement and community support for mitigation efforts.

1.2.1 *Transboundary waste flows and illegal recycling*

Studies and reports document how mis-declared waste and weak port controls have allowed high volumes of plastic and e-waste to enter Southeast Asia. Malaysia became the world’s top destination for plastic waste exports in 2018, receiving more

than 800,000 tons of plastic waste [40]. Greenpeace Malaysia began investigating this growing crisis early on and red-flagged it to the world, exposing illegal shipments, naming polluters, and supporting local communities fighting back [10]. Asia imported 74% of the plastic waste in the world in 2016, and China (mainland) imported the most plastic waste until 2017, with 5.8 to 8.3 Mt or megatonnes [19]. China’s ban on solid waste imports redirected waste to new markets, especially in Southeast Asia. The influx of waste into Malaysia, a small country in the Malay Archipelago, led to a sharp rise in illegal recycling, dumping, and burning, causing noticeable pollution. In Indonesia, despite watchdog reports and public pressures on the impact of plastic and paper waste trade, a tsunami of plastic waste trade entered Indonesia, which resulted in new policies for an improved regulatory framework [15].

1.2.2 *Health impacts of plastic open burning and plastic waste fuel used in food preparation*

Open burning of plastics has links with respiratory illness, cancers, neurodevelopmental effects in children, and cardiovascular risks. It was reported that prolonged contact with heightened concentrations of microplastics within indoor microplastics from residential and industrial perspectives may also bring about various consequences, including oxidative stress, DNA damage, organ dysfunction, metabolic disorders, immune responses, neurotoxicity, and reproductive and developmental toxicity (Figure 2).

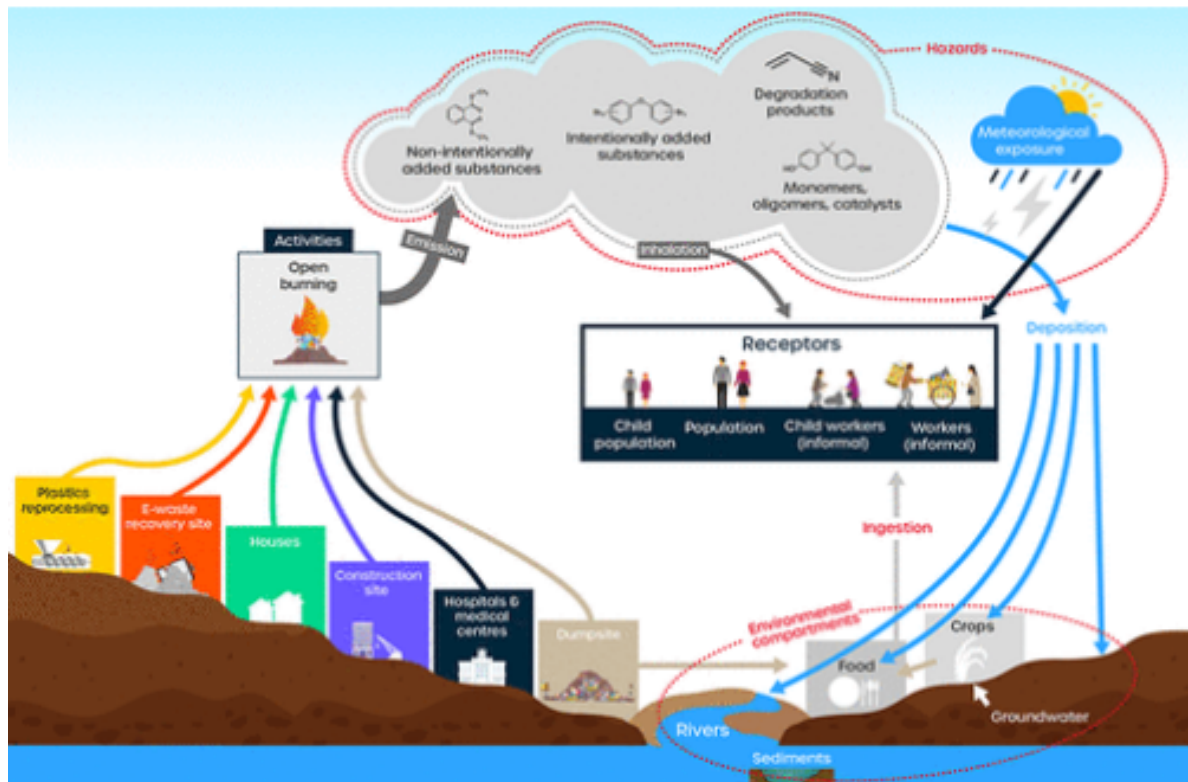


Figure 2. Mismanagement of Plastic Waste through Open Burning and impact on Occupation Public Health

Source: [39]

Besides open burning effects, it was found that high risk of harm happens to waste pickers and informal entrepreneurs who work closely with waste, delivering a circular economy but often without protective equipment or a structured, safe system of work [39].

1.2.3 Risk perception and environmental behaviour

Research shows that knowledge alone does not always translate into protective behaviour; perceived personal susceptibility, media exposure and trust in institutions mediate behaviour change. Inadequate management of plastic waste in Indonesia is attributed to its environmentally unfriendly practices in industry [28]. In Malaysia, microplastics studies have exposed the extent of plastics waste impacts in diverse environments matrixes, which has engendered calls for policy formulation and public awareness [27].

1.2.4 Environmental justice and socio-economic drivers

Low-income communities and informal workers are disproportionately affected. Rural areas are exposed to severe environmental pollution issues fed by industrial and agricultural activities combined with poor waste and sanitation management practices, struggling to achieve the United Nations' Sustainable Development Goals (SDGs) in line with Agenda 2030 [23]. Indonesia is considered the second largest contributor of plastic waste in the world. However, existing policies have not addressed this issue. Policies, such as bans on single-use plastic bags and fees on plastic bags, have recently been implemented in some pilot cities, but the results remain unclear [5]. Economic benefits gained by local actors in pilot cities can reduce willingness to support bans on the harmful effects of plastic waste.

2.Literature Review

Several models used in this study helps determine factors that shape individual and organization behaviour in managing plastic waste processing.

2.1 Health Belief Model

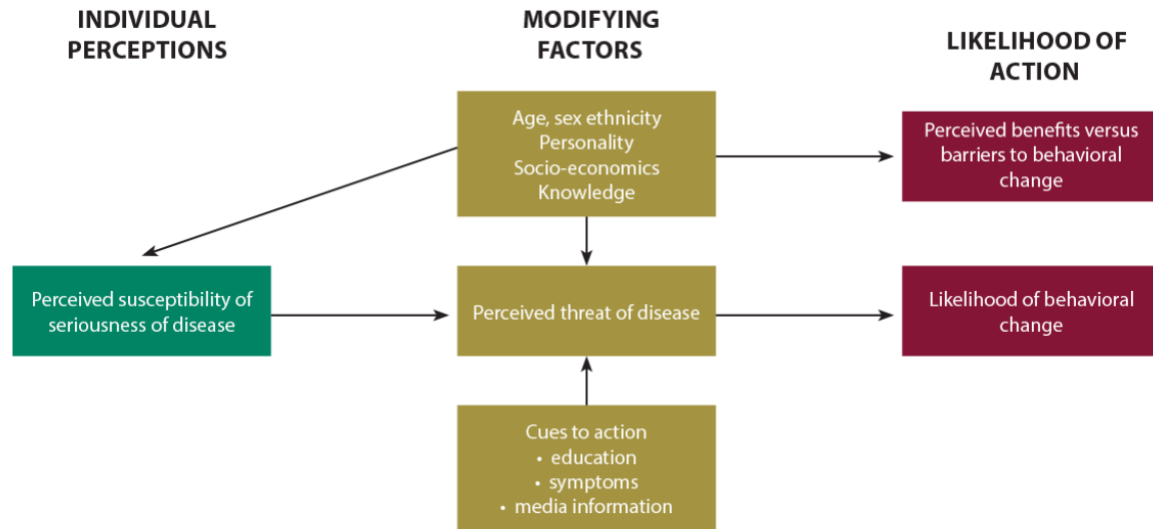


Figure 3. Health Belief Model

Source: [16]

The Health Belief Model (Figure 3) is best used when promoting individual preventive behaviours, such as vendor or consumer purchasing or verification practices. It focuses on the beliefs and perceptions of the individual, so it is appropriate to change behaviours that are not heavily influenced by society and social norms. This explains how perceptions of risk for plastic waste use and benefits drive protective behaviour and awareness.

2.2 Risk Perception Theory

Perceived risk is a crucial factor in the social dilemmas surrounding the risks and hazards of the environment. Risk perception is a concept used to describe people's attitude toward and subjective judgment of an array of risks, including

environmental risks. The factors shaping individuals' risk perception are diverse, including not only their knowledge and understanding of the nature and characteristics of risk.

People's judgments about hazards are shaped by affect, perceived control, trust, and familiarity. Media and direct experience are strong drivers of perceived risk. According to Ref. [18], seven typical risks include drinking polluted water, interior decoration, electromagnetic radiation, air pollution, chemical plants, public transportation, and natural hazards, reflecting the general and referential changes in risk perception which is suitable for use in this study on plastic waste processing and related risks (Figure 4).



Figure 4. Seven Risk Perceptions

Source: [18]

2.3 Knowledge-Attitude-Behaviour (KAB) framework

Knowledge (awareness) shapes attitudes, which in turn influence behavioural intention (Figure 5). This is useful to conceptualize awareness as both

an outcome and a predictor of intended action. It has been found that programs, preventative education and classes that only focus on knowledge don't necessarily change the person in behaviours surrounding plastic waste and its effects on health [7].

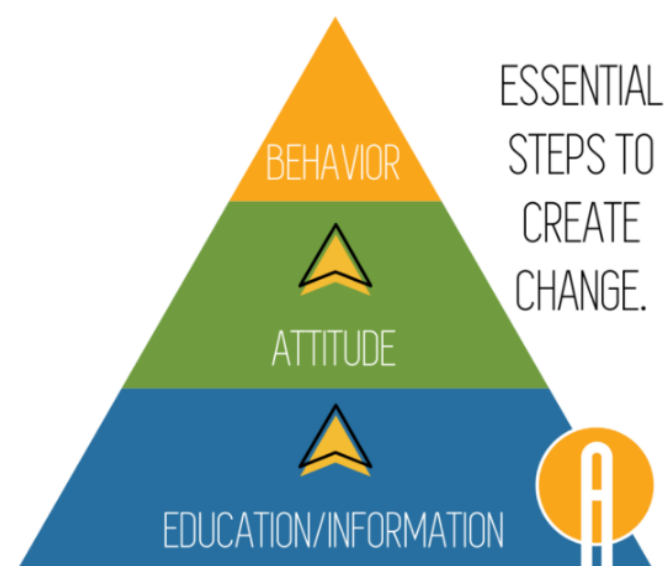


Figure 5. Knowledge, Attitude, then Behaviour

Source: [7]

2.4 Theory of Planned Behaviour

Theory of Planned Behaviour (Figure 6) complements KAB when attitudes, subjective norms and perceived behavioural control predict

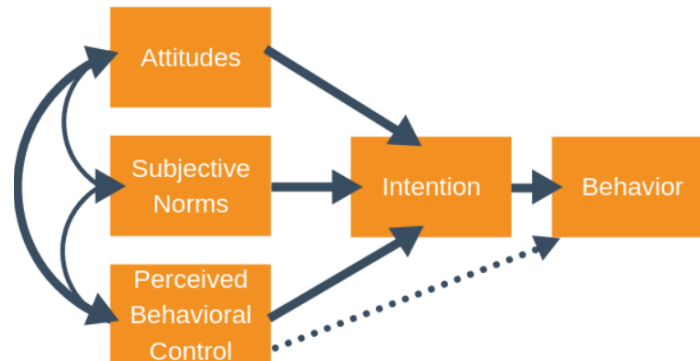


Figure 6. Theory of Planned behaviour

Source: [2]

These frameworks together justify measuring: (a) awareness/knowledge, (b) perceived risk/personal vulnerability, (c) exposure to information/media, (d) attitudes about policy/economic trade-offs, and (e) behavioural intentions.

2.5 Factors drawn from underlying theory that impact this study

The study draws on several behavioural and psychological frameworks to identify key factors influencing public awareness and action. These include awareness of the health and environmental dangers of plastic waste dumping, exposure to media and information sources, perceived personal health risks, attitudes toward economic benefits of waste trade, and behavioural intentions to act. Each factor is grounded in models such as the Health Belief Model, Risk Perception Theory, Knowledge-Attitude-Behaviour Framework and Theory of Planned Behaviour, which collectively explain how knowledge, perception, and social context shape individual responses to plastic pollution.

2.5.1 Awareness of the pitfalls of plastic-waste dumping

The health and environmental impacts, perceived severity, and recognition of practices (e.g., open burning, illegal imports, contamination of food) follows the Chinese plastic-waste import ban of the biggest EU exporting countries trade flows. Lundmark writes that the environmental impact of

intentions to act (e.g., community activism, avoiding contaminated food) and is used in this study to explain behaviour on plastic waste processing and use [2].

exporting thousands of tonnes of plastic waste to Southeast Asia has led to new trade patterns, stagnated domestic recycling rates and this impacts human health and the marine environment [22].

2.5.2 Exposure to information (media exposure)

The frequency and variety of exposure to news and reports about plastic waste issues begin to dominate through television, social media, non-governmental organizations and investigative reports. Public knowledge regarding environmental problems is determined by how new media sources frame the issues in specific terms. Media images of Southeast Asian countries, particularly Malaysia, drowning in plastic waste are rife after China's import ban. The concern is mounting over the uneven distribution of environmental and health burdens between developed and developing countries [24].

2.5.3 Perceived personal risk / health concern

Environmental risk factors were found to contribute to 24% of the global burden of disease from all causes and to 23% of all global deaths [12] and there is therefore a need for environmental health practitioners in Malaysia and Indonesia to focus on the most significant and urgent environmental health concerns, perceived susceptibility and severity for self and family for respiratory issues,

cancer, neurological effects for effects of plastic waste related illnesses.

2.5.4 *Attitude toward waste trade / economic benefit*

With China's ban on solid waste imports, Malaysia became the world's top destination for plastic waste exports in 2018, receiving more than 800,000 tons of plastic waste amid challenges and public apathy toward domestic waste management. However, despite environmental cost, there are members of the Malaysian and Indonesian population that believe importing/processing waste is economically beneficial. This has led to a sharp rise in illegal recycling, dumping, and burning, causing noticeable pollution [40].

2.5.5 *Behavioural intention / pro-environmental intention*

In Indonesia, methods used to determine illegal waste disposal sites (IWDS) include ground-based individual investigation methodology using the transect walk method. A transect walk is a systematic walk along a defined path (transect) across the community/project area together with the local people to explore the water and sanitation conditions by observing, asking, listening, looking and producing a transect diagram. Other community engagement investigations methodology, use direct interviews, focus group discussions (FGDs), and whistleblowers to identify, locate, and quantify these IWDS. This was intended to support policy changes and avoid contaminated products from flowing into communities, report illegal dumping and participate in community actions [3].

3. Methodology

Studies in Indonesia collected demographic data based on weight of domestic waste and key demographic data such as occupation, education, and the number of families. Qualitative methods of collecting data from village officials' households was recorded by observing daily activities and people's beliefs about waste and environmental

conditions in settlements. This also included secondary data in the form of photographs, maps, and descriptions [6]. Demographic data in Malaysia included age, education level, occupation, gender, proximity to dumping and recycling sites [8], where data on 338 households were collected for locality, house type and waste type.

Based on previous studies, Section A of this study asked respondents for age range, highest educational qualification, gender, country of residence and proximity (within ~5km) to a waste dumping, recycling or disposal site.

This study adopts a qualitative research design, drawing upon survey-based data from respondents in Malaysia and Indonesia. The unit of analysis is the individual respondent which is the "average man/woman on the street" living in Malaysia or Indonesia as well as working adults in the supply chain and logistics sectors. Data was collected at the individual level using an online questionnaire distributed via social media, community groups and partner NGOs. The target sample size was 200 respondents but 162 responded. An online questionnaire was developed to collect data.

Section B of the questionnaire required participants to answer two qualitative questions as follows:

B1. In your own words, what do you think are the main health or environmental dangers of accepting/processing large amounts of imported plastic waste in your community? (2–3 short sentences).

B2. What actions, if any, would you like local or national authorities to take to address plastic-waste dumping and illegal recycling in your country? (2–3 short sentences).

3.1 Tests and analyses

Qualitative testing was undertaken and 4 tables included results for the Thematic (Main Themes) Mapping, Thematic (Empathy) Map, User Journey Map and Strategies to promote awareness of plastic waste dumping and related health issues.

4. Discussion

The findings reveal a complex understanding of public awareness in Malaysia and Indonesia. While respondents recognize the health and

environmental dangers of plastic waste, their behavioural intentions are shaped by media exposure, perceived personal risk, and trust in institutions. The data suggest that awareness is necessary but not sufficient, effective policy must also address emotional responses, socio-economic realities, and community empowerment.

4.1 Demographic distribution of respondents

Table 1 outlines the age, education, gender, country, and proximity to waste sites of the 162

respondents. The largest age group was 18–24 (27.78%), and most respondents held a bachelor's degree (28.40%). A slight majority were male (54.94%) and from Malaysia (55.56%). Notably, 35.19% lived near a waste site, with 30.86% unsure of their proximity. The demographic spread is balanced and provides a strong foundation for comparative analysis. However, the high percentage of respondents unaware of their proximity to waste sites suggests a gap in environmental literacy or local transparency, which could be explored further.

Table 1. Demographic distribution of respondents

		Count	Percentage
Age Group	18–24	45	27.78
	25–34	28	17.29
	35–44	28	17.29
	45–54	24	14.81
	55–64	16	9.87
	65+	21	12.96
Education Level	Bachelor's degree	46	28.4
	Postgraduate (Master / PhD)	34	20.99
	Secondary (high school)	31	19.14
	Diploma/Vocational	25	15.43
	Primary or less	18	11.11
Gender	Male	89	54.94
	Female	73	45.06
Country	Malaysia	90	55.56
	Indonesia	72	44.44
Proximity to Waste Site	Yes	57	35.19
	No	55	33.95
	Don't know	50	30.86

4.2 Thematic Analysis Summary

Table 2 categorizes responses to the two open-ended questions: perceived dangers and desired authority actions. Air pollution and respiratory health were the most cited dangers (42 mentions), while public awareness and education were

overwhelmingly the most desired actions (116 mentions). The strong emphasis on education reflects a public readiness to engage if properly informed. The relatively low frequency of calls for stricter enforcement (11 mentions) may indicate either resignation or lack of trust in authorities, an area worth probing in future studies.

Table 2. Thematic Analysis Summary

Theme	Frequency	Theme	Frequency
(Question 1)	(Question 1)	(Question 2)	(Question 2)
Dangers of Plastic Waste		Desired Authority Actions	
Air pollution / Respiratory health	42	Public awareness / Education	116
Chronic diseases / Cancer risk	33	Ban/Restrict plastic imports	15
Environmental degradation	23	Stricter enforcement / Regulation	11
Food chain contamination	23	Others	20
Water/Soil contamination	22		
Others	19		

4.3 Thematic (Empathy) Map

Table 3 captures respondents' thoughts, feelings, actions, and statements regarding plastic waste dangers. Emotions ranged from fear and anxiety to confusion and indifference. Actions included advocacy, avoidance, and passive behaviour. The

empathy map is a powerful tool that humanizes the data. It reveals emotional drivers behind behavioural intentions and highlights the psychological toll of environmental degradation. The presence of passive responses suggests that awareness alone may not be sufficient, empowerment and agency are also needed.

Table 3. Thematic (Empathy) Map

Theme	Thinking	Feeling	Doing	Saying
Air Pollution/Respiratory Health	"Burning plastic releases toxic fumes that harm our lungs."	Worried, fearful for children's health.	Avoiding outdoor activities, seeking cleaner air.	"The air smells bad. My kids are coughing more".
Chronic Diseases/ Cancer Risk	"Long-term exposure to plastic toxins could cause cancer."	Anxious, helpless, angry at authorities.	Researching health risks, advocating for change.	"We shouldn't trade health for economic gain."
Environmental Degradation	"Plastic waste is destroying our natural surroundings".	Sadness, guilt, urgency to act.	Supporting environmental campaigns	"Our rivers and forests are being poisoned."
Food Chain Contamination	"Pollutants from plastic waste end up in our food."	Disgust, fear, betrayal.	Avoiding local produce, demanding transparency.	"We don't know what's safe to eat anymore."
Water/Soil Contamination	"Plastic chemicals are leaking into our water and soil."	Concerned, protective of family	Filtering water, raising awareness.	"Our land is no longer safe for farming."
Others	"I'm not sure what the dangers are, but it doesn't feel right."	Confused, indifferent, uncertain.	Passive behaviour, limited engagement.	"I don't know, maybe it's bad for the environment."

4.4 User Journey Map

Table 4 tracks experiences, reactions, and impacts of plastic waste exposure. Triggers like smelling burnt plastic or hearing about microplastics in food led to fear, disgust, and behavioural changes such as avoiding local produce or supporting policy

change. The journey map effectively illustrates how lived experiences translate into advocacy or avoidance. It supports the study's theoretical framing and could be used to design targeted interventions at key emotional and experiential touchpoints.

Table 4. User Journey Map

Theme/Trigger	Experience	Reaction	Impact
Air Pollution/Respiratory Health	Smelling burnt plastic	Fear, Frustration, avoidance	Reduced outdoor activity, increased health concerns
Chronic Diseases/ Cancer Risk	Learning about toxic chemicals in plastic	Anxiety, anger	Demand for policy change, distrust in authorities
Environmental Degradation	Seeing polluted rivers, dying plants	Sadness, urgency	Support for environmental movements
Food Chain Contamination	Hearing about microplastics in food	Disgust, worry	Change in consumption habits, demand for transparency
Water/Soil Contamination	Noticing poor crop yield, dirty water	Concern, protectiveness	Water filtering, advocacy for clean farming
Others	General unease or lack of clarity	Indifference, confusion	Low engagement, passive stance

4.5 Strategies to develop awareness of pitfalls of plastic waste dumping and related health issues

Table 5 proposes six strategies, including community workshops, school campaigns, social media outreach, non-governmental organization

(NGO) collaborations, mobile exhibitions, and public service announcements. These strategies are well-aligned with the findings and offer practical, scalable solutions. However, integrating feedback loops (e.g., community reporting mechanisms) could enhance accountability and sustain engagement.

Table 5. Strategies to develop awareness of pitfalls of plastic waste dumping and related health issues

Strategy	Description	Target Audience	Expected Outcomes
Community Workshops	Organize local events to educate residents on health risks of plastic waste	General public, especially near dumping sites	Increased awareness and proactive community behaviour
School-based Campaigns	Integrate environmental health topics into school curricula	Students and educators	Early education on pollution and prevention
Social Media Outreach	Use platforms like Facebook, Instagram, Tik Tok to share infographics and videos	Youth and urban populations	Wider reach and engagement on pollution and prevention
Collaborations with NGOs	Partner with environmental NGOs for joint campaigns and resources	Local communities and activists	Stringer advocacy and resource sharing
Mobile Exhibitions	Create traveling exhibits showing effects of plastic waste on health and environment	Rural and underserved areas	Visual impact and direct engagement
Public Service Announcements	Broadcast short messages on radio, TV, and public transport	Mass audience	Reinforcement of key messages in daily life

4.6 Conclusion

This study highlights the urgent need for localized responses to the global plastic waste crisis. The public in Malaysia and Indonesia is increasingly

aware of the health risks posed by open burning, contaminated food chains, and environmental degradation. However, gaps in enforcement, education, and infrastructure continue to undermine efforts to mitigate these risks. The findings

underscore the importance of integrating public perception into policy design, particularly in regions disproportionately affected by transboundary waste flows.

As the United Nations advances the Global Plastics Treaty, this research offers timely insights into the lived realities of communities on the frontlines of plastic pollution. The treaty must prioritize environmental justice, enforceable trade regulations, and inclusive governance that reflects the voices of affected populations. By aligning global frameworks with local needs, the treaty can move beyond symbolic commitments and foster tangible improvements in health, sustainability, and equity.

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