

Knowledge and Practice Regarding E-Waste Management Among Adults in Selected Wards of Nellanadu Panchayat, Thiruvananthapuram District: A Cross-Sectional Study

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Abstract: ***Background:** Electronic waste (e-waste) is an emerging environmental and public health concern associated with the increasing use and rapid replacement of electrical and electronic devices. Unscientific disposal and handling of e-waste may contribute to environmental contamination and human exposure to hazardous substances. Community knowledge and disposal practices are important determinants of safe e-waste management. **Objectives:** The study aimed to assess the level of knowledge regarding e-waste management among adults, identify their practices related to e-waste management, determine the relationship between knowledge and practice, and develop and distribute an informational pamphlet on e-waste management. **Methods:** A quantitative approach with a cross-sectional descriptive design was adopted. The study was conducted among 250 adults aged 18-60 years residing in selected wards of Nellanadu Panchayat, Thiruvananthapuram District. Participants were selected using a non-probability sampling technique. Data were collected using a structured knowledge questionnaire and a self-reported practice checklist. Descriptive statistics were used to summarize the data, and Spearman's rank correlation was used to determine the relationship between knowledge and practice scores. **Results:** Among the 250 participants, 65% were females. The largest proportion of participants (28.4%) belonged to the 51-60-year age group. Sixty-three percent reported having previous knowledge regarding e-waste management, with social media being the most commonly reported source of information. Regarding knowledge level, 62% had good knowledge, 36% had average knowledge, and 2% had poor knowledge. The mean knowledge score was 8.82 ± 2.20 . Regarding practice, 44.4% demonstrated good practice, 31.6% very good practice, 18.8% satisfactory practice, and 5.2% required improvement. The mean practice score was 10.82 ± 2.44 . Spearman's rank correlation demonstrated a statistically significant positive relationship between knowledge and practice ($\rho = 0.442$, $p < 0.01$). **Conclusion:** The study identified generally good knowledge regarding e-waste management among the participants, while practices showed some areas requiring improvement. A statistically significant positive relationship was observed between knowledge and practice. Community-based education and accessible information regarding appropriate e-waste disposal may help promote safer management practices.*

Keywords: E-waste, electronic waste, knowledge, practice, waste management, adults, community health, cross-sectional study

1. Introduction

The rapid development and widespread use of electronic and electrical equipment have resulted in a substantial increase in electronic waste. E-waste includes discarded, obsolete, broken, or unwanted electrical and electronic equipment and their components. Common examples include computers, mobile phones, televisions, refrigerators, batteries, calculators, and household electrical appliances.

E-waste is an important environmental health concern because inappropriate disposal and handling can contribute to environmental pollution and exposure to hazardous substances. The research project notes that global e-waste generation reached approximately 62 million tonnes in 2022 and that only a proportion was formally collected and recycled. The study also highlights the continued importance of informal e-waste handling in India.

The increasing consumption of electronic devices, shorter product life cycles, and technological advancement have contributed to the growing volume of discarded electronic equipment. Inadequate knowledge about safe disposal methods may contribute to inappropriate disposal practices.

Previous studies reviewed in the research project indicate that awareness does not always translate into appropriate disposal behaviour. The literature reviewed by the investigators also identified informal recycling, inadequate infrastructure,

insufficient public awareness, and gaps in implementation as important concerns in e-waste management.

From a community health perspective, nurses can contribute to environmental health promotion by educating individuals and families about the hazards associated with improper e-waste handling and promoting safe waste-management practices. Therefore, assessing community knowledge and practice provides useful baseline information for planning health education interventions.

The present study was undertaken to assess knowledge and practice regarding e-waste management among adults residing in selected wards of Nellanadu Panchayat, Thiruvananthapuram District.

2. Objectives

The objectives of the study were:

- To assess the level of knowledge regarding e-waste management among adults.
- To identify the practice regarding e-waste management among adults.
- To determine the correlation between knowledge and practice regarding e-waste management.
- To develop and distribute an informational pamphlet related to e-waste management.

3. Materials and Methods

3.1 Research approach and design

A quantitative research approach was adopted for the study. A cross-sectional descriptive research design was used to assess knowledge and practice regarding e-waste management.

3.2 Study setting

The study was conducted in selected wards of Nellanadu Panchayat, Thiruvananthapuram District. The selected households were located in Mylakkal Ward, Venjaramoodu Town Ward and Kavara Ward.

3.3 Study population and sample

The study population consisted of adults residing in the selected wards of Nellanadu Panchayat.

A total of **250 adults** aged 18-60 years participated in the study. Participants were selected using a non-probability sampling technique. The study excluded individuals who had difficulty understanding Malayalam or English.

3.4 Study variables

The research variables were:

- Knowledge regarding e-waste management
- Practice regarding e-waste management

The selected socio-demographic variables included age, gender, religion, educational status, occupation and socioeconomic status.

3.5 Data collection tools

Data were collected using:

- A structured questionnaire to assess knowledge regarding e-waste management.
- A self-reported checklist to assess e-waste management practices.

The knowledge score had a maximum of 12, while the practice score had a maximum of 15.

3.6 Data analysis

Descriptive statistics, including frequency, percentage, mean and standard deviation, were used to summarize the data.

Since the study data were not normally distributed, Spearman's rank correlation was used to assess the relationship between knowledge and practice scores.

4. Results

4.1 Socio-demographic characteristics

Among the 250 participants, 28.4% belonged to the 51-60-year age group, 28% to the 41-50-year group, 25.2% to the 21-40-year group and 18.4% to the 18-20-year group.

Females constituted 65% of the participants, while males constituted 35%.

Regarding education, 30.4% had higher secondary education, 26% were graduates, 20.4% had secondary education, 17.2% had primary education, 5.6% had postgraduate education or above, and 0.4% were illiterate.

Regarding occupation, 37.6% were unemployed, 19.2% were self-employed, 17.6% were private employees, 10.4% were daily wage workers, 8.8% were students and 6.4% were government employees.

Most participants (80.8%) belonged to nuclear families. Regarding monthly family income, 47.6% had an income below ₹10,000.

4.2 Previous knowledge regarding e-waste

Of the 250 participants, **158 (63%)** reported having previous knowledge regarding e-waste management, whereas **92 (37%)** reported no previous knowledge.

Among those who had previous knowledge, **53.1% reported social media as a source of information**, followed by newspapers and magazines (33.54%), family members (17.72%), friends (11.39%) and other sources (10.75%).

4.3 Level of knowledge regarding e-waste management

Knowledge level	Frequency	Percentage
Good	155	62%
Average	90	36%
Poor	5	2%
Total	250	100%

The majority of participants, **62%**, had good knowledge regarding e-waste management. The mean knowledge score was 8.82 ± 2.20 , with scores ranging from 3 to 12.

4.4 Level of practice regarding e-waste management

Practice level	Frequency	Percentage
Very good	79	31.6%
Good	111	44.4%
Satisfactory	47	18.8%
Need improvement	13	5.2%
Poor	0	0%
Total	250	100%

The largest proportion of participants, **44.4%**, demonstrated good practice, followed by 31.6% with very good practice. The mean practice score was 10.82 ± 2.44 , with scores ranging from 4 to 15.

4.5 Relationship between knowledge and practice

Spearman's rank correlation was used to determine the relationship between knowledge and practice scores.

The analysis showed:

Spearman's rho (ρ) = 0.442, $p < 0.01$

Thus, a statistically significant positive relationship was observed between knowledge and practice regarding e-waste management. Participants with higher knowledge scores tended to have higher practice scores.

5. Discussion

The present study found that 63% of participants had previous knowledge regarding e-waste management. Social media was the most frequently reported source of information among participants who had previous knowledge. This finding indicates the importance of digital and social-media-based communication in disseminating information related to environmental health.

In the present study, 62% of participants had good knowledge, while 36% had average knowledge and 2% had poor knowledge. The findings indicate that although a substantial proportion of participants demonstrated good knowledge, a considerable group still had room for improvement.

Regarding practice, 44.4% of participants had good practice and 31.6% had very good practice. However, 18.8% had satisfactory practice and 5.2% required improvement. Thus, the distribution of practice levels suggests that adequate knowledge does not necessarily correspond to uniformly appropriate practices.

The study demonstrated a statistically significant positive correlation between knowledge and practice ($p = 0.442$, $p < 0.01$). This indicates an association between the two variables in this study. However, because the study used a cross-sectional design, the finding should be interpreted as an association rather than evidence that increasing knowledge directly causes improvement in practice.

The research project also reviewed studies from India and Kerala reporting varying levels of awareness and practice regarding e-waste management, indicating differences across populations and settings.

6. Implications for Nursing

- **Nursing practice:** Community health nurses can provide education to individuals and families regarding safe e-waste disposal and the potential environmental and health hazards associated with inappropriate handling.
- **Nursing education:** Environmental health and e-waste management can be incorporated into community health nursing education. Nursing students can participate in community awareness programmes and develop educational materials such as pamphlets and posters.
- **Nursing administration:** Nursing administrators can support community outreach activities and collaborate with local authorities and health agencies to promote environmental health education.
- **Nursing research:** The findings provide baseline information for future research investigating educational interventions and community-based strategies for improving e-waste management practices.

7. Limitations

The study had the following limitations:

- It was limited to selected wards of Nellanadu Panchayat.
- The sample size was limited, restricting generalizability.
- Data were collected through self-report, which may introduce response bias.
- The study assessed knowledge and practice related to e-waste disposal and did not include attitude.
- The study did not include follow-up assessment after distribution of the informational pamphlet.

8. Conclusion

The present cross-sectional study among 250 adults in selected wards of Nellanadu Panchayat demonstrated that the majority of participants had good knowledge regarding e-waste management. A considerable proportion also demonstrated good or very good practices, although some participants required improvement in their e-waste management practices.

A statistically significant positive relationship was found between knowledge and practice ($p = 0.442$, $p < 0.01$). The findings support the importance of continuing community education and environmental health promotion related to safe e-waste management.

Informational pamphlets were developed and distributed as part of the study.

9. Recommendations

Based on the findings of the study, the following recommendations are suggested:

- Similar studies can be conducted among larger populations in different communities.
- Community-based educational programmes can be conducted to improve knowledge and safe e-waste disposal practices.
- Future studies can evaluate the effectiveness of structured teaching programmes or awareness interventions.
- Further research can explore barriers to appropriate e-waste disposal.
- Studies can be conducted to assess the effectiveness of different educational methods, including social media, posters, pamphlets and audiovisual programmes.
- Future research can include assessment of attitudes and perceptions in addition to knowledge and practice.

10. Ethical Considerations

Participation was voluntary, informed consent was obtained from the participants, and confidentiality of participant information was maintained. The research project included institutional research and ethics committee permissions as well as setting permission and informed consent documentation.