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Article Review

-Microplastics

Pollution

# **Consumer Awareness of The Environmental and Health Risks of Micro plastics Pollution**

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KEY WORDS	ABSTRACT					

# ConsumerMicroplastic pollution is a major environmental and healthAwareness -concern of the 21<sup>st</sup> century. These tiny plastic particles, resulting<br/>from the breakdown of larger plastics or produced for industrial<br/>use, threaten both ecosystems and human health. This study<br/>examines consumer awareness in Kuwait regarding the

use, threaten both ecosystems and human health. This study examines consumer awareness in Kuwait regarding the environmental and health risks of microplastics and how this awareness influences behavior. Using a descriptive-analytical approach, the research involved 400 Kuwaiti participants who completed a survey on health impacts, environmental effects, and sustainable consumption. The findings reveal a generally good level of awareness, though knowledge gaps exist in some areasparticularly misconceptions about which groups are most affected. Results showed that 80% of respondents understanding the link between microplastics and health problems such as respiratory and digestive disorders. Meanwhile, 90% recognize their harmful impact on ecosystems and marine life. Additionally, 87.5% reported reducing single-use plastic usage, and 77.5% engage in recycling-indicating environmentally responsible behaviors. However, only 65% follow awareness campaigns, highlighting the need for stronger public education efforts.

The study stresses the crucial role of consumer awareness in mitigating microplastic pollution. It calls for targeted educational campaigns, supportive policies, and effective media outreach to promote sustainable practices. The findings also underlined the importance of collective action among individuals, policymakers, and institutions to address the growing global threat of microplastics.

#### Introduction

Plastic particularly waste. microplastics, represents one of the most significant environmental challenges of the 21<sup>st</sup> century. Microplastics are small plastic particles less than 5 millimeters in size, originating from the breakdown of larger plastics or intentionally manufactured for specific uses, such as in cosmetics and cleaning products (Galloway, 2015). Microplastics are highly pervasive in various ecosystems, spreading across oceans, rivers, soil, and even the air, thereby posing multiple health and environmental risks to wildlife and humans (Browne et al., 2011).

Raising consumer awareness about the and health environmental risks of microplastics has become essential. given the increasing scientific evidence highlighting their role in contaminating food and water. Studies indicated that humans may be exposed to microplastics consumption through the of contaminated seafood, drinking water, or even inhaling polluted air (Cox et al., 2019). Consequently, consumer awareness plays a pivotal role in adopting more sustainable practices to reduce plastic usage and mitigate its adverse effects.

Microplastics pollution represents a growing environmental and health concern, exacerbated by the widespread use of plastic products and their improper disposal (Andrady, 2011). This pollution pervades terrestrial, aquatic, and even atmospheric ecosystems, with its effects reverberating across all levels of the food chain (Wright et al., 2013).

One of the most pressing issues with microplastics is their persistence in the

environment. Unlike organic materials, plastics do not biodegrade but fragmented into increasingly smaller particles. These particles accumulate in aquatic systems, where they are ingested bv marine organisms, leading to bioaccumulation and biomagnification in food webs (Cole et al., 2011). Humans, as apex consumers, face heightened exposure risks through the consumption of contaminated seafood, water, and even inhalation of airborne microplastics (Cox et al., 2019). Such exposure raises serious concerns about potential health impacts, including inflammation, of oxidative stress, and disruption (Galloway endocrine functions & Lewis, 2016).

Despite the critical nature of the problem, consumer awareness about microplastics and their associated risks remains limited. Studies had indicated that many individuals are unaware of how everyday behaviors, such as improper waste management or the use microplastic-containing of products. contribute to this growing issue (Hartley et al., 2018). Moreover, misinformation and a lack of accessible education about environmental and the health implications of microplastics hinder the adoption of sustainable practices.

Addressing the challenge of microplastics pollution necessitates enhancing public understanding and engagement. Raising awareness can empower consumers to make informed choices, such as reducing single-use biodegradable plastics, supporting and participating alternatives, in recycling programs. Policymakers and educators also play a crucial role in effective crafting communication strategies and regulations to mitigate the

production and spread of microplastics. By combining individual action with institutional efforts, the risks posed by microplastics can be significantly curtailed.

Previous studies indicated that of health awareness the and microplastic environmental risks of pollution is a critical factor in addressing this growing environmental issue. For example, the study by Smith et al., (2020) revealed an increase in awareness among individuals about the health risks of microplastics, such as respiratory and digestive disorders; however, there is still a need for improved awareness in some areas. These findings support the importance of the current research in measuring Kuwaiti consumers' of awareness the impacts of microplastics on their health, which helps identify knowledge gaps and enhance preventive actions. Similarly, Sharma & Chatteriee (2017)emphasize the importance of education in raising awareness about the effects of microplastics on human health and the environment, which is a key objective of the current research.

On the other hand, many studies focus on the environmental impacts of microplastics. For instance, Geyer et al. (2017) and Wright et al. (2013) showed that microplastics significantly affect marine ecosystems, threatening biodiversity and leading to the degradation of the food chain. These results align with the current research's objectives to analyze Kuwaiti consumers' awareness of the environmental impact of these particles, particularly their effects on marine life. Furthermore, the study by Hassan et al. (2020) highlights the role of consumer behavior in reducing plastic pollution by decreasing single-use plastic consumption, which is a significant part of Kuwaiti consumer behavior in the current research. These studies emphasize the importance of including environmental awareness in the research surveys to encourage more sustainable consumption practices within Kuwaiti society.

This research explores the importance of consumer awareness regarding the risks associated with microplastics. It reviews scientific evidence confirming their impact on the environment and human health while emphasizing the role of environmental education in fostering sustainable behaviors of Kuwaiti consumers.

# The Importance of Consumer Awareness of the Environmental Harm of Microplastics

Consumer awareness plays a pivotal role in addressing the environmental harm caused by microplastics. These tiny plastic particles have infiltrated various ecosystems, including oceans, rivers, and soil, where they disrupt natural processes and threaten biodiversity. Educating consumers about the sources and impacts of microplastics is essential for fostering sustainable practices and reducing the environmental footprint of plastic waste (Hartley et al., 2018). Consumer awareness is an essential factor in mitigating the environmental impacts of microplastics, as it directly influences individual behaviors and societal attitudes toward sustainability. Microplastics have a pervasive presence in the environment, affecting marine ecosystems, terrestrial soil, and even atmospheric Consumers' processes. understanding of their role in contributing to and addressing this issue is a significant step toward reducing

plastic pollution (**Sharma & Chatterjee, 2017**).

One key aspect of raising awareness involves highlighting the contribution of daily consumer habits to microplastic single-use pollution. For instance, plastics, improper waste disposal, and the use of products containing microbeads, such as cosmetics and detergents, are significant contributors to microplastic contamination (Andrady, **2011**). Informing consumers about these can encourage sources behavioral changes, such as choosing sustainable alternatives and supporting products with environmentally friendly packaging.

Moreover, consumer awareness initiatives have the potential to drive broader societal and legislative changes. As public understanding of microplastics grows, so does the demand for policies aimed at mitigating their production and spread. For example. bans on microbeads in cosmetics and efforts to regulate plastic waste have often been driven by informed and engaged consumers advocating for change (UNEP, 2018). This demonstrates how individual awareness can cascade into collective action, amplifying its impact on environmental sustainability.

Educational campaigns and awareness programs have proven effective in enhancing understanding of the microplastic problem. For instance, integrating microplastic education into curricula school or community workshops has been shown to significantly improve knowledge and inspire action. Studies reveal that individuals who are better informed about the environmental impacts of microplastics are more likely to adopt sustainable behaviors, such as reducing plastic use and participating in recycling programs (**Heidbreder et al., 2019**).

Raising consumer awareness about the health risks associated with microplastics is critical as these pollutants have become pervasive in daily life, with potential long-term implications for human health. Microplastics have been detected in drinking water, food, and even the air, individuals exposing to risks of ingestion, inhalation, and dermal contact. Despite their ubiquity. public understanding of their health impacts remains limited, emphasizing the need for targeted education efforts (Smith et al., 2018).

Microplastics can carry harmful chemicals, such as endocrine-disrupting compounds and carcinogens, which may leach into the human body after ingestion. These chemicals have been linked to various health issues, including hormonal imbalances, developmental disorders, and even cancer (Teuten et al., 2009). For instance, studies have shown that microplastics can serve as vectors for persistent organic pollutants (POPs), which are known to bioaccumulate and pose significant risks to human health (Rochman et al., 2016). Increasing consumer awareness about these risks can encourage individuals to reduce their reliance on plastic products and support stricter regulations on plastic usage.

The presence of microplastics in food products, particularly seafood, highlights the need for consumer vigilance. A study by **Barboza et al. (2018)** found that microplastics were present in commonly consumed fish and shellfish, raising concerns about the cumulative health effects on consumers. Informing the public about such findings can drive

Another concerning pathway of exposure is through the inhalation of airborne microplastics, which have been found in indoor and outdoor air. These particles can lodge in the respiratory system, potentially causing inflammation and other respiratory disorders (Prata, **2018**). Public awareness campaigns highlighting these risks can encourage changes in behavior, such as minimizing the use of synthetic textiles that shed microplastics during washing and opting for natural materials instead.

Consumer awareness is a cornerstone of efforts to combat microplastic pollution. understanding By the origins, consequences, and solutions related to microplastics, individuals are empowered to make informed choices and advocate for sustainable practices. This, in turn, contributes to reducing the environmental harm posed by microplastics and fostering a healthier generations. planet for future By understanding the health risks of microplastics. consumers can make informed decisions that protect not only their well-being but also the broader ecosystem. Education initiatives, supported by scientific evidence, can empower individuals to advocate for sustainable solutions and adopt healthier Enhanced lifestyles. consumer awareness can also contribute to collective efforts aimed at reducing plastic pollution and its associated health hazards.

#### Uses of micro plastics in Kuwait

In Kuwait, microplastics are associated with specific uses and environmental

management practices. They are often generated through wastewater treatment processes. Major wastewater treatment plants in Kuwait, such as the Sulabiya and Kabd facilities, remove significant amounts of microplastics, yet treated effluent and sludge may still contribute to their spread. Some of the treated water is used for landscape irrigation and maintaining bird reserves, potentially microplastics introducing into the terrestrial environment. Sludge practices. management though not currently involving agricultural use, also implications for microplastic have dissemination (Uddin, et al, 2022), Additionally, Kuwait has initiated steps to address broader plastic pollution. The Environment Public Authority (EPA) distributed eco-friendly bags made from materials organic to cooperative societies, aiming to reduce reliance on plastics. traditional These bags disintegrate safely in water and were part of a campaign to enhance public awareness about the environmental impacts of plastics, including microplastics (Uddin, et al, 2022).

These insights highlight the significance of local environmental strategies and infrastructure in managing microplastics while balancing their applications in daily and industrial processes. For more detailed scientific research or case studies specific to Kuwait, exploring these cited sources can provide additional context.

Photo (1) illustrates some examples of microplastic pollution spread on beaches. Photo (2) shows the necessary for microplastics recycling to reduce their pollution depending on Awareness, Reuse, Recycling, and Eco-Friendly Alternatives.



**Photo (1):** Microplastic pollution on beaches (https://www.aljazeera.net/news/2016/4/22/)



Photo (2): Key Actions to Reduce Microplastics Pollution (researcher)

#### Methodology

Research methodology: Descriptive-

Analytical Study.

# **Data Collection Tools**

- Questionnaire: A questionnaire was designed for a sample of 400 Kuwaiti consumers. The questionnaire consists of 22 items divided into five categories: Health Impact, Environmental Impact, Consumer Behavior, General Awareness, and Role of Society and Institutions. The questions focused on the level of awareness regarding the health and environmental risks of microplastic pollution.
- Interviews: Some interviews will be conducted with experts in the fields of

environmental science and public health clarify the impact of to microplastics on health and the environment to gather their insights for refining improving and the questionnaire.

#### **Research Implementation**

Data will be collected through the microplastic awareness pollution questionnaire designed by the researcher, focusing on health and environmental risks. The data will be analyzed by calculating the frequency of consumer responses to each item in the questionnaire, along with the corresponding percentages.

### Procedures

The researcher prepared a questionnaire to identify consumer awareness of the environmental and health risks of pollution with Microplastic particles. The researcher distributed the questionnaire to the research sample, which consisted of (400) consumers from Kuwaiti society. Table (1) shows the frequency and percentages of consumer responses to the questionnaire phrases.

### **Results and Discussion**

Table (1) concluded several insights regarding the awareness among people in Kuwaiti society of the environmental and health risks of Microplastics pollution.

Based on the data extracted from Table (1), it is evident that there is a reasonable level of awareness among people in Kuwaiti society regarding the environmental and health risks associated with Microplastics pollution, though there were some gaps that can be addressed.

Table	(1):	Frequencies	and	percentages	of	consumer	responses	to	the	questionnaire	on
awareness of the environmental and health risks of Microplastic pollution											

Category	Statement	Frequency	%
	Health disorders such as respiratory and digestive issues are primarily caused by Microplastic particles.	320	80.0%
Health Impact	I avoid consuming food and beverages packaged with Microplastics.	300	75.0%
	Microplastics pose a health risk only to children.	100	25.0%
	I feel reassured when choosing glass containers as an alternative to Microplastic particles.	280	70.0%
	Microplastic pollution affects marine life and ecosystems.	280	70.0%
Environmentel	I believe that Microplastics contribute to environmental degradation and the pollution of water and soil.	360	90.0%
Impact	I understand that marine organisms may ingest Microplastics, disrupting the entire food chain.	340	85.0%
	I protect the ecosystem by avoiding products exposed to Microplastic particles.	330	82.5%
	I use products that contain eco-friendly materials.	300	75.0%
	I try to reduce the use of single-use plastic products to minimize environmental pollution.	350	87.5%
Consumer Behavior	I encourage my family to use products containing eco-friendly materials.	320	80.0%
	I look for eco-friendly alternatives when purchasing daily products to avoid plastic pollution.	300	75.0%
	I actively recycle as part of my contribution to reducing the spread of Microplastics.	310	77.5%
	I have sufficient knowledge about the primary sources of Microplastics in the environment.	280	70.0%
General Awareness	I follow news or awareness campaigns about the risks of plastic pollution.	260	65.0%
	I recognize the importance of changing consumption patterns to address the issue of Microplastic pollution.	300	75.0%
	I try to learn more about less harmful materials to use them.	290	72.5%
	I support government initiatives aimed at reducing the use of plastics in daily life.	340	85.0%
Role of Society and	I believe that institutions and companies are responsible for reducing plastics in their products to combat pollution.	330	82.5%
Institutions	I participate in community activities that aim to raise awareness about the risks of plastic pollution on health and the environment.	260	65.0%
	I watch programs aimed at reducing Microplastic pollution.	240	60.0%
	I watch television programs discussing Microplastic pollution.	220	55.0%



Awareness and Behavior Regarding Microplastic Pollution in Kuwaiti Society

**Fig (1):** Comparison between different awareness and behavior impacts of the Kuwaiti society regarding microplastic pollution.

The percentage of participants aware of the health and environmental impacts, as well as their engagement in sustainable behaviors and their participation in relevant media and societal initiatives are indicated in Fig. (1).

#### **Awareness of Health Impacts**

The results showed a significant portion of participants, up to 80%, were aware by that Microplastic particles contribute to health issues such as respiratory and digestive problems. Moreover, 75% avoid consuming foods and drinks containing Microplastic particles, indicating that most individuals link their health to plastic pollution. This was aligned with the findings of a study by Smith et al., (2020), which showed that exposure to Microplastic particles can lead to serious problems health like respiratory inflammation, digestive disorders, and toxic effects on human tissues. However, there was a gap in awareness, as 25% of participants believed that these risks were limited to children only, suggesting the

need to correct misconceptions about the effects of Microplastic particles.

#### Awareness of Environmental Impacts

On the environmental front, awareness higher. 90% was significantly of participants acknowledge that Microplastic pollution impacts marine life and ecosystems. Additionally, this was aligned with the findings of Geyer et al., (2017).which demonstrated that Microplastic pollution has severe effects on marine ecosystems, as marine organisms can ingest these tiny particles, leading to the destruction of the marine food chain. Wright et al., (2013) also showed that Microplastic pollution leads degradation of the marine to the environment in general, causing changes in marine ecosystems. 85% believed that particles Microplastic contribute to environmental degradation, including water and soil pollution. This indicated that participants were more aware of plastic's impact on marine organisms and the overall ecological balance. However, there was still room for improvement in understanding the effect of plastic on the food chain, as 82.5% acknowledge that marine organisms may ingest Microplastic particles, which could disrupt the entire food chain.

# **Consumer Behavior Trends**

The results also showed a strong trend towards environmentally positive behaviors among participants. 87.5% of participants attempted to reduce single-use plastic, and 75% actively seeked ecofriendly alternatives in their daily purchases. Additionally, 77.5% recycling participated in programs, reflecting individual commitment to reduce Microplastic pollution. People in Kuwaiti society are environmentally conscious adopt sustainable and consumption practices. These behaviors aligned with the findings of Hassan et al., (2020), which showed that consumers had become more aware of the need to reduce single-use plastics by adopting sustainable consumption behaviors, such as buying products made from eco-friendly materials and using sustainable alternatives to plastic. On the other hand, Boucher & Friot (2017) highlighted the importance of participation in recycling programs in reducing plastic pollution impacts.

# Public Awareness and the Role of Media

Regarding public awareness, data showed that 65% of participants followed news or awareness campaigns related to plastic pollution risks, indicating the need to expand the scope of these campaigns to increase general knowledge. While a large portion of participants (75%) understood the importance of changing consumption patterns to address Microplastic pollution, more educational initiatives are needed to raise awareness overall. This was aligned with the study by Bain et al., (2021), which emphasized awareness that

campaigns and media play a key role in increasing awareness about plastic pollution and encouraging individuals to more sustainable adopt behaviors. Additionally, Claudio (2018) showed that the use of traditional and digital media had a significant impact on changing habits promoting consumer and environmental awareness.

# **Role of Community and Institutions**

The results also showed strong support for government initiatives and community activities. 85% of participants support governmental efforts to reduce plastic use in daily life, and 82.5% believed that institutions and companies are responsible for reducing plastic in their products. Furthermore, there was an increase in individuals interest among for in participating in community activities to pollution, with combat 65% of participants engaged in such activities. This result supported the findings of Jambeck et al. (2015), which showed that government legislation plays a vital role in reducing single-use plastic in many countries, contributing to the reduction of pollution. These plastic deductions suggest that the Kuwaiti community is ready to join collective efforts to combat plastic pollution and supports institutional initiatives in this regard.

# Conclusion

# 1. High Awareness Levels

Respondents showed a significant understanding of the environmental and health risks associated with Microplastics, particularly their impact on marine ecosystems and health disorders.

# 2. Behavioral Shift

Many respondents exhibit eco-conscious behaviors, such as reducing single-use plastics, recycling, and seeking sustainable alternatives.

# 3. Need for Educational Campaigns

While general awareness is good, there is a need to address misconceptions (e.g., Microplastics harm children exclusively) and enhance knowledge about the sources and long-term impacts of Microplastics.

# 4. Role of Media and Institutions

There is strong support for institutional responsibility and governmental action, emphasizing the importance of coordinated efforts.

# 5. Room for Engagement

Media campaigns and community initiatives can further strengthen awareness and action, especially among less informed demographics.

#### Recommendations

Based on the results. awareness campaigns should focus on correcting misconceptions and enhancing the public's understanding of both the health and environmental impacts of Microplastic pollution. Furthermore, behaviors that environment support the can be encouraged by motivating more individuals to participate in recycling programs and choose sustainable alternatives to plastic. This can be achieved through the following:

# 1) Educational Campaigns

Target misconceptions and provide detailed insights into the risks of Microplastics through workshops, social media, and school curricula.

# 2) Increased Community Engagement

Encourage participation in recycling programs and environmental initiatives to foster a culture of sustainability.

#### 3) Policy Advocacy

Promote stronger regulations on singleuse plastics and support companies that adopt sustainable practices.

# 4) Media Utilization

Utilize both traditional and digital media to disseminate information effectively and reach a broader audience.

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# وعي المستهلك بالمخاطر البيئية والصحية الناجمة عن تلوث البلاستيك الدقيق أ/ ريم سعود المليفي

كلية الدر اسات التكنولوجية، قسم تكنولوجيا المختبر ات، الهيئة العامة للتعليم التطبيقي والتدريب بدولة الكويت

يُعد تلوث البلاستيك الدقيق مصدر قلق بيئي وصحي رئيسي في القرن الحادي والعشرين، حيث تُهدد هذه الجزيئات البلاستيكية الدقيقة، الناتجة عن تحلل البلاستيك الأكبر حجمًا أو المُنتج للاستخدام الصناعي النظم البيئية وصحة الإنسان على حد سواء. تبحث هذه الدراسة و عي المستهلك في الكويت بالمخاطر البيئية والصحية للبلاستيك الدقيق، وكيف يؤثر هذا الوعي على سلوكه، واستخدمت الباحثة المنهج الوصفي التحليلي، واشتمل البحث على عد (٤٠٠) مشارك كويتي أكملوا استطلاعًا حول الأثار الصحية والبيئية والاستهلاك المستدام، وأسفرت النتائج عن مستوى جيد بشكل عام من الوعي، على سلوكه، واستخدمت الباحثة المنهج الوصفي التحليلي، واشتمل البحث على عد (٤٠٠) مشارك كويتي أكملوا استطلاعًا حول الأثار الصحية والبيئية والاستهلاك المستدام، وأسفرت النتائج عن الخاطئة حول الفئات الأكثر تضررًا، حيث أظهرت النتائج أن ٨٠% من المشاركين يدركون العلاقة بين البلاستيك الدقيق والمشاكل الصحية مثل اضطرابات الجهاز التنفسي والجهاز الهضمي. في الوقت نفسه يُدرك ٩٠% من الخاطئة حول الفئات الأكثر تضررًا، حيث أظهرت النتائج أن ٨٠% من المشاركين يدركون العلاقة بين البلاستيك الدقيق والمشاكل الصحية مثل اضطرابات الجهاز التنفسي والجهاز الهضمي. في الوقت نفسه يُدرك ٩٠% من المشاركين تأثيرها الضار على النظم البيئية والحياة البحرية، بالإضافة إلى ذلك أفاد ٥٠٨% من المشاركين بتقليل المشاركين تأثيرها الضار على النظم البيئية والحياة البحرية، بالإضافة إلى ذلك أفاد ٥٠٨% من المشاركين يقليل المشاركين تأثيرها الضار على النظم البيئية والحياة البحرية، بالإضافة إلى ذلك أفاد ٥٠٠% من المشاركين يقليل المشاركين تأثيرها الضار على النظم البيئية والحياة البحرية، بالإضافة إلى ذلك أفاد ٥٠٠% من المشاركين تأثيرها المي على المشاركين مالحرين مالمان كان مالم البيئية والحيات عارم من المشاركين مالماركين مالويتي العادي المالي تنعير إلى مالمالركين يقليل من والمستيك الدقيق والحي مالمشاركين مالوين ألحادي الاستيك ما مالماركين مالماركين مالماركين تأثيرها الضار على المالينية والحيا معمون المشاركين فقط حملات التوعية، مالمالركين مالماليين إلى عمود سوكي يلبي إلى مالوكياتية عامة أقوى. ألمان على المالي على المالي على المالركين مالمالي على مالماركين مالماركين مالمالي على مالمال عامي وعلى المعرول بالمالي عامة أقوى. ألمال ساحي على أممارسات المامي