Sustainable Social Development 2025, 3(3), 8269.
https://doi.org/10.54517/ssd8269

Article

Evaluating plastic bag levies: A systematic review of behavioural, regulatory, and normative pathways

Noraliah Natasya Saiddin

Department of Science and Technology Studies, Faculty of Science, Universiti Malaya, Kuala Lumpur 50603, Malaysia;
noraliahnatasya1@gmail.com

CITATION

Saiddin NN. Evaluating plastic bag levies: A systematic review of behavioural, regulatory, and normative pathways. Sustainable Social Development. 2025; 3(3): 8269.
https://doi.org/10.54517/ssd8369

ARTICLE INFO

Received: 13 March 2025
Accepted: 16 April 2025
Available online: 15 June 2025

Abstract: Single-use plastic bags remain a critical contributor to plastic pollution, with ecological impacts ranging from terrestrial litter to marine ecosystem degradation. In response, governments worldwide have introduced financial disincentives, regulatory restrictions, and educational campaigns to curb their consumption. However, the relative effectiveness and sustainability of these interventions remain contested. This systematic review followed PRISMA 2020 guidelines. A comprehensive search was conducted in the Web of Science Core Collection using the Boolean string ("levies" OR "charge") AND ("single-use plastic" OR "plastic bag"), yielding 2445 records. After applying filters for publication year (2007–2025), article type, and English language, 10,496 records were screened. A total of 136 full-text articles were assessed for eligibility, 16 met the inclusion criteria. Findings revealed that economic instruments, particularly levies and charges, consistently produced the most substantial reductions in plastic bag consumption. Regulatory and campaign-based approaches improved awareness but lacked durability unless coupled with financial disincentives. Educational and social-norm interventions reinforced pro-environmental behaviours, amplifying compliance and long-term sustainability when integrated with levies. Overall, multi-layered strategies combining economic, regulatory, and cultural levers were the most effective. Economic instruments are necessary but not sufficient on their own. Integrated approaches by pairing charges with enforcement, education, and social-norm reinforcement to offer the greatest potential to reduce plastic bag use and align with global sustainability goals.

Keywords: behaviour change, economic instruments, environmental policy, plastic bag levy, single-use plastics, sustainability

1. Introduction

Single-use plastic bags represent a significant environmental challenge due to their lightweight nature and widespread availability, resulting in ecological repercussions including litter, ecosystem degradation, and microplastic formation. The implementation of financial disincentives, such as levies or charges on these bags, has been identified as a strategy to reduce their consumption and mitigate environmental impacts.

In England, the introduction of a 5-pence charges on single-use carrier bags in 2015 has successfully decreased plastic bag usage across diverse demographics. Initial evaluations indicated a notable decline in purchasing behaviour, demonstrating shifts in consumer attitudes towards the use of plastic bags [1]. Similarly, South Africa's plastic bag levy, enacted in May 2003 at a nominal cost of ZAR 0.46 per bag, reported immediate reductions in bag consumption. However, subsequent evaluations revealed an increase in bag usage per unit of retail sales, suggesting that the low cost of the levy and consumer habit persistence may have influenced long-term behaviour [2]. This

emphasizes the importance of understanding both the initial effectiveness of such financial measures and the long-term adaptations of consumers in response to pricing strategies.

Regional examples from Asia illustrate the potential for plastic bag charges. In Malaysia, surveys showed broad support for financial measures aimed at reducing plastic use, yet actual behavioural changes following the enactment of charges remain under-studied, indicating that more rigorous evaluations are needed [3]. These findings highlight the need for thorough assessments of policy interventions to measure their effectiveness on consumer behaviours over extended periods and different socio-economic contexts.

While the positive impacts of levies are demonstrated by the examples from England and South Africa, unresolved questions remain regarding the mechanisms underlying the effectiveness of such financial disincentives. Key factors include the perceived fairness of the levy, social pressures to conform, and the disruption of habitual behaviours. Additionally, contextual variables, such as income levels, access to reusable alternatives, and enforcement of levy policies, play significant roles in determining the overall success of these interventions. There is a need for further systematic exploration of these aspects to provide actionable insights for policy refinement [3].

This proposed systematic review aims to aggregate empirical studies on plastic bag levies to quantify their effects on consumption, elucidate mediating pathways, and identify moderating factors, particularly equity concerns associated with socio-economic disparities across various regions. This will support the development of evidence-based policy recommendations to enhance the effectiveness of regulations aimed at reducing plastic pollution, thereby contributing to global sustainability efforts.

2. Literature review

2.1. Policy instruments and global effectiveness

Economic instruments, particularly per-bag levies or charges, have demonstrated efficacy in significantly reducing the demand for single-use carrier bags at points of sale. For instance, Ireland's PlasTax, introduced in 2002 with an initial charge of €0.15 per bag, resulted in a substantial decrease in bag usage and litter, establishing a prototype for effective price-based environmental policy [4]. Similarly, evaluations of the UK's staggered implementation of bag charges (Wales in 2011 and England in 2015 onwards) revealed substantial reductions in bag consumption, bolstered by controlled studies that indicated marked shifts in public attitudes and behaviours towards single-use bags; notably, the British government's assessments reported a decrease in single-use bag usage following the introduction of a charge [5,6].

Beyond the European context, initial successes from South Africa's plastic bag levy (implemented in 2003) were gradually undermined by design flaws such as reduced levy amounts and alterations in bag thickness requirements, alongside behavioural rebounds in consumer habits. These observations point to the nuanced interplay of levy structure, enforcement rigor, and public perception in determining the long-term effectiveness of such charges [7]. This sensitivity is further corroborated

by a systematic review of regulations targeting plastic bag consumption, which concluded that interventions deploying price-based measures yield better results than actions applying "thickness-only" stipulations [7].

Recent scoping studies on the broader spectrum of single-use plastics reinforce the notion that behavioural interventions involving direct financial implications (like charges) markedly outperform purely informational campaigns [7]. Particularly in the context of reducing environmental footprints, the efficacy of such economic instruments is significant, as they compel consumers to reconsider their purchasing habits and engage more consciously with their environmental responsibilities.

2.2. Short-run versus long-run effects

The implementation of plastic bag levies has resulted in immediate reductions in disposable plastic bag usage across various demographics. An observational study from England noted significant reductions in bag consumption within a month of the enforcement of the plastic bag charge, highlighting the effects of price salience and disruption of habitual behaviours associated with free bag use [6]. This aligns with broader trends observed in various jurisdictions that have instituted similar policies. However, the long-term effectiveness of these policies can be influenced by multiple factors. The experience of South Africa illustrates this, where a partial rebound in plastic bag consumption was observed following decreases in levy levels and the introduction of thicker reusable bags at competitive prices [8]. Additionally, changes in shopping practices, such as the growth of online grocery services, have been associated with an increase in plastic bag usage, presenting challenges to the sustained success of in-store charges [5].

Long-term studies are beginning to reveal insights regarding the effectiveness of plastic bag charges on environmental impact. Surveys monitoring beach litter suggest a consistent decline in plastic bag waste over the past decade, indicating that such levies can provide enduring environmental benefits despite potential fluctuations in consumer behaviours correlated with market dynamics [9]. This approach emphasizes the complexity of addressing plastic pollution through economic incentives and underscores the necessity for effective policy measures and ongoing consumer education to mitigate the rebound effects observed in different contexts [10]. In summary, while plastic bag levies can lead to substantial initial reductions in usage, their long-term effectiveness depends on consistent policy enforcement, adaptation to changing market conditions, and continual engagement with consumers to foster environmentally responsible behaviours.

2.3. Behavioural mechanisms

The interaction of multiple pathways significantly influences consumer behaviours regarding environmental practices, particularly in the context of utilizing reusable bags. Three predominant mechanisms, which are price salience and loss aversion, norm activation and social signalling, and habit disruption that work together to foster responsible behaviour in consumers. The price salience and loss aversion mechanisms emphasize that even minimal charges associated with plastic bag usage can have a profound effect on consumer behaviour. This phenomenon is especially

pertinent; when bags are perceived as costly rather than free, it triggers a reluctance to incur such charges. This was observed in studies in Ireland and the UK [11]. The introduction of a cost transforms the decision-making process, making consumers weigh the perceived economic loss against the benefit of foregoing a disposable bag.

The second mechanism involves norm activation and social signalling, where the introduction of charges for bags serves to activate both descriptive and injunctive norms. Descriptive norms reflect what most people do, bringing their own bags becomes a common practice, while injunctive norms convey societal approval for such behaviour [12,13]. Research indicates that this shift in norms leads to broader "spill over" effects, where individuals engaged in environmentally positive behaviours in one domain are likely to adopt similar behaviours in others [14]. Consequently, the act of bringing reusable bags becomes normalized, contributing to wider cultural acceptance of pro-environmental practices.

Lastly, the pathway involving habit disruption is crucial during the transition phase when a charge is implemented. By introducing the cost at checkout, existing automatic behaviours, such as taking plastic bags without thought, are interrupted, creating a unique opportunity to establish new habits, such as remembering to bring cloth bags. Providing a rationale that links the charge to environmental consequences further solidifies this behavioural change, reinforcing new habits through consistent practice [15]. Some experimental studies show that explicitly presenting the costs linked to environmental impacts increases the likelihood of adopting and maintaining these new practices [16]. In conclusion, the interplay of price salience, norm activation, and habit disruption forms a comprehensive framework through which consumer behaviours regarding reusable bags can be understood. Such frameworks not only inform policy-making but also provide valuable insights for designing effective interventions to promote pro-environmental behaviour.

2.4. Moderators, equity, and contextual factors

The effectiveness of policy interventions such as plastic bag levies is influenced by several critical factors. One crucial aspect is the magnitude of the levy; research indicates that if the price is too low, it can diminish consumer incentives to reduce plastic usage [17]. Moreover, the availability and quality of low-cost reusable alternatives substantially shape consumer behaviour, as individuals may choose substitutes if the perceived costs of compliance with the levy are too high [18]. Additionally, the extent of retailer compliance and the coverage of the policy across various store formats play significant roles in ensuring the effectiveness of such interventions [17]. For instance, studies from the UK show that a uniform charge can yield reductions in plastic bag usage across all income groups, implying that the perceived regressivity of small fees may not hold in practice [17].

Additionally, socio-demographic factors such as education level, environmental attitudes, and prior normative behaviours affect how different populations respond to charging policies [17]. Studies have highlighted that groups with varying socio-demographic backgrounds exhibit diverse levels of responsiveness to such charges, which may be driven by their prior environmental norms and attitudes [19]. The effective communication of these policies is crucial; perceived fairness in their

implementation is imperative for public acceptance and compliance, especially among segments of the population that might otherwise resist [20].

In a regional context like Malaysia, state-level initiatives, such as the "No Free Plastic Bag Every Day" campaign, have garnered significant public support; however, rigorous evaluations of their effectiveness remain limited [21]. Surveys indicate a willingness to adopt measures that may impose higher fees, demonstrating initial public support for behavioural change; however, there is a notable lack of causal evidence linking such charges directly to sustained reductions in plastic bag consumption [17]. Earlier research has underscored those successful initiatives depend not just on the financial implications but also on the perceived fairness and transparency of communication strategies concerning the charge [20]. All these variables underline the complex interdependencies that determine the overall effectiveness of environmental policy interventions in achieving the desired behavioural change among consumers.

2.5. Gaps and implications for the present review

The literature indicates that well-designed charges can effectively reduce consumption behaviour across diverse contexts. Salient price changes, coupled with strategic placement of charges, can prompt a reconsideration of habitual consumption patterns, necessitating exploration into mediating pathways such as price salience, social norms, and habits. Mindfulness has been shown to enhance ethical consumption practices, primarily through increased connectedness to nature, thus augmenting socially responsible consumption and potentially contributing to reduced overall consumption [22].

Furthermore, longitudinal research is essential to assess the durability of these behavioural changes over time, as well as to examine potential system-level rebounds, which are particularly relevant in the context of e-commerce and its implications for packaging consumption [23]. A systematic review focusing on these aspects can illuminate the average treatment effects of charges aimed at reducing plastic bag consumption and assess the efficacy of regulatory mechanisms such as charge magnitude and enforcement intensity [23].

3. Methodology

3.1. Review design

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, ensuring transparency, reproducibility, and methodological rigor. The primary objective of the review was to synthesize empirical evidence on the effectiveness of financial disincentives, specifically levies and charges that aimed at reducing the consumption of single-use plastic bags.

3.2. Search strategy

A comprehensive search was undertaken in the Web of Science Core Collection, chosen for its extensive coverage of environmental policy and behavioural research.

The Boolean search string applied was:

("levies" OR "charge") AND ("single-use plastic" OR "plastic bag")

This search strategy was designed to capture studies that examined financial interventions targeting single-use plastic bags and their impact on consumption behaviours.

3.3. Eligibility criteria

Studies were eligible for inclusion if they presented empirical evidence evaluating the effects of levies, charges, or taxes on single-use plastic bags. Only articles that reported behavioural outcomes, such as reductions in bag consumption, adoption of reusable alternatives, or changes in litter generation, were considered. Additional inclusion criteria required that studies be published between 2007 and 2025, written in English, and employ observational, quasi-experimental, or experimental designs.

Exclusion criteria were applied to maintain relevance and rigor. Studies were excluded if they evaluated interventions without a financial component (for example, bans based solely on bag thickness regulations), or if they focused exclusively on perceptions and attitudes without providing behavioural outcome data. Reviews, commentaries, editorials, and policy briefs without primary data were also excluded, along with duplicate records or articles that were inaccessible in full text.

3.4. Study selection

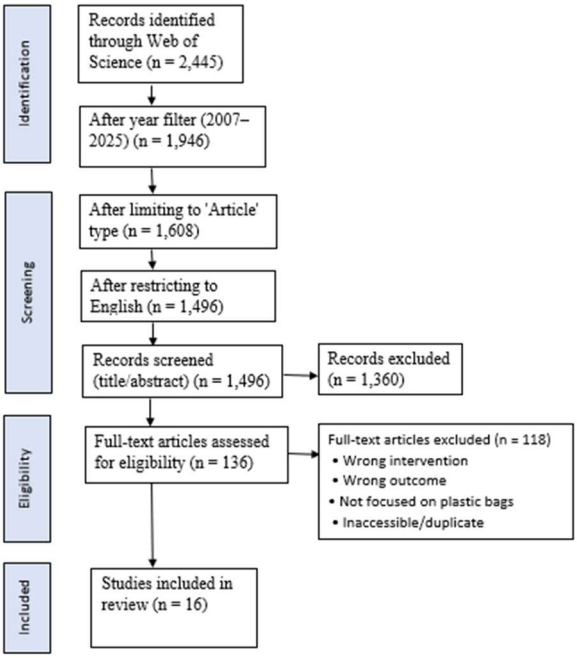

Figure 1. PRISMA 2020 flow diagram of study selection.

All records were exported to a reference manager, and duplicates were removed. 2445 records identified, and after filtering by year, 1946 records remained. The filtration then narrowed down to article, and 1608 records remain. After filtered by English and excluded at title or abstract level, 1496 records left, excluding 1360

records. 136 full-text articles accessed for eligibility, and 118 were excluded for wrong intervention, wrong outcome, not focused on plastic bags and inaccessible or duplicate. Out of these, only sixteen studies met the inclusion and criteria and were included in the final synthesis. The selection process was summarized in the PRISMA flow diagram, **Figure 1**.

4. Results

Table 1 shows the summary of the main outcomes of the sixteen studies applying levies and charges to reduce single-use plastic bag consumption. The studies are classified into three main themes; economic instruments, regulatory and campaign-based approaches, and educational and social-norm interventions, and further organized according to their specific intervention types. Each entry highlights the key findings and contextual insights, demonstrating the comparative effectiveness and sustainability of different policy and behavioural strategies.

Table 1. Thematic mapping of levies and charges and single-use plastic bag consumption.

Theme	Intervention Type	Author(s), Year	Outcome
Economic Instruments	Levy/Tax (Direct Charge)	Convery, McDonnell & Ferreira [4]	The Irish plastic bag levy, introduced in 2002 at €0.15 per bag, reduced consumption by over 90% almost immediately. Revenues were earmarked for environmental projects, and public acceptance was high due to clear communication. The intervention demonstrated that even modest charges can disrupt habitual behaviours and normalize reusable bag use.
	Levy/Tax with Weak Enforcement	Dikgang, Leiman & Visser [8]	In South Africa, an initial levy (ZAR 0.46 per bag) achieved sharp reductions in plastic bag consumption. However, subsequent lowering of the levy and changes in bag thickness standards led to partial rebound. The study highlights the importance of maintaining levy salience and ensuring enforcement to sustain long-term behaviour change.
	Comparative Penalty vs. Incentive	Homonoff [24]	A quasi-experimental study in the United States found that taxes on disposable bags (penalties) were far more effective than equivalent-value bonuses for bringing reusable bags. This suggests that loss aversion is a powerful driver of consumer behaviour.
	Symbolic/Signalling Charge	Jakovcevic et al. [25]	Demonstrated that small charges act as both economic disincentives and symbolic signals, increasing awareness and changing norms. Results suggested that combining pricing with environmental messaging enhances long-term compliance.
	Survey on Willingness to Pay	Khalifa [1]	Survey findings revealed mixed consumer knowledge and behaviour. While awareness of plastic bag impacts was relatively high, the absence of sustained economic instruments limited long-term reduction. The study supports that financial disincentive, if introduced, could leverage existing awareness into durable behaviour change.

Table 1. (*Continued*).

Theme	Intervention Type	Author(s), Year	Outcome
Regulatory and Campaign-Based Approaches	Voluntary Campaign/Awareness Program	Asmuni et al. [2]	Examined the "No Plastic Bag Day" program. Public participation was positive, and short-term reductions in usage were reported. However, inconsistent enforcement and lack of continuous monitoring limited the program's long-term impact.
	Campaign without Economic Support	Zen, Ahamad & Omar [26]	Analysed Malaysia's campaign-based initiatives. While the campaigns improved awareness and temporarily reduced bag use, weak policy design and lack of financial disincentives reduced effectiveness. The study emphasized that standalone campaigns are insufficient without supportive regulations.
	Global Policy Review (Mixed Tools)	Schnurr et al. [27]	Global review of single-use plastics policies showed that integrated strategies (levies, bans, and education) yield sustained reductions, whereas partial measures often shift consumption patterns without reducing total plastic waste.
	Systematic Review of Interventions	Adeyanju et al. [28]	Systematic review of interventions found that levies and bans were consistently effective in reducing bag consumption, while campaigns alone had limited behavioural impact. The authors concluded that economic and regulatory instruments must be the backbone of effective policy.
Educational and Social-Norm Interventions	School-Based Education	Pranada et al. [3]	School-based program in Indonesia used eco-literacy and innovative "EcoCapsitBag" campaigns to discourage plastic bag use. The intervention improved environmental literacy among students and reduced demand for plastic bags within school communities.
	Environmental Awareness/Socio-Demographic Study	Senturk et al. [29]	Found that environmental awareness and demographic factors (age, education, and income) significantly influenced plastic bag consumption patterns. Awareness alone was insufficient, but it moderated the effectiveness of policy interventions.
	Messaging (Guilt Appeals)	Muralidharan et al. [30]	Showed that guilt-based messaging significantly increased compliance with bag levies, with notable gender differences—women were more responsive to guilt appeals. This demonstrates how emotional and psychological framing can reinforce policy effectiveness.
	Normative Influence (Cross-Cultural)	Kim et al. [31]	Consumers were more willing to choose environmentally friendly packaging, even at an extra cost, when social norms supported pro-environmental behaviour. Highlights that norm-based messaging can amplify the effects of levies.

4.1. Economic instruments

Economic tools, particularly levies, charges, and taxes, were the most frequently reported interventions. Evidence from Ireland [4], South Africa [8], Botswana [32], England [6], and the United States [24] demonstrates that small, visible charges substantially reduced single-use plastic bag (SUPB) consumption. In Ireland, the levy

led to an immediate and dramatic drop in usage, becoming widely accepted by the public and generating environmental funds. South Africa showed initial reductions but later rebounds due to weak enforcement and declining salience. England's charge resulted in sharp declines in consumption while also increasing public support for broader waste policies. In the U.S., natural experiments confirmed that taxes were more effective than bonuses, consistent with behavioural economic principles. Willingness-to-pay (WTP) studies provide additional insight: in Malaysia, consumers expressed partial willingness to accept higher fees for biodegradable alternatives, though overall WTP levels remain insufficient to cover higher costs [33].

Table 2 shown the introduction of charges on plastic bags has had a partial success in influencing consumer behaviour, with over half of the respondents (52.3%) not incurring any levies, indicating that many consumers either brought their own bags or completely avoided single-use plastics. The majority of the payments were concentrated at MYR 0.20 and MYR 0.40, suggesting that consumers who did purchase plastic bags did so sparingly, reflecting a cautious approach to their usage. Conversely, extremely few paid more than MYR 0.60, with under 5% exceeding MYR 0.80, which indicates that the levy effectively deterred excessive consumption. However, nearly half of the sample still paid levies, albeit in small amounts, demonstrating the ongoing prevalence of habitual plastic bag use [2].

Table 2. Descriptive summary of plastic bag levy.

Total levy paid (MYR)	Frequency of consumers (N = 560)	Valid percent (100%)
0.00	293	52.3
0.20	151	27.0
0.40	68	12.1
0.60	19	3.4
0.80	14	2.5
1.00	9	1.6
Above 1.00	6	1.2

Source: Public Participation and Effectiveness of the no Plastic Bag Day Program in Malaysia [2].

4.2. Regulatory and campaign-based approaches

Several studies examined campaigns and regulatory frameworks aimed at discouraging SUPB use. In Malaysia, the "No Plastic Bag Day" campaign reduced usage and raised awareness but revealed inconsistent compliance among retailers [2,26]. In Indonesia, the paid plastic bag policy was found to align with pollution-levy principles but highlighted governance and implementation challenges [34]. Broader analysis across African countries found that bans and levies were undermined by weak enforcement, lack of coordination, and informal economies [2]. These findings indicate that regulatory interventions are effective when robust enforcement, clear legal mandates, and multi-stakeholder engagement are ensured.

4.3. Educational and social-norm interventions

Educational interventions and social-norm strategies complemented monetary measures. In Indonesia, a school-based program (EcoCapsitBag) successfully

improved students' environmental literacy and cultivated early pro-environmental behaviours [3]. Systematic reviews confirmed that non-monetary strategies, such as awareness campaigns, guilt appeals, and norm-based messaging that can reinforce and sustain behaviour change, especially when paired with economic charges [28]. Evidence from consumer psychology studies also shows that social norms and pro-environmental messaging increase willingness to adopt alternatives, even when they involve additional cost.

5. Discussion

This review shows that interventions targeting single-use plastic bag (SUPB) consumption cluster into three main domains: economic instruments, regulatory and campaign-based strategies, and educational or social-norm interventions. Each domain contributes uniquely, yet financial disincentives; particularly levies and charges that emerge as the most consistently effective short-term tools.

5.1. Economic measures

Evidence from Ireland, England, and the United States confirms that even small charges can trigger substantial declines in bag consumption [4,6,24]. These reductions are largely explained by loss aversion and cost salience, whereby consumers react strongly to the visibility of even nominal fees. Importantly, Ireland's levy illustrates that revenue reinvestment into environmental programs enhances both sustainability and public legitimacy. By contrast, South Africa's mixed outcomes highlight how low levy amounts, weak enforcement, and lack of retail cooperation can undermine impact, producing rebound effects [8]. These findings underscoring that effectiveness depends on enforcement strength, income sensitivity, and the availability of affordable reusable alternatives.

5.2. Regulatory and campaign-based approaches

While less immediately impactful than levies, these interventions provide essential complementary tools. Malaysia's "No Plastic Bag Day" successfully raised awareness but revealed the importance of legislative support and retailer participation to achieve consistent reductions [2,26]. Similarly, experiences across African countries demonstrate that ambitious bans and levies are unlikely to succeed without adequate enforcement capacity and stakeholder buy-in [35]. These cases reinforce the view that legal frameworks alone are insufficient unless supported by institutional strength and governance clarity.

5.3. Educational and norm-based interventions

Long-term cultural transformation depends on embedding pro-environmental values early and reinforcing them socially. School-based initiatives, such as Indonesia's EcoCapsitBag program, illustrate how environmental literacy fosters early sustainable habits [3]. Systematic reviews further show that guilt appeals, social norms, and awareness campaigns enhance compliance with economic tools, extending their durability [28]. Although these interventions do not produce immediate reductions comparable to levies, they strengthen social norms, reduce resistance, and

sustain behaviour change across generations, providing a critical complement to financial disincentives.

5.4. Integrated interpretation

Evidence from the reviewed studies shows that small charges not only act as economic disincentives but also serve as symbolic signals, raising awareness and reinforcing social norms. When combined with environmental messaging, these charges are more likely to support long-term compliance [25]. Survey-based findings, however, reveal mixed consumer knowledge and behaviour: although awareness of plastic bag impacts is relatively high, the absence of sustained financial instruments has limited meaningful reductions [1]. Campaigns implemented without supportive regulations also proved insufficient, producing only short-lived impacts [26]. Global reviews of single-use plastic policies confirm that integrated strategies, combining levies, bans, and education that achieve sustained reductions, whereas partial measures often lead to substitution or rebound effects [27]. Similarly, systematic reviews consistently demonstrate that levies and bans are effective, while campaigns alone yield limited behavioural impact [29]. Awareness, though not powerful on its own, plays a moderating role that enhances the effectiveness of financial and regulatory interventions.

Taken together, these findings demonstrate that no single intervention can adequately address the challenge of single-use plastic bag consumption. Financial disincentives, such as levies and charges, remain the most effective short-term measure, but their long-term success depends on reinforcement through robust regulatory frameworks and cultural embedding via education and social norms [35]. An integrated approach therefore offers the most sustainable pathway, ensuring not only reduced consumption at the point of sale but also wider societal acceptance, inclusivity, and equity. Ultimately, the success of these strategies rests on governance quality, enforcement capacity, and transparency in the use of levy revenues, which together determine legitimacy and enhance effectiveness across diverse contexts.

5.5. Future directions

Future research on environmental outcomes should focus not only on short-term reductions in plastic bag use but also on long-term measures linking behavioural change to ecological health indicators. Evaluating the equity and distributional impacts of levies is crucial, as studies indicate varied consumer acceptance, particularly among vulnerable groups; thus, policies should incorporate equity-sensitive mechanisms, such as subsidies for reusable alternatives [33]. While biodegradable bags are marketed as eco-friendly, they may inadvertently lead to rebound effects and necessitate rigorous life-cycle assessments and clear product standards [27]. Effective governance is hindered by weak enforcement, and future policies must enhance enforcement mechanisms, promote regional coordination, and ensure transparency in the use of levy revenues [35]. Additionally, behavioural innovations extending beyond financial incentives, such as leveraging social norms, community engagement, and digital nudges that should be explored to ensure sustained reductions in plastic bag usage. Finally, there is a need for more research focused on the Global South,

particularly in Asia, Africa, and Latin America, to address the unique challenges of enforcement, informal economies, and cultural contexts, given that much of the existing evidence is based on studies from Europe and North America.

While plastic bag levies are often criticized as regressive, evidence suggests that even small charges reduce consumption across all income groups. However, the relative burden can be higher for low-income households. To ensure equity, levy revenues can be earmarked for subsidies on reusable alternatives, public education campaigns in underserved communities, or local recycling infrastructure. Such redistributive mechanisms strengthen both the environmental and social justice dimensions of policy, aligning interventions with inclusive sustainable development goals.

The findings of this review underscore the importance of adopting integrated and equity-sensitive approaches to reducing single-use plastic bag consumption. Economic instruments such as levies must be complemented by strong governance and educational strategies in order to secure long-term behavioural change. This requires maintaining levy salience through periodic adjustments and consistent enforcement across retail sectors, while also earmarking revenues for community-level environmental programs and providing subsidies that make reusable alternatives affordable for low-income households. At the same time, embedding education and norm-shaping campaigns within school curricula and public spaces can foster cultural acceptance of sustainable practices. Together, these interventions align closely with the United Nations Sustainable Development Goals (SDGs): levies contribute to SDG 12 (Responsible Consumption and Production) by reducing plastic use, support SDG 14 (Life Below Water) by lowering marine litter, and advance SDG 11 (Sustainable Cities and Communities) through reduced urban waste. Furthermore, equity-focused mechanisms address SDG 10 (Reduced Inequalities), while transparent governance in the use of levy revenues reinforces SDG 16 (Strong Institutions).

6. Conclusion

This systematic review synthesized evidence from sixteen empirical studies examining interventions to reduce single-use plastic bag consumption. Across diverse contexts, economic instruments such as levies and charges consistently demonstrated the strongest and most immediate reductions in bag use, on order of 90% declines after implementation. The success of these measures was attributed not only to their direct financial disincentives but also to their ability to disrupt habitual behaviours and trigger social norm shifts. However, long-term effectiveness depended heavily on maintaining levy salience, ensuring consistent enforcement, and providing accessible reusable alternatives.

Regulatory and campaign-based approaches contributed to increased awareness and short-term reductions but often lacked the durability seen with financial interventions. Campaigns in Malaysia and other regions showed that while voluntary measures can mobilize public support, their impact diminishes without integration with stronger economic or legal instruments. Reviews of international policy confirmed that bans and levies outperform awareness campaigns when implemented consistently and transparently. Educational and social-norm interventions played a

crucial supporting role by embedding pro-environmental attitudes and strengthening compliance. School-based eco-literacy programs, guilt- or norm-based messaging, and culturally tailored interventions enhanced the sustainability of behaviour change, particularly when combined with charges or regulatory measures. These findings highlight the value of pairing financial interventions with educational strategies to address both the economic and psychological dimensions of plastic use.

Taken together, the evidence suggests that no single intervention is sufficient in isolation. The most effective strategies are integrated approaches that combine economic instruments with regulatory enforcement and educational or normative reinforcement. Such multi-layered interventions not only reduce plastic bag consumption but also cultivate broader support for sustainable practices, contributing directly to global environmental goals. From a policy perspective, governments should prioritize salient, well-enforced levies, regularly review charge levels to prevent behavioural rebound, and complement them with public education and norm-shaping campaigns. Future research should extend beyond short-term consumption outcomes to assess long-term durability, equity implications across socio-economic groups, and potential spill over into wider pro-environmental behaviours.

In conclusion, reducing plastic bag use requires more than simple awareness or symbolic action; it demands a coherent mix of financial, regulatory, and cultural levers. When aligned, these interventions can meaningfully curb plastic pollution, protect ecosystems, and advance the transition toward sustainable consumption in line with the United Nations Sustainable Development Goals.

Conflict of interest: The author declares no conflict of interest.

References

1. Khalifa Z. Consumer knowledge, attitudes and behaviors towards the use of plastic bags in the Kingdom of BAHRAIN[J]. International Journal of Academic Research in Accounting Finance and Management Sciences. 2023; 13(2): 962-975. doi: 10.6007/IJARAFMS/v13-i2/18068
2. Asmuni S, Hussin NB, Khalili JM, et al. Public participation and effectiveness of the no plastic bag day program in Malaysia. Procedia-Social and Behavioral Sciences. 2015; 168: 328-340. doi: 10.1016/j.sbspro.2014.10.238
3. Pranada T, Nur AR, Nur MA, et al. Emergency reduction of plastic contents using ecocapsitbag and private school student literation increasion treatments in damage education (Indonesian). Ibriez Jurnal Kependidikan Dasar Islam Berbasis Sains. 2023; 8(1): 1-14. doi: 10.21154/ibriez.v8i1.296
4. Convery F, McDonnell S, Ferreira S. The most popular tax in Europe? Lessons from the Irish plastic bags levy. Environmental & Resource Economics. 2007 Jul 26;38(1):1–11. doi: 10.1007/s10640-006-9059-2
5. Poortinga W, Whitmarsh L, Suffolk C. The introduction of a single-use carrier bag charge in Wales: Attitude change and behavioural spillover effects. Journal of Environmental Psychology. 2013; 36: 240–247. doi: 10.1016/j.jenvp.2013.09.001
6. Thomas GO, Sautkina E, Poortinga W, et al. The English Plastic Bag Charge Changed Behavior and Increased Support for Other Charges to Reduce Plastic Waste. Frontiers in Psychology. 2019; 10: 266. doi: 10.3389/fpsyg.2019.00266
7. Muralidharan S, Sheehan K. "Tax" and "fee" message frames as inhibitors of plastic bag usage among shoppers: A social marketing application of the theory of planned behaviour. Social Marketing Quarterly. 2016; 22: 200–217.
8. Dikgang J, Leiman A, Visser M. Elasticity of demand, price and time: lessons from South Africa's plastic-bag levy. Applied Economics. 2012; 44(26): 3339–3342. doi: 10.1080/00036846.2011.572859
9. Madigele PK, Mogomotsi GEJ. Polluter pays or polluter enriching the retailers: The case of plastic bag levy failure in Botswana. Ethiopian Journal of Environmental Studies and Management. 2017; 10(4):472-481.
10. Chandra G. Non-monetary intervention to discourage consumption of single-use plastic bags. Behavioural Public Policy.

2023; 7(1): 143–156.
11. Schultz PW. Secret Agents of Influence: Leveraging Social Norms for Good. Current Directions in Psychological Science. 2022; 31(5): 443–450. doi: 10.1177/09637214221109572
12. Han H, Lee MJ, Kim W. Promoting towel reuse behaviour in guests: A water conservation management and environmental policy in the hotel industry. Business Strategy and the Environment. 2018; 27(8): 1302–1312. doi: 10.1002/bse.2179
13. Jacobson RP, Mortensen CR, Cialdini RB. Bodies obliged and unbound: Differentiated response tendencies for injunctive and descriptive social norms. Journal of Personality and Social Psychology. 2011; 100(3): 433–448.
14. Reno RR, Cialdini RB, Kallgren CA. The transsituational influence of social norms. Journal of Personality and Social Psychology. 1993; 64(1): 104–112. doi: 10.1037/0022-3514.64.1.104
15. Göckeritz S, Schultz PW, Rendón T, et al. Descriptive normative beliefs and conservation behavior: The moderating roles of personal involvement and injunctive normative beliefs. European Journal of Social Psychology. 2009; 40(3): 514–523. doi: 10.1002/ejsp.643
16. Turaga RMR, Howarth RB, Borsuk ME. Pro-environmental behavior: rational choice meets moral motivation. Ann N Y Acad Sci. 2010; 1185(1): 211–224. doi: 10.1111/j.1749-6632.2009.05163.x
17. Maestre-Andrés S, Drews S, van den Bergh J. Perceived fairness and public acceptability of carbon pricing: a review of the literature. Climate Policy. 2019; 19(9): 1186–1204. doi: 10.1080/14693062.2019.1639490
18. Wang X, Feng S, Tang T. Acceptability toward Policy Mix: Impact of Low-Carbon Travel Intention, Fairness, and Effectiveness. Sustainability. 2023; 15(20): 15070. doi: 10.3390/su152015070
19. Bos C, Lans IVD, Van Rijnsoever F, Van Trijp H. Consumer Acceptance of Population-Level Intervention Strategies for Healthy Food Choices: The Role of Perceived Effectiveness and Perceived Fairness. Nutrients. 2015; 7(9): 7842–7862. doi: 10.3390/nu7095370
20. Grelle S, Hofmann W. When and Why Do People Accept Public-Policy Interventions? An Integrative Public-Policy-Acceptance Framework. Perspectives on Psychological Science. 2023; 19(1): 258–279. doi: 10.1177/17456916231180580
21. Maestre-Andrés S, Drews S, Savin I, van den Bergh J. Carbon tax acceptability with information provision and mixed revenue uses. Nature Communications. 2021; 12(1): 7017. doi: 10.1038/s41467-021-27380-8
22. Li Y, Wei L, Zeng X, Zhu J. Mindfulness in ethical consumption: the mediating roles of connectedness to nature and self-control. International Marketing Review. 2021; 38(4): 756–779. doi: 10.1108/IMR-01-2019-0023
23. Li B, Yang J, Sun W. Can Expanding Cultural Consumption Improve Urban Air Quality? An Analysis Based on China's Cultural Consumption Pilot Policy. Int J Environ Res Public Health. 2022; 20(1): 642. doi: 10.3390/ijerph20010642
24. Homonoff TA. Can Small Incentives Have Large Effects? The Impact of Taxes versus Bonuses on Disposable Bag Use. Am Econ J Econ Policy. 2018; 10(4): 177–210. doi: 10.1257/pol.20150261
25. Jakovcevic, Steg L, Mazzeo N, et al. Charges for plastic bags: Motivational and behavioral effects. Journal of Environmental Psychology. 2014; 40: 372–380. doi: 10.1016/j.jenvp.2014.09.004
26. Zen IS, Ahamad R, Omar W. No plastic bag campaign day in Malaysia and the policy implication. Environment Development and Sustainability. 2013; 15(5): 1259–1269. doi: 10.1007/s10668-013-9437-1
27. Schnurr REJ, Alboiu V, Chaudhary M, et al. Reducing marine pollution from single-use plastics (SUPs): A review. Mar Pollut Bull. 2018; 137: 157–171. doi: 10.1016/j.marpolbul.2018.10.001
28. Adeyanju GC, Augustine TM, Volkmann S, et al. Effectiveness of intervention on behaviour change against use of non-biodegradable plastic bags: a systematic review. Discover Sustainability. 2021; 2(1): 13. doi: 10.1007/s43621-021-00015-0
29. Senturk G, Dumludag D. The relationship between consumption of single-use plastic bags, environmental awareness, and socio-demographic factors. Journal of Material Cycles and Waste Management. 2022; 24(4): 1494–1507. doi: 10.1007/s10163-022-01407-8
30. Muralidharan S, Sheehan K. The Role of Guilt in Influencing Sustainable Pro-Environmental Behaviors among Shoppers. Journal of Advertising Research. 2018; 58(3): 349–362. doi: 10.2501/JAR-2017-029
31. Kim J, Kitkuakul S, Alden DL. The Impact of Social Norms on Consumer Willingness to Choose Green Packaging for an Extra Charge in the United States and South Korea. Journal of International Consumer Marketing. 2024; 36(5): 463–484. doi: 10.1080/08961530.2024.2303583
32. Dikgang J, Visser M. Behavioural response to plastic bag legislation in Botswana. South African Journal of Economics. 2012; 80(1): 123–133. doi: 10.1111/j.1813-6982.2011.01289.x

33. Mohamed Noor MF Bin, Matthew NK, Puan CL. Consumers' Willingness to Pay for an Increase Fee in Biodegradable Plastic Bag Use in Bandar Baru Bangi, Selangor, Malaysia. Sage Open. 2024; 14(2). doi: 10.1177/21582440241244668
34. Hasan D. Indonesia: Paid Plastic Bag Policy: Its Concept and Relevance to Pollution-Levy Principles. Environmental Policy and Law. 2021; 50(4–5): 415–422. doi: 10.3233/EPL-200244
35. Nyathi B, Togo CA. Overview of Legal and Policy Framework Approaches for Plastic Bag Waste Management in African Countries. Journal of Environmental and Public Health. 2020; 2020: 8892773. doi: 10.1155/2020/8892773