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Original Research Article

BEYOND AWARENESS: GAPS IN KNOWLEDGE AND PRACTICE REGARDING MICROPLASTIC EXPOSURE IN URBAN HOUSEHOLDS

Meet M. Chauhan[1], Ahmad I. Vohra[2], Drashti B. Vadhel[3], Tanvi V. Vadhel[4], Foram G. Theba[5]

[1]*Professor, Department of Community Medicine, Shantabaa Medical College, Amreli, Gujarat, India.*
[2-5]*4th Year MBBS Student, Shantabaa Medical College, Amreli, Gujarat, India.*

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Corresponding Author:
Dr. Meet M. Chauhan,
Professor, Department of Community Medicine, Community Medicine Department, Shantabaa Medical College, Amreli, Gujarat, India.
Email: drmeetchauhan88@gmail.com

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ABSTRACT

Background: Microplastics, plastic particles smaller than 5 mm, are increasingly recognised as an environmental and public health concern due to their widespread presence in food, water, air, and commonly used household products. Although scientific evidence on potential health effects is expanding, public understanding of microplastic exposure and related risks remains insufficient. **Objectives:** To assess the level of knowledge, attitude, and awareness (KAA) regarding microplastics among the urban general population and to identify socio-demographic factors associated with variations in KAA.
Materials and Methods: A cross-sectional observational study was conducted in urban residential areas of western Gujarat among individuals aged 18–65 years. Using a multistage sampling technique, 258 participants were included in the final analysis. Data were collected through face-to-face interactions using a self-administered, pretested, semi-structured questionnaire consisting of 13 items assessing knowledge, attitude, and awareness. Responses were recorded on a 5-point Likert scale and categorised into low, moderate, and high levels using Bloom's cut-off points. Descriptive statistics, chi-square tests, and multivariable logistic regression were applied for data analysis.
Results: High levels of knowledge, attitude, and awareness were observed in 58.5%, 63.1%, and 47.7% of participants, respectively. Education emerged as the most consistent and significant determinant across all KAA domains ($p<0.001$). Younger age was significantly associated with higher knowledge, while female gender independently predicted higher attitude and awareness. Despite moderate to high awareness, 47.2% of participants reported boiling plastic baby bottles, indicating a discrepancy between awareness and household practices.
Conclusion: While general concern regarding microplastics was evident, critical gaps persist in specific knowledge and risk-related behaviours. Targeted educational interventions addressing high-risk household practices are essential, particularly among populations with lower educational attainment.
Keywords: Microplastics; Environmental Exposure; Environmental Health; Health Knowledge; Urban Population.

INTRODUCTION

Plastic's unique combination of versatility, durability and affordability has made it essential in numerous applications, from everyday goods to advanced medical devices and fundamentally shaping modern life. However, improper disposal practices have led to widespread environmental degradation, with one of the most alarming consequences being the rise of microplastic particles smaller than 5 mm. These particles have now become central to what scientists refer to as the "microplastic crisis". This increasing concern is driven by excessive use of single-use plastics, inadequate public awareness, and poor waste segregation.[1] Promoting the 3 R's- Reduce, Reuse, and Recycle will be a critical and environmentally sound intervention to address this challenge.[2]

The term “microplastic” was first described in 2004 as tiny plastic particles found in marine environments. ³ microplastic are typically classified into: primary microplastic: microplastic particles manufactured for personal care products, industrial abrasives, and medical applications. secondary microplastic: generated from the degradation of larger plastic items such as packaging, plastic bottles and bags through weathering, UV radiation and mechanical abrasion.[1,4] Human activities significantly contribute to microplastic pollution. Practices such as using damaged polytetrafluoroethylene (PTFE) based non-stick cookware, microwaving food in plastic containers, improper disposal of cosmetic products, packaging materials and glitter are key contributors of microplastic.[5,6] Notably, degraded non-stick pans and plastic baby bottles may leach microplastic into food and liquids thus elevating microplastic exposure risks particularly among infants. While many microplastic sources originate on land and marine ecosystems serve as their ultimate sink. Marine litter, both land-based and oceanic, persists in the environment, affecting organisms across trophic levels. microplastic disrupt biological processes such as photosynthesis in algae and enter the human food chain via drinking water, seafood and even through inhalation.[7] microplastic have been detected in human stool, indicating dietary exposure; these particles are suspected to be associated with infertility, respiratory illness, neurotoxicity and hormonal imbalance.[8,9,10]

Emerging evidence indicates that microplastic can cross biological barriers. Studies have reported microplastic in the placenta, breast milk and more recently, in the human brain, one study reported microplastic accumulation in individuals with dementia.[11,12,13] These findings raise serious concerns about long-term systemic exposure and its possible role in neurodegenerative and inflammatory diseases.[13,14] Additionally, freshwater species, including mosquitoes, may act as vectors in transferring microplastic between aquatic and terrestrial ecosystems.[15]

Previous studies have highlighted growing concern about the potential human health effects of microplastic exposure, while also emphasising substantial gaps in understanding exposure pathways and health implications at the population level.[4] Most of existing research articles has focused on environmental contamination or experimental health effects with limited attention to population-level knowledge, attitudes and awareness related to everyday household practices such as use of non-stick cookware, plastic baby feeding bottles, and waste disposal. This study was undertaken in urban residential areas of western part of Gujarat, with the objective of evaluating knowledge, attitude, and awareness (KAA) related to microplastic among its general population. The findings were to provide baseline data to support awareness-building efforts, promote environmentally responsible behaviours and guide the development of evidence-based municipal waste management strategies.

Objectives

1. To assess the knowledge of the general population regarding sources and health impacts of microplastic.
2. To evaluate the attitudes of the general population towards microplastic.
3. To assess awareness related to microplastic among the general populations.
4. To analyse demographic factors associated with variations in knowledge, attitudes and awareness related to microplastic.

MATERIALS AND METHODS

1. Study Type

This study was designed as a cross-sectional observational study to evaluate the knowledge, attitude, and awareness regarding microplastic exposure among the general population of urban areas.

2. Place of Study / Setting

The study was conducted in urban residential areas in the western part of Gujarat.

3. Study Population

The study population consisted of individuals aged between 18 and 65 years.

4. Inclusion/Exclusion Criteria

Individuals below 18 years or above 65 years of age were excluded from the study. Participation was limited to those who provided voluntary verbal informed consent.

5. Sampling Design and Size

A multi-stage sampling design was carried out in the urban areas, comprising a total of 11 administrative wards. In the first stage, 6 wards were selected from the 11 wards using a simple random sampling (lottery method). In the second stage, households within each selected ward, were identified through a purposive sampling. Subsequently, from each selected ward, 50 households were selected using a simple random sampling by field surveyors. Purposive sampling was used only to identify residential households, after which simple random sampling was applied for household selection. The initial sample comprised 300 households. During data screening, 42 households were excluded due to non-response, partial completion or incomplete information. The final analysis was performed on 258 valid and complete responses. The overall response rate was 86%.

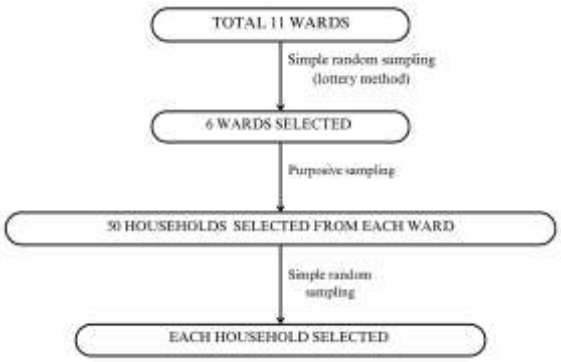

Figure 1: Multistage sampling procedure for selection of study participants

6. Techniques of Data Collection

Data were collected through direct face-to-face interactions using self-administered, pretested questionnaires. Participants completed the questionnaire independently, while Surveyors were present to provide clarification when required. No digital or online methods were employed.

7. Tools for Data Collection

A semi-structured, pretested questionnaire was used as the data collection tool. The questionnaire was prepared in English and covered demographic details, microplastic-related knowledge, awareness and attitudes.

The original questionnaire was translated from English to Gujarati to ensure better understanding by participants. A pilot study was carried out to ensure that the questionnaire was easy, clear and appropriate for participants to understand. The pilot study included a small subset of participants not included in the final analysis. The initial draft included 15 questions. Feedback from the pilot participants helped identify items that were repetitive or unclear. After removing two questions and revising the wording, the final version of the questionnaire comprised 13 questions. The final Gujarati version was used for data collection. Responses were recorded using a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Negatively framed items were scored such that higher total scores consistently reflected more favourable knowledge, attitude, and awareness. Some items assessed overlapping constructs of knowledge and awareness due to their conceptual interdependence. The total score for each participant was calculated and converted into a percentage of the maximum obtainable score. The levels were categorised Based on Bloom's cut-off points, into low (<50%), moderate (50–79%) and high (≥80%). This classification has been widely used in KAA studies in public health research.

8. Statistical Framework

All data were organized in MS Excel and analysed using Statistical Package for the Social Sciences (SPSS), version XX. Descriptive statistics were applied to summarise socio-demographic variables and questionnaire responses, which were expressed as frequencies and percentages. Data analysis was carried out using both descriptive and inferential statistics. Associations between socio-demographic variables and KAA categories were examined using the Chi-square test (χ^2). When expected cell counts were less than five, Fisher's exact test was applied. For binary logistic regression analysis knowledge, attitude, and awareness scores were subdivided into high and non high (moderate+Low) categories. This subdivision was done to meet the assumptions of binary logistic regression. Multicollinearity assessed prior to regression and found to be within acceptable limits. Age was analysed as a categorical variable in bivariate analysis and as a continuous variable in regression models to retain statistical power. The results were expressed as odds ratios (OR) and adjusted odds ratios (AOR) with 95% confidence intervals. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval of the study was obtained from the Institutional Ethics Committee of Shantabaa Medical College.

RESULTS

Table 1 presents the demographic profile of 258 participants. The majority were aged 34-49 years (43.4%), followed by 50-65 years (36.0%) and 18-33 years (20.5%). Males predominated (58.5%), while females comprised (41.5%). Education levels were diverse, with graduates forming the largest group (41.1%), followed by secondary education (18.6%) and higher secondary (17.4%); only 0.8% were illiterate.

Table 2 summarizes responses across 13 questionnaire items categorized into knowledge (5 items), attitude (4 items), and awareness (4 items), using a 5-point Likert scale (strongly disagree to strongly agree). Knowledge responses indicated moderate to high knowledge: most agreed/strongly agreed that microplastic are present in water/food/utensils/air (72.4%), cause health issues (69.7%), and contaminate food via packets (87.5%). Awareness was strongest about plastic waste harming animals (94.5%) and microplastic as a serious problem (84.7%). Attitudes showed majority support for reducing plastic use (68.5%), concern over health hazards (69.7%), and government bans (89.4%). However, it was observed that 47.2% often boiled plastic baby bottles while feeding their baby.

Table 3 stratifies high, moderate, and low levels of knowledge, attitude, and awareness by age, gender, and education. Knowledge was high in 58.5% overall, with significant associations by age ($p=0.041$; highest in 18-33 years at 67.9%) and education ($p<0.001$; 88.8% high among postgraduates vs. 0% among illiterates). Attitude levels were high in 63.1%, with significant education gradient ($p<0.001$; 100% high in postgraduates). Awareness was high in 47.7%, also significantly

linked to education (p<0.001; 88.8% high in postgraduates). Gender differences were not significant in bivariate analysis but emerged as significant predictors in multivariable analysis. age effects were non-significant for attitude/awareness (p≥0.089). Fisher's exact test was applied where expected cell counts were less than five.

Table 4 reports multivariable logistic regression analyses identifying predictors of high scores (reference: moderate/low). For high knowledge, postgraduate (AOR=4.12, 95% CI: 2.14-7.91, p=0.002), graduate (AOR=2.54, 95% CI: 1.68-4.21, p=0.006), and higher secondary education (AOR=1.89, 95% CI: 1.05-3.41, p=0.034) vs. primary were significant; age showed modest effect high attitude was predicted by postgraduate and graduate education, female gender and no addiction. High awareness linked to postgraduate and graduate education, female gender and non-addicted persons.

Table 1: Socio-demographic characteristics of study participants (n = 258)

Demographic variables	Frequency (%)
Age (Years)	
18-33	53(20.54%)
34-49	112(43.42%)
50-65	93(36.04%)
Gender	
Male	151(58.52%)
Female	107(41.48%)
Education	
Illiterate	2(0.8%)
Primary	24(9.3%)
Secondary	48(18.6%)
Higher secondary	45(17.4%)
Diploma	6(2.3%)
Graduate	106(41.1%)
Post graduate	27(10.5%)
Addiction/habitual consumption	
Smoking	17(6.6%)
Tobacco chewing	56(21.7%)
Tobacco Snuffing	6(2.3%)
Alcohol	1(0.4%)
Packet Food	17(6.6%)
Soft Drink	30(11.6%)
Chewing gum	2(0.8%)
None	129(50%)

Note: *The category "Addiction/habitual consumption" includes self-reported use of tobacco products, alcohol, and commonly consumed packaged products.*

Table 2: Distribution of responses to the microplastic knowledge, attitude and awareness questionnaire

Questionnaires	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Knowledge					
Q.1 I know what microplastic particles are and their ill effects	7(2.7%)	17(6.5%)	27(10.4%)	141(54.6%)	66(25.5%)
Q.2 Microplastic particles are present in drinking water, food, non-stick utensils and air	1(0.38%)	18(6.9%)	52(20.1%)	109(42.2%)	78(30.2%)
Q.3 Microplastic particles cause digestive problems, hormonal imbalance, cancer, infertility and respiratory problems	3(1.1%)	20(7.7%)	55(21.3%)	102(39.5%)	78(30.2%)
Q.4 I am aware of the adverse health effects caused by non-stick utensils	8(3.1%)	35(13.5%)	43(16.6%)	104(40.3%)	68(26.3%)
Q.5 Food is contaminated with microparticles of plastic due to plastic packets	4(1.5%)	9(3.4%)	19(7.3%)	134(51.9%)	92(35.6%)
Attitude					
Q.1 I often boil plastic baby milk bottles with hot water	30(11.6%)	27(10.4%)	79(30.6%)	77(29.8%)	45(17.4%)
Q.2 I have changed my daily habits to reduce the consumption of microplastic particles	8(3.1%)	28(10.8%)	45(17.4%)	127(49.2%)	50(19.3%)
Q.3 I am concerned about health hazards caused by microplastic	5(1.9%)	16(6.2%)	57(22.0%)	117(45.3%)	63(24.4%)
Q.4 I support government policies that ban certain plastic products to reduce microplastic pollution	2(0.7%)	5(1.9%)	20(7.7%)	142(55.0%)	89(34.4%)
Awareness					
Q.1 I know that babies are exposed to microplastic particles by chewing on milk bottles and plastic toys	1(0.3%)	24(9.3%)	56(21.7%)	109(42.2%)	68(26.3%)

Q.2 I believe that microplastic pollution is a serious problem	1(0.3%)	8(3.1%)	30(11.6%)	130(50.3%)	89(34.4%)
Q.3 I think about microplastic pollution while using or disposing of plastic items	5(1.9%)	27(10.4%)	63(24.4%)	99(38.3%)	64(24.8%)
Q.4 I know that improper disposal of plastic waste can harm cows, dogs and other animals that roam the roads	2(0.7%)	5(1.9%)	7(2.7%)	109(42.2%)	135(52.3%)

Note: *Responses were recorded on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Negatively framed items were reverse-scored so that higher scores indicated more favourable knowledge, attitude, and awareness*

Table 3: Association of socio-demographic variables with knowledge, attitude, and awareness levels regarding microplastic

Variables	Frequency (%)	Knowledge			Attitude			Awareness		
		High	Moderate	Low	High	Moderate	Low	High	Moderate	Low
Age										
18-33	53 (20.54%)	36 (67.9%)	16 (30.1%)	1 (1.8%)	38 (71.6%)	15 (28.3%)	0 (0.0%)	24 (45.2%)	27 (50.9%)	2 (3.7%)
34-49	112 (43.42%)	69 (61.6%)	41 (36.6%)	2 (1.7%)	74 (66.0%)	37 (33.0%)	1 (0.8%)	57 (50.8%)	50 (44.6%)	5 (4.4%)
50-65	93 (36.04%)	46 (49.4%)	39 (41.9%)	8 (8.6%)	51 (54.8%)	41 (44.0%)	1 (1.07%)	42 (45.1%)	51 (54.8%)	0 (0.0%)
P Value		**0.041**			0.089			0.238		
Gender										
Male	151 (58.52%)	90 (59.6%)	56 (37.0%)	5 (3.3%)	95 (62.9%)	54 (35.7%)	2 (1.3%)	72 (47.6%)	75 (49.6%)	4 (2.6%)
Female	107 (41.48%)	61 (57.0%)	40 (37.3%)	6 (5.6%)	68 (63.5%)	39 (36.4%)	0 (0.0%)	51 (47.6%)	53 (49.5%)	3 (2.8%)
P Value		0.653			0.916			0.997		
Education										
Illiterate	2 (0.8%)	0 (0.0%)	2 (100%)	0 (0.0%)	0 (0.0%)	2 (100%)	0 (0.0%)	0 (0.0%)	1 (50%)	1 (50%)
Primary	24 (9.3%)	5 (20.8%)	13 (54.1%)	6 (25%)	8 (33.3%)	15 (62.5%)	1 (4.1%)	4 (16.6%)	18 (75%)	2 (8.3%)
Secondary	48 (18.6%)	20 (41.6%)	27 (56.2%)	1 (2.0%)	21 (43.7%)	26 (54.1%)	1 (2.0%)	15 (31.2%)	32 (66.6%)	1 (2.0%)
Higher secondary	45 (17.4%)	21 (46.6%)	21 (46.6%)	3 (6.6%)	22 (48.8%)	23 (51.1%)	0 (0.0%)	14 (31.1%)	29 (64.4%)	2 (4.4%)
Diploma	6 (2.3%)	5 (83.3%)	1 (16.6%)	0 (0.0%)	4 (66.6%)	2 (33.3%)	0 (0.0%)	4 (66.6%)	2 (33.3%)	0 (0.0%)
Graduate	106 (41.1%)	76 (71.6%)	29 (27.3%)	1 (0.9%)	81 (76.4%)	25 (23.5%)	0 (0.0%)	62 (58.4%)	43 (40.5%)	1 (0.9%)
Postgraduate	27 (10.5%)	24 (88.8%)	3 (11.1%)	0 (0.0%)	27 (100%)	0 (0.0%)	0 (0.0%)	24 (88.8%)	3 (11.1%)	0 (0.0%)
P Value		**<0.001**			**<0.001**			**<0.001**		

Table 4: Multivariate logistic regression analysis of predictors of high knowledge, attitude and awareness scores

Predictor	Category	Reference	OR	AOR	95% CI for AOR	p- value
High Knowledge Score						
Education	Postgraduate	Primary	5.12	4.12	2.14-7.91	**0.002**
	Graduate	Primary	3.18	2.54	1.68-4.21	**0.006**
	Higher Secondary	Primary	2.31	1.89	1.05-3.41	**0.034**
	Secondary	Primary	1.78	1.42	0.79-2.56	0.245
	Diploma	Primary	1.92	1.56	0.78-3.12	0.208
Age	Continuous	-	1.05	1.03	1.006-1.054	**0.016**
Gender	Female	Male	1.56	1.31	0.87-1.96	0.198
Addiction/habitual consumption	None	Any Addiction/habitual consumption	1.48	1.27	0.81-1.99	0.298
High Attitude Score						
Education	Postgraduate	Primary	3.45	2.89	1.58-5.29	**0.004**
	Graduate	Primary	2.56	2.12	1.42-3.64	**0.011**
	Higher Secondary	Primary	1.89	1.56	0.89-2.73	0.118
	Secondary	Primary	1.48	1.24	0.68-2.26	0.481
Age	Continuous	-	1.02	1.01	0.995-1.025	0.187
Gender	Female	Male	2.01	1.67	1.12-2.48	**0.012**
Addiction/habitual consumption	None	Any Addiction/habitual consumption	1.89	1.58	1.02-2.45	**0.041**
High Awareness Score						
Education	Postgraduate	Primary	4.56	3.78	1.95-7.32	**0.004**
	Graduate	Primary	2.89	2.34	1.52-3.87	**0.008**
	Higher Secondary	Primary	2.12	1.72	0.96-3.08	0.069
	Secondary	Primary	1.34	1.18	0.65-2.14	0.581

Age	Continuous	-	1.02	1.01	0.996-1.024	0.164
Gender	Female	Male	2.56	2.12	1.42-3.17	**0.011**
Addiction/habitual consumption	None	Any Addiction/habitual consumption	2.34	1.92	1.08-3.41	**0.027**

DISCUSSION

A cross-sectional study provides a detailed assessment of knowledge, attitude, and awareness (KAA) regarding microplastic among the 258 participants of urban residential areas. Our study sample showed that 43.42% of respondents were in the 34–49 year age group, 36.04% were aged 50–65 years, and 20.54% were between 18–33 years. These findings align with those of Mistry et al. (2025) who also reported that the majority of participants fell within the 31–50 year age group. The similarity in age distribution indicates that both studies predominantly captured middle-aged adults, reducing age-related variability and supporting meaningful comparisons of microplastic KAA patterns across the two urban populations.[16] (Table 1)

In our study 69.7% of participants recognised that microplastic may contribute to digestive problems, hormonal imbalance, infertility and respiratory issues. This finding aligns with Premarathna et al. (2023), who reported 68% recognition of microplastic-related health harms among Sri Lankan communities.[17] Additionally, 68.1% of respondents agreed that they had changed daily habits to reduce microplastic exposure, consistent with Deng et al. (2020), who found that respondents more willing to adopt safer practices once informed about microplastic risks.[18] A critical insight from this study is the disconnect between general awareness and specific high-risk behaviours. Although participants acknowledged microplastic risks, 47.2% of our participants reported boiling plastic baby bottles. Marege et al. (2023) reported similar findings with 44.5% of caregivers boiling bottles, and the Syria IYCF KAP survey documented 48.9% sterilising bottles by boiling.[19,20] These aligned proportions indicate that boiling plastic feeding bottles is a widespread behaviour and likely represents an under-recognised source of microplastic exposure in infants. Only 47.7% of participants demonstrated high overall awareness. This aligns with the GESAMP Global Assessment (2015), which noted that public understanding of microplastic is generally incomplete and rarely extends to specific sources or health implications. [1] Mistry et al. (2025) similarly found low to moderate awareness levels and limited knowledge of microplastic origins and associated health impacts.[16] Rahman et al. (2023) also observed low awareness of microplastic spread and ecological effects even in sensitive coral reef ecosystems.[21] Despite these gaps, our study documented strong public support for restrictive government policy action, with 89.4% of respondents supporting restrictive government measures. This aligns with WHO (2019), which emphasises applying the precautionary principle in plastic-pollution management.[14] The knowledge-attitude-awareness gap observed in our findings mirrors patterns described by Deng et al. (2020), who found that only 26% of respondents had heard of microplastic, although more than 80% expressed concern once informed.[18] Chin et al. (2023) similarly found that although over 90% recognised plastic pollution as harmful, only 41–55% correctly understood microplastic sources or health implications.[22] Premarathna et al. (2023) also reported a gap, with 94% acknowledging the environmental harm caused by plastics, but only 68% demonstrating microplastic-specific awareness.[17] These findings indicate that surface-level awareness is common, while deeper understanding remains limited across populations. [Table 2]

The most robust finding from our chi-square analysis is the decisive role of education in shaping KAA outcomes. High knowledge rose from 20.8% among participants with only primary education to 88.8% among post-graduates, a statistically significant pattern. This aligns with the GESAMP Global Assessment (2015), which emphasised that higher education is often associated with better environmental health literacy.[1] It also aligns with Premarathna et al. (2023), who found higher awareness among those with tertiary-educated participants, and with Yusuf et al. (2023), who reported 82% awareness among urban residents with a strong association with education level.[17,23] Borah et al. (2025) similarly found that higher-educated farmers demonstrated significantly better awareness and more positive attitudes toward microplastic pollution, although percentage distribution was not reported.[24] In our study, gender showed no significant association with awareness, consistent with finding from Yusuf et al. (2023).[23] Age showed a significant association with knowledge. High knowledge was most common among younger adults, with 67.9% of respondents aged 18–33 demonstrating high knowledge compared with 49.4% in the 50–65 year group. Most published microplastic KAP studies, including Premarathna et al. (2023) and Mistry et al. (2025) did not identify age as a significant factor.[17,16] Thus, our results contribute new evidence that age may influence satisfactory knowledge even when it does not affect attitude or awareness. [Table 3]

In our logistic regression analysis, education, age and gender emerged as significant independent predictors of KAA outcomes. Education showed the strongest effect, with post-graduates demonstrating substantially higher odds of achieving high knowledge and awareness compared with those with primary education. These findings align with previous studies examining public perceptions of

microplastic. Felipe-Rodriguez et al. (2022) reported that individuals with higher educational levels demonstrated more comprehensive mental models of microplastic, including greater recognition of causes, consequences, and potential solutions.[25] Age also remained significantly associated with high knowledge, with younger adults showing greater odds than older respondents. Although attitude (63.5% vs 62.9%) and awareness (47.6% in both groups) levels were similar between female and male in bivariate analysis, female gender remained a significant independent predictor in multivariable analysis. Women had higher odds of achieving both high attitude (AOR 1.67, 95% CI 1.12–2.48) and high awareness (AOR 2.12, 95% CI 1.42–3.17). This finding aligns with the Felipe-Rodriguez et al. (2022), who reported that female respondents were more likely to associate microplastic with environmental and health impacts, reflecting higher concern and awareness. This also aligns with the finding of Hossain et al. (2024), who reported that women and higher-educated respondents showed greater readiness to support microplastic-restriction policies.[26] [Table 4]

CONCLUSION

This study provides an assessment of knowledge, attitude, and awareness (KAA) regarding microplastic among urban residential areas. Even though a large proportion of participants recognized that plastics cause environmental harm, fewer demonstrated adequate understanding of microplastic-related sources and exposure pathways. High-risk household practices, like boiling plastic feeding bottles, were still reported in spite of moderate to high awareness, which indicates a gap between knowledge and behaviour. Education emerged as the steadiest determinant across all three KAA components. Participants with higher educational attainment showed significantly better knowledge scores, higher awareness levels, and more positive attitudes. Younger participants show higher knowledge compared with older age groups. Logistic regression analysis confirmed that higher education was the most consistent independent predictor of KAA outcomes, while younger age predicted higher knowledge and female gender predicted better attitude and awareness. In spite of existing gaps in detailed understanding, attitudes toward preventive measures and policy-level actions were largely positive. These findings indicate the need for targeted educational interventions that strengthen microplastic-related knowledge and promote safer household practices.

Limitation

This study has several limitations, including that the sample was taken from urban populations, so the results might not apply to people living in suburban or rural areas, who may have different backgrounds. All data were self-reported, which introduces the possibility of recall and social desirability bias, particularly for household behaviours such as boiling plastic feeding bottles. Although the questionnaire assessed components of microplastic knowledge, attitude, and awareness, it could not check what they actually do in real life or measure their real exposure to microplastic. Also, the study did not account for other influencing factors such as media exposure or prior environmental education, which may affect KAA levels. The cross-sectional design limits causal interpretation of observed associations.

Recommendation

Based on the results of the study, health education efforts should focus especially on people who have less formal education. The reason is that education was found to be the biggest factor affecting people's knowledge, attitude, and awareness regarding microplastic. Health education efforts focus on correcting specific high-risk household practices identified in this study, like boiling of plastic feeding bottles, and promoting safer alternatives through clear and practical guidance. Integrating microplastic risk education into routine health services like maternal and child health and preventive care settings can help reinforce the message among caregivers. In addition, community awareness campaigns using local media and community platforms should highlight common household sources of microplastic exposure and encourage behaviour change beyond general environmental awareness. Furthermore, study involving larger and more diverse populations is recommended to enhance generalisability and to examine variations across different socio-demographic groups.

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