



“Assessment of Knowledge and Practice Regarding Plastic Bag Usage Among Women in Nellikuzhy Panchayat: A Community-Based Cross-Sectional Study”

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Abstract: Background: Plastic pollution has emerged as one of the most significant environmental and public health challenges worldwide. Single-use plastic bags contribute substantially to environmental degradation due to their non-biodegradable nature and improper disposal practices. Household women play a crucial role in purchasing, storing, reusing, and disposing of plastic bags, making their knowledge and practices important determinants of plastic waste management.

Objectives: This study aimed to assess the knowledge and practices regarding plastic bag usage among women residing in Nellikuzhy Panchayat, Kerala, and to determine the association between knowledge and selected socio-demographic variables.

Methods: A community-based descriptive cross-sectional study was conducted among 60 women residing in Ward 7 of Nellikuzhy Panchayat. Participants were selected using a convenient sampling technique. Data were collected using a structured knowledge questionnaire comprising 20 items and a 25-item practice rating scale. Descriptive statistics (frequency and percentage) and inferential statistics (Chi-square test) were used for data analysis.

Results: Among the participants, 53.4% demonstrated average knowledge regarding plastic bag usage, while 45.0% had good knowledge and only 1.6% had poor knowledge. Regarding practices, 62.0% reported good practices and 38.0% demonstrated average practices; none exhibited poor practices. No statistically significant association was observed between knowledge scores and socio-demographic variables including age, educational status, occupation, family income, or family type.

Conclusion: Although most women exhibited satisfactory practices regarding plastic bag usage, their knowledge remained predominantly at an average level. Strengthening community-based educational interventions and promoting environmentally sustainable alternatives such as reusable cloth bags may further improve public awareness and contribute to reducing plastic pollution.

Keywords: Plastic bags; Knowledge; Practice; Women; Plastic pollution; Environmental health; Community health; Kerala.

Introduction

Plastic has become one of the most widely used synthetic materials because of its durability, affordability, flexibility, and convenience. Since its commercial introduction in the twentieth century, plastic production has increased exponentially, transforming manufacturing, healthcare, agriculture, transportation, and household activities. However, the rapid expansion of plastic production and consumption has generated an unprecedented environmental challenge. Plastic waste accumulates in terrestrial and aquatic ecosystems because most

conventional plastics require several decades to centuries to degrade completely. Consequently, plastic pollution has become a major global environmental concern with significant implications for ecosystem sustainability, biodiversity conservation, and human health.^{3,13}

Among various plastic products, single-use plastic bags remain one of the most commonly consumed items worldwide. Their lightweight nature, low production cost, and easy availability have encouraged excessive usage in daily household activities. Unfortunately, these same characteristics contribute to improper disposal, littering,



blockage of drainage systems, contamination of water bodies, soil degradation, and harm to wildlife. Discarded plastic bags often persist in the environment for extended periods, breaking down into microplastics that enter food chains and drinking water sources.⁴

Increasing scientific evidence indicates that plastic pollution is not merely an environmental issue but also an emerging public health concern. Toxic chemicals used during plastic manufacturing, including phthalates, bisphenol compounds, heavy metals, and other additives, may leach into food and water, particularly when plastic bags are used for storing hot or oily foods. Exposure to these substances has been associated with endocrine disruption, reproductive disorders, developmental abnormalities, immune dysfunction, respiratory diseases, and certain cancers. Furthermore, the open burning of plastic waste releases hazardous pollutants such as dioxins, furans, and carbon monoxide, contributing to poor air quality and increasing the risk of respiratory illnesses.^{3,5}

India is among the largest consumers of plastic products due to rapid urbanization, industrialization, and changing consumer lifestyles. Although per capita plastic consumption in India remains lower than that of many developed nations, the country's large population generates enormous quantities of plastic waste annually. According to national environmental reports, plastic waste generation has increased steadily over recent years, placing considerable pressure on existing waste management systems. Despite legislative measures restricting single-use plastics and banning certain categories of plastic bags, implementation and public compliance remain inconsistent across different regions.^{5,10}

Kerala has introduced several regulatory initiatives aimed at reducing plastic pollution, including restrictions on single-use plastic products and promotion of environmentally friendly alternatives such as cloth and jute bags. Nevertheless, the continued availability and widespread use of plastic carry bags indicate that behavioural change has not kept pace with policy implementation. Effective environmental legislation requires adequate public awareness, positive attitudes, and

sustainable behavioural practices to achieve meaningful reductions in plastic consumption.

Women are central to household decision-making regarding shopping, food storage, waste segregation, and domestic waste disposal. Consequently, their knowledge and daily practices have a direct influence on household plastic consumption and waste management. Educated and environmentally conscious women can promote sustainable practices within families by encouraging the use of reusable bags, reducing unnecessary plastic consumption, segregating recyclable waste, and educating younger generations regarding environmental conservation. Assessing their knowledge and behavioural practices is therefore essential for designing targeted community-based interventions that support plastic waste reduction strategies. Previous studies conducted in India and other countries have reported varying levels of knowledge and environmentally responsible practices regarding plastic bag usage. While awareness regarding the harmful effects of plastics has generally improved, many communities continue to exhibit poor disposal practices, frequent use of single-use plastics, and inadequate understanding of recycling procedures and environmental legislation. Educational status, occupation, age, and exposure to awareness campaigns have been identified as important determinants influencing knowledge and practices related to plastic usage. Several studies have assessed public awareness regarding plastic bag usage. Kaur and Jeganathan reported that students possessed only moderate knowledge regarding the health hazards associated with plastic use, indicating the need for environmental education¹. Similarly, Chaudhary et al. observed varying levels of knowledge, attitude, and practice among school students regarding plastic use, emphasizing the importance of awareness programmes².

Considering the increasing burden of plastic pollution and the pivotal role of women in household waste management, assessing community knowledge and practices provides valuable information for environmental health planning. Such evidence can assist healthcare professionals, public health authorities, local self-government institutions, and policymakers in developing effective awareness programmes



and behavioural interventions that encourage responsible plastic use and environmentally sustainable alternatives.

A community-based study conducted by Hamza and Mahmoud in Egypt reported that adults had moderate knowledge and practices regarding plastic products, although positive attitudes towards reducing plastic use were observed⁷. Likewise, Chin et al. found that while Malaysians demonstrated awareness of plastic pollution, behavioural changes remained inadequate, highlighting the need for stronger public education and policy implementation⁸.

Studies conducted in India have reported similar findings. Shaira et al. found moderate knowledge and practices regarding single-use plastics among rural residents of coastal Karnataka¹⁰. Pandirajan et al. also reported limited awareness and emphasized the importance of community-based environmental education in rural Tamil Nadu¹¹. Khanam et al. demonstrated that school-going adolescents possessed inadequate knowledge regarding the environmental hazards of plastic products and recommended strengthening educational interventions¹².

Research conducted in Guwahati highlighted the widespread use of plastic bags despite awareness of their environmental hazards, indicating that knowledge alone may not be sufficient to change behaviour¹³. Similarly, Khairnar et al. reported that many adults remained unaware of the health hazards associated with plastic bag use, emphasizing the importance of community awareness programmes⁶.

Although several studies have investigated knowledge and practices regarding plastic bag usage in different populations, limited evidence is available among women residing in rural Kerala. Since women play a crucial role in household waste management and environmental conservation, assessing their knowledge and practices is essential for planning effective educational interventions and promoting sustainable plastic waste management⁷.

Therefore, the present study was undertaken to assess the knowledge and practices regarding plastic bag usage among women residing in Nellikuzhy Panchayat, Kerala, and to examine the association between knowledge levels and selected socio-demographic characteristics. The findings are expected to contribute to community-based environmental

health promotion and support strategies aimed at reducing plastic pollution through informed public participation.

Materials and Methods

Study Design

A community-based descriptive cross-sectional study was conducted to assess the knowledge and practices regarding plastic bag usage among women residing in Nellikuzhy Panchayat, Ernakulam district, Kerala. A quantitative research approach was adopted because it facilitates the systematic measurement of knowledge and behavioural practices using standardized instruments and enables statistical analysis of the collected data. The descriptive cross-sectional design was considered appropriate as it provides a snapshot of participants' knowledge and practices at a single point in time without manipulating study variables.

Study Setting

The study was conducted in Ward 7 of Nellikuzhy Panchayat, located in Kothamangalam, Ernakulam district, Kerala. Nellikuzhy Panchayat comprises predominantly residential communities with mixed socioeconomic characteristics. Women residing in the selected ward who were responsible for household management, including handling and disposal of plastic bags, constituted the accessible study population.

Study Population

The target population consisted of women residing in households within Nellikuzhy Panchayat. The accessible population included women living in Ward 7 who fulfilled the eligibility criteria and were available during the period of data collection. Women were considered appropriate participants because they generally undertake household shopping, storage of consumables, waste segregation, and disposal of plastic materials, thereby influencing domestic plastic consumption and waste management practices.

Sample Size and Sampling Technique

A total of 60 women participated in the study. Participants were selected using a convenient sampling technique. Eligible women were approached through household visits,



and those who voluntarily agreed to participate after receiving information regarding the study objectives were enrolled. Although convenience sampling limits the generalizability of findings, it was considered feasible for this exploratory community-based study because of time constraints, accessibility of participants, and available resources.

Eligibility Criteria

Inclusion Criteria

Women were included if they:

- Resided in Nellikuzhy Panchayat.
- Were responsible for household management.
- Were able to read and understand Malayalam.
- Provided informed written consent to participate.

Exclusion Criteria

Women who declined participation or were unavailable during data collection were excluded from the study.

Data Collection Instruments

Data were collected using a structured questionnaire developed after an extensive review of relevant literature and consultation with subject experts. The instrument consisted of three sections.

Section I: Socio-demographic Characteristics

This section collected information regarding participants' age, educational status, occupation, monthly family income, religion, and type of family. These variables were selected because previous studies have suggested that socio-demographic characteristics may influence environmental knowledge and behavioural practices.

Section II: Knowledge Questionnaire

Knowledge regarding plastic bag usage was assessed using a structured questionnaire containing 20 items. The questionnaire covered five domains:

- Health hazards associated with plastic bags
- General usage of plastic bags
- Disposal methods
- Plastic bag legislation
- Colour coding and environmental safety

Each correct response was awarded one mark, while incorrect responses received zero marks, yielding a maximum possible score of 20. Knowledge scores were categorized as follows:

- **Good knowledge:** 14–20
- **Average knowledge:** 8–13
- **Poor knowledge:** 0–7

The questionnaire was designed to evaluate participants' awareness regarding environmental hazards, health risks, disposal practices, biodegradable alternatives, recycling, and government regulations concerning plastic bag usage.

Section III: Practice Rating Scale

Practices regarding plastic bag usage were measured using a 25-item three-point rating scale. Responses were recorded as "Always," "Sometimes," and "Never." Positive statements were scored from three to one, whereas negative statements were reverse scored.

Possible scores ranged from 25 to 75 and were categorized as:

- **Good practice:** 61–75
- **Average practice:** 43–60
- **Poor practice:** 25–42

The rating scale assessed routine household behaviours such as reuse of plastic bags, segregation of plastic waste, disposal methods, use of reusable alternatives, and adherence to environmentally responsible practices.

Validity and Reliability

Content validity of the data collection instruments was established through expert review. Three nursing faculty members with expertise in Community Health Nursing and Obstetrics and Gynaecology evaluated the questionnaire for relevance, clarity, accuracy, and appropriateness. Recommendations provided by the experts were incorporated before finalization of the instrument.

Reliability of the instrument was assessed using the split-half method, demonstrating satisfactory internal consistency for community-based data collection.



Pilot Study

A pilot study was conducted among six women residing in the study area who were not included in the final sample. The pilot study assessed the feasibility of the research methodology, clarity of the questionnaire, duration of data collection, and participants' understanding of the questions. The pilot findings confirmed that the study protocol was feasible without requiring substantial modifications to the research instruments or procedures.

Data Collection Procedure

Formal administrative permission was obtained from the Principal of Mar Baselios College of Nursing and the authorities of Nellikuzhy Panchayat before commencement of the study. Ethical approval was secured through the institutional review process prior to participant recruitment.

Data collection was carried out on 14 December 2023 through household visits. Eligible women were informed about the objectives and procedures of the study, and written informed consent was obtained before participation. Participants completed the socio-demographic questionnaire, structured knowledge questionnaire, and practice rating scale under the supervision of the investigators. Clarifications were provided whenever necessary to ensure accurate responses.

Completion of the questionnaire required approximately 30 minutes for each participant. Confidentiality and anonymity of the collected information were maintained throughout the study.

Ethical Considerations

The study adhered to established ethical principles governing research involving human participants. Administrative approval was obtained from the concerned institutional authorities before data collection. Participation was voluntary, and informed written consent was obtained from every participant after explaining the objectives, benefits, and confidentiality of the study.

Participants were informed that they could withdraw from the study at any stage without penalty. Personal identifiers were not included during data analysis, ensuring anonymity and confidentiality of the collected information. Following completion of data collection, informational pamphlets regarding safe plastic bag usage and environmentally responsible disposal practices were distributed to participants as a community health education initiative.

Statistical Analysis

Collected data were coded, entered, and analysed using descriptive and inferential statistical methods.

Descriptive statistics, including frequencies and percentages, were used to summarize socio-demographic characteristics and participants' knowledge and practice levels. Inferential statistics were performed using the Chi-square test to determine associations between knowledge scores and selected socio-demographic variables. A p -value of less than 0.05 was considered statistically significant.

Results

Participant Characteristics

A total of 60 women participated in the study. The socio-demographic characteristics of the participants are presented in **Table 1**.

The largest proportion of participants (40.0%) belonged to the 51–65 years age group, followed by 33.3% aged 36–50 years and 26.7% aged 21–35 years. More than half of the respondents (58.3%) were Hindus, while 40.0% were Christians and 1.7% were Muslims. Most participants (71.7%) belonged to nuclear families.

Regarding educational attainment, 38.3% were graduates, 28.3% had completed primary education, 25.0% had completed senior schooling, and 8.3% were postgraduates. The majority (68.3%) were homemakers, whereas 18.3% were employed, 10.0% belonged to other occupational categories, and 3.3% were unemployed. Nearly one-third (31.7%) reported a monthly family income of ₹15,000–₹25,000, while the remaining participants were distributed across the other income categories.



Table 1. Socio-demographic Characteristics of Participants (N = 60)

Variable	Category	n	%
Age (years)	21–35	16	26.7
	36–50	20	33.3
	51–65	24	40.0
Religion	Hindu	35	58.3
	Christian	24	40.0
	Muslim	1	1.7
Family Type	Nuclear	43	71.7
	Joint	17	28.3
Educational Status	Primary schooling	17	28.3
	Senior schooling	15	25.0
	Graduate	23	38.3
	Postgraduate	5	8.3
Occupation	Unemployed	2	3.3
	Employed	11	18.3
	Homemaker	41	68.3
	Others	6	10.0
Monthly Family Income	< ₹5,000	8	13.3
	₹5,000–15,000	17	28.3
	₹15,000–25,000	19	31.7
	> ₹25,000	16	26.7

Knowledge Regarding Plastic Bag Usage

Knowledge regarding plastic bag usage was evaluated using a structured questionnaire with a maximum possible score of 20. Scores were categorized into poor, average, and good levels according to predetermined criteria.

More than half of the participants (53.4%) demonstrated **average knowledge** regarding plastic bag usage. Good knowledge was observed among 45.0% of women, whereas only one participant (1.6%) exhibited poor knowledge.

OVERALL KNOWLEDGE

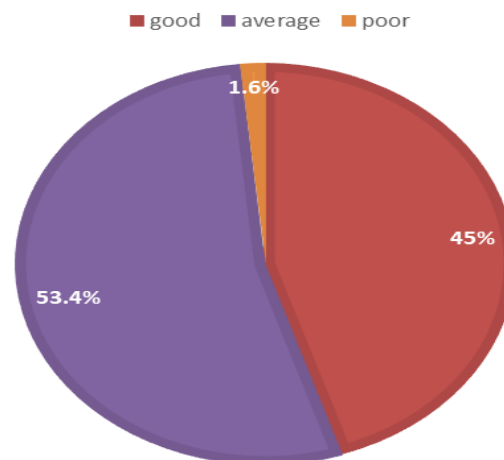


Figure 1: Level of knowledge regarding plastic bag usage

These findings indicate that although awareness regarding plastic bag usage was reasonably satisfactory within the community, substantial opportunities remain for improving knowledge concerning environmental hazards, safe disposal methods, plastic legislation, and sustainable alternatives.

Table 2. Distribution of Participants According to Knowledge Level

Knowledge Level	Frequency (n)	Percentage (%)
Good	27	45.0
Average	32	53.4
Poor	1	1.6

Practice Regarding Plastic Bag Usage

Practice regarding plastic bag usage was assessed using a three-point rating scale comprising 25 items.

The majority of respondents (62.0%) demonstrated **good practices** related to plastic bag usage, whereas 38.0% exhibited average practices. None of the participants fell into the poor practice category.

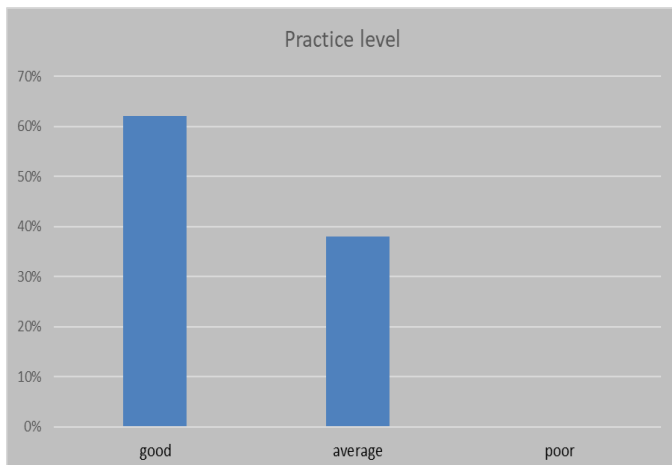


Figure 2: Level of practice regarding plastic bag usage

These findings suggest that environmentally responsible behaviours such as reusing plastic bags, minimizing unnecessary plastic consumption, and adopting appropriate disposal methods were relatively common among the study participants despite only moderate levels of knowledge.

Table 3. Distribution of Participants According to Practice Level

Practice Level	Frequency (n)	Percentage (%)
Good	37	62.0
Average	23	38.0
Poor	0	0.0

Association Between Knowledge and Socio-demographic Variables

The association between knowledge regarding plastic bag usage and selected socio-demographic variables was examined using the Chi-square test.

No statistically significant association was observed between knowledge scores and any of the selected socio-demographic variables, including age, educational status, occupation, monthly family income, or family type ($p > 0.05$). These findings indicate that participants' knowledge regarding plastic bag usage was relatively independent of their demographic characteristics within the present study population.

Table 4. Association Between Knowledge and Selected Socio-demographic Variables

Variable	χ^2	df	Statistical Significance
Age	4.87	4	Not significant
Family type	0.42	2	Not significant
Educational status	5.54	8	Not significant
Occupation	3.77	6	Not significant
Monthly family income	4.02	6	Not significant

Summary of Findings

The present study demonstrated that women residing in Nellikuzhy Panchayat possessed **predominantly average knowledge** regarding plastic bag usage, with nearly half exhibiting good knowledge. Encouragingly, most participants reported **good environmental practices**, suggesting that positive behaviours related to plastic bag usage were more prevalent than comprehensive knowledge. Furthermore, no statistically significant relationship was identified between knowledge level and the selected socio-demographic variables.

Overall, these findings indicate that while environmentally responsible practices are being adopted by many women, strengthening educational interventions and community awareness programmes may further improve knowledge regarding plastic pollution, appropriate disposal methods, recycling, and compliance with existing environmental regulations.

Discussion

The present community-based cross-sectional study assessed the knowledge and practices regarding plastic bag usage among women residing in Nellikuzhy Panchayat, Kerala. The findings revealed that the majority of participants possessed average knowledge (53.4%), while 45.0% demonstrated good knowledge and only 1.6% had poor knowledge. Furthermore, 62.0% of participants reported good practices regarding plastic bag usage, whereas 38.0% exhibited average practices. The study also found no statistically significant association between knowledge levels



and selected socio-demographic variables, including age, educational status, occupation, family income, and family type.

Knowledge Regarding Plastic Bag Usage

Knowledge is an important determinant of environmentally responsible behaviour because it influences individuals' awareness of environmental hazards, health risks, and sustainable waste management practices. In the present study, more than half of the participants demonstrated an average level of knowledge, suggesting that although women were familiar with the general harmful effects of plastic bags, there were gaps in understanding specific aspects such as appropriate disposal methods, plastic legislation, colour coding, and biodegradable alternatives.

The findings are consistent with several previous studies reporting moderate levels of public awareness regarding plastic pollution. A community-based study conducted in Egypt found relatively low knowledge regarding the uses and hazards of plastic products despite generally positive environmental attitudes. The authors emphasized that inadequate knowledge remains a major barrier to reducing plastic consumption and recommended incorporating environmental education into school curricula and community awareness programmes. Similar observations have been reported from Malaysia, where respondents demonstrated insufficient knowledge despite recognizing plastic pollution as an environmental concern.

Comparable findings have also been reported in India. Studies conducted among residents of Karnataka and Tamil Nadu observed that although many participants were aware of the harmful effects of plastic bags, knowledge regarding environmental consequences, plastic recycling, and legislative measures remained inadequate. These studies suggested that awareness campaigns should focus not only on the hazards of plastic pollution but also on practical measures for reducing plastic consumption and promoting environmentally sustainable alternatives.

The relatively satisfactory knowledge observed in the present study may be attributed to increasing public discussions on environmental protection, media campaigns, educational programmes, and statewide initiatives promoting the

reduction of single-use plastics. Kerala has implemented several environmental policies aimed at reducing plastic waste, which may have contributed to improved community awareness. Nevertheless, the predominance of average rather than good knowledge indicates that continued educational efforts remain necessary.

Practice Regarding Plastic Bag Usage

An encouraging finding of the present study was that nearly two-thirds of the participants demonstrated good practices regarding plastic bag usage. This suggests that many women had adopted environmentally responsible behaviours such as reusing plastic bags, reducing unnecessary plastic consumption, and following appropriate disposal practices in their daily lives.

Interestingly, the level of good practice exceeded the proportion of participants demonstrating good knowledge. This observation indicates that positive environmental behaviours may be influenced not only by knowledge but also by external factors such as government regulations, community norms, local campaigns, social responsibility, and increasing availability of reusable alternatives. In recent years, restrictions on single-use plastics and widespread promotion of cloth bags by local self-government institutions may have encouraged behavioural changes even among individuals with only moderate knowledge.

However, previous studies conducted in several countries have reported less favourable practices. Research from Malaysia found that although participants generally recognized plastic pollution as an environmental issue, environmentally responsible practices remained poor across different demographic groups. Likewise, studies conducted in the Philippines and rural Karnataka reported that many individuals continued to rely heavily on plastic bags despite being aware of their harmful effects, indicating a gap between environmental awareness and actual behaviour.

The comparatively better practices observed among women in Nellikuzhy Panchayat may reflect effective community-level environmental initiatives, increased public participation in waste management programmes, and growing social acceptance of reusable shopping bags.



Association Between Knowledge and Socio-demographic Variables

The present study found no statistically significant association between knowledge regarding plastic bag usage and selected socio-demographic variables. Participants from different age groups, educational backgrounds, occupations, family types, and income categories demonstrated comparable knowledge levels.

This finding differs from several previous investigations in which educational attainment was identified as a significant predictor of environmental knowledge. Studies conducted in Egypt, Malaysia, Mangalore, and Pune reported that individuals with higher educational qualifications generally possessed greater awareness regarding plastic pollution and environmental hazards. The discrepancy between the present findings and previous reports may be explained by the relatively small sample size, limited geographic coverage, and homogeneity of the study population, which could reduce the ability to detect statistically significant differences.

Furthermore, the widespread dissemination of information through television, newspapers, social media, and public awareness campaigns may have reduced traditional educational disparities in environmental knowledge within the study community.

Nursing Implications

Plastic pollution has become an important environmental health issue that requires coordinated action from healthcare professionals, educators, policymakers, and communities. Community health nurses play a vital role in promoting environmentally responsible practices by educating families regarding the health hazards of plastics, encouraging waste segregation, advocating the use of reusable alternatives, and supporting community-based environmental programmes.

The findings of this study indicate that educational interventions should focus on strengthening knowledge regarding plastic legislation, safe disposal methods, recycling practices, and the health effects associated with improper plastic use. Integrating environmental health education into routine community health programmes may further enhance sustainable household practices and contribute to reducing plastic pollution.

Additionally, collaboration between healthcare institutions, educational organizations, local self-government bodies, and environmental agencies could facilitate large-scale awareness campaigns promoting behavioural change and responsible plastic consumption.

Strengths and Limitations

The present study provides useful baseline information regarding household knowledge and practices related to plastic bag usage within a rural Kerala community. Standardized data collection instruments, ethical research procedures, and direct household-based data collection contributed to the quality of the findings.

Nevertheless, several limitations should be acknowledged. The study included only 60 participants selected through convenience sampling from a single ward of one Panchayat, thereby limiting the generalizability of the findings. The cross-sectional design precludes causal inference between knowledge and practice. Furthermore, practices were assessed using self-reported responses, which may have been influenced by recall bias or social desirability bias.

Future studies should include larger, randomly selected community samples across multiple geographic locations. Analytical and interventional research designs may further evaluate the effectiveness of educational programmes, behavioural interventions, and policy measures aimed at reducing plastic consumption and promoting sustainable waste management.

Conclusion

Plastic pollution remains a major environmental and public health concern, with improper plastic bag use contributing to ecosystem damage and health risks. This study assessed knowledge and practices regarding plastic bag usage among women in Nellikuzhy Panchayat, Kerala. Most participants had average knowledge (53.4%), while 45.0% had good knowledge. Despite moderate awareness, 62.0% demonstrated good practices, and no significant association was found between knowledge and socio-demographic variables. The findings highlight the need for community-based environmental education, promoting reusable alternatives and proper waste management. Strengthening collaboration among healthcare providers, local authorities,



and educational institutions can enhance environmental sustainability and public health.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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No external funding was received for this study.

Ethical Approval

The study was conducted after obtaining institutional and administrative permission. Written informed consent was obtained from all participants before data collection, and confidentiality of participant information was maintained throughout the study.

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