State Fragility initiative

IGC

CASE STUDY

E-waste management programme in Cox's Bazar refugee camps

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How can e-waste be effectively managed in situations of fragility and displacement? This case study outlines the experience of a collaborative programme (launched by UNHCR Bangladesh supported by UNHCR Innovation Service, the NGO Forum for Public Health, Schneider Electric Foundation, Electriciens sans Frontières, and UNITAR/GPA) to promote e-waste management and build local capabilities for e-waste repair and recycling in the Rohingya refugee camps in Cox's Bazar, Bangladesh.

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Front cover photo: UNHCR, Sumayet Naiyer Oshmita

CONTENTS

1. Background

The Rohingya refugee camps in Cox's Bazar, Bangladesh, host approximately 968,000 displaced individuals who depend on basic energy services for their daily activities and essential needs. Many of these energy needs are met through solar-powered appliances provided by humanitarian organisations. However, the rapid turnover and limited lifespan of these appliances have generated substantial amounts of electronic waste (e-waste), resulting in a significant environmental challenge. To address this issue, a collaborative project supported by UNHCR Innovation service was launched by UNHCR Bangladesh, NGO Forum for Public Health, Schneider Electric Foundation, Electriciens sans Frontières and UNITAR/GPA to manage e-waste effectively and build local capacities for e-waste repair and recycling. The project aims to develop skills in e-waste management and promote sustainable recycling practices within the camps while boosting livelihood opportunities.

A key component of this project was the establishment of a **Green Innovation Hub** (GIH), designed to enhance local skills and infrastructure for e-waste management. The GIH serves as a dedicated space for training refugees in e-waste collection, analysis, and repair of solar and domestic appliances. By establishing e-waste take-back and recycling value chains, the project aims to extend the lifespan of electronic products and ensure environmentally responsible disposal. Additionally, the project also seeks to improve the overall sustainability of humanitarian operations and support economic activities in both the refugee and host communities.

This case study provides an overview of the e-waste situation in the Kutupalong and Nayapara refugee camps, outlines the implementation of the project, key challenges, achievements, and shares lessons learned.

The report contributes to the wider knowledge base and lessons learned of the global humanitarian sector e-waste task force, managed by the Coordination Unit of the Global Platform for Action on Sustainable Energy in Displacement Settings (GPA) hosted at UNITAR.

2. Implications of improper disposal of e-waste

The surge in electronic device usage within the refugee camps in Cox's Bazar has led to a significant increase in e-waste. Before intervention, some common practices in the camps involved burning cables to extract valuable copper for resale, disposing battery water into nearby drains or yards, and dumping invaluable waste in the garbage. These practices not only posed environmental and health hazards but also contributed to the release of hazardous materials such as lead, cadmium, mercury, and nickel, as well as endocrine-disrupting chemicals.

These toxic substances, contained in e-waste, can leach into soil and water, contaminating local ecosystems and posing serious health risks to nearby communities. Exposure to these toxins is linked to severe health issues, including developmental delays, learning difficulties, and reduced IQ in children, as well as kidney damage, cancer, and neurological impairments. Children and pregnant women are particularly vulnerable due to their developing systems and higher absorption rates.

Moreover, improper e-waste disposal releases harmful substances into the air, water, and soil, causing respiratory problems, cancer risks, and ecosystem degradation. Effective e-waste recycling can mitigate these risks by recovering valuable materials and preventing toxins from entering the environment, thereby protecting both human health and ecological integrity while supporting a circular economy. Robust e-waste management programmes are thus essential to safeguarding vulnerable populations and promoting environmental sustainability.

3. E-waste assessment in camps

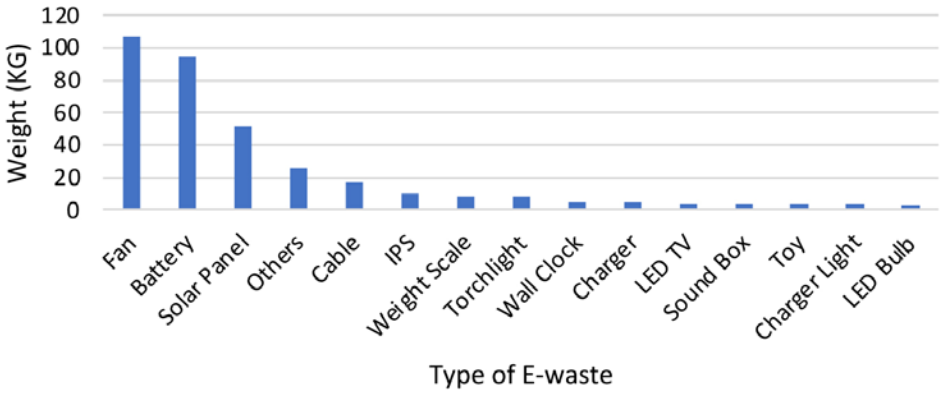
The e-waste project was implemented in the Kutupalong Refugee Camp (KRC) and the Nayapara Refugee Camp (NRC), which are structured into various blocks (A, B, C, D etc.). Representative leaders from each block played a crucial role in the project's implementation and facilitated community engagement. The block-level approach allowed for targeted intervention and fostered community ownership and participation in managing e-waste within the camps.

3.1. E-waste assessment

A detailed e-waste assessment was conducted at the household level in KRC through door-to-door interviews in four blocks. The data collected in A-block revealed that **fans, solar panels, and various types of batteries** accounted for more than **70% of the total e-waste by weight,** as can be seen in **Figure 1** below. The assessment documented approximately **349 kilograms of e-waste** in A-Block, including:

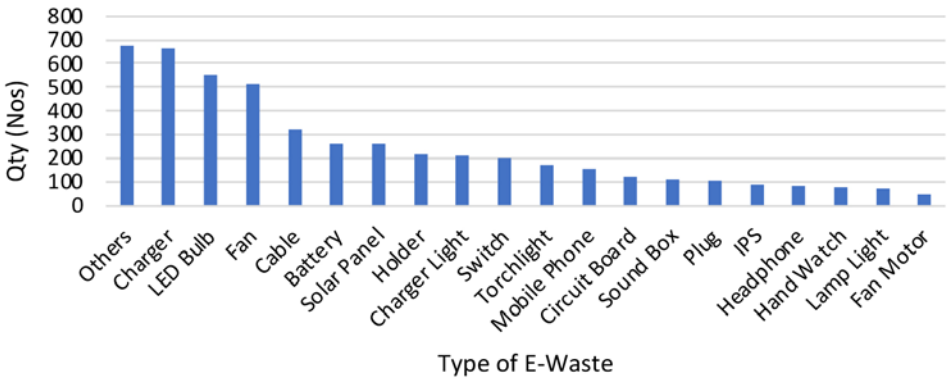
- **Fans and solar panels:** Major contributors to the e-waste stream.
- **Batteries:** Varied types including dry cell, lead-acid, and lithium-ion batteries.
- **Other items:** Mobile phones, lights, headphones, and small household appliances.

Figure 1. Amount (kg) of e-waste observed in Camp KRC – Block A



For the other six blocks (B, C, D, E, F, G), e-waste data was collected based on the number of items observed. The most frequently found types of e-waste in these blocks included **chargers, LED bulbs, ceiling and stand fans, cables, and batteries**, among other items. More than a hundred different types of individual e-waste items were recorded, most of which were found in small quantities ranging from one to fifty and categorised under "other," as shown in **Figure 2** below.

Figure 2. Number of e-waste recorded in Camp KRC – Block B, C, D, E, F, G



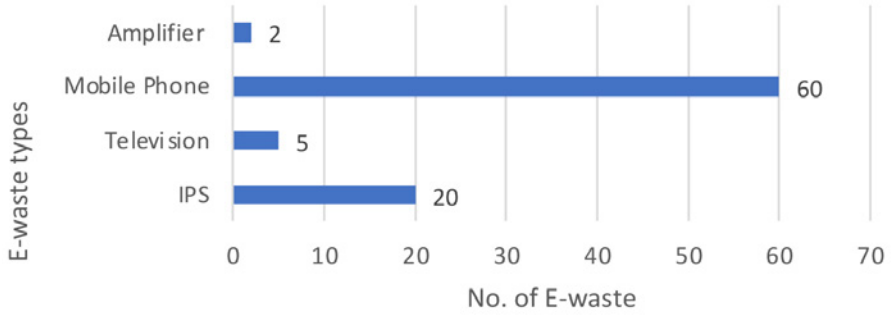
E-waste in KRC is typically **purchased by the local repair shops based on the material type,** such as plastic, iron, aluminium, and others. For example, batteries are classified as toxic, fans are categorised as plastic/copper/iron, cables are categorised as copper/aluminium.

3.2. Repair shop assessment

An initial survey conducted in July 2022 identified four informal e-waste repair shops in KRC. The initial survey revealed that repair shops primarily dealt with **mobile phones and Interruptible Power Supply (IPS) systems**, with limited tools and technical knowledge for more complex repairs. The most common e-waste observed in the repair shop can be seen in **Figure 3** below. Key findings included:

- **Tool availability:** Basic tools such as screwdrivers, pliers, cutters, tweezers, multi-meters, variable power supplies, and soldering machines were available in the repair shops.
- **Repairs:** The repairmen mainly specialise in repairing items such as fans, lights, mobile phones, amplifiers, scales, and mosquito-killing bats.
- **Training needs:** Shop owners expressed a need for training in repairing more complex items, including fridges, televisions, and batteries.
- **Storage:** The repairmen reported storing e-waste for varying periods of time, ranging from less than six months to more than five years.

Figure 3. Most common e-waste observed in the repair shop



4. Project implementation

The implementation of the project involved **establishing a comprehensive e-waste collection, repair, and recycling scheme** tailored to the unique needs and conditions of the Kutupalong and Nayapara Refugee Camps. This initiative aimed to manage e-waste effectively by categorising items as repairable or non-repairable and taking appropriate action accordingly.

The NGO Forum, in collaboration with other stakeholders, hired 20 incentivised volunteers (10 in Kutupalong and 10 in Nayapara; 14 men and 6 women) who were responsible for door-to-door collection of 1 to 2 e-waste items per household. These volunteers were trained to handle e-waste safely and were compensated according to the government's 'Cash for Work' regulations, receiving 50 BDT per hour with a maximum wage of 350 BDT per day. This section describes the various components and phases involved in the implementation of the e-waste take-back and storage programme.

Awareness raising

The project commenced with **awareness raising among different community** groups about the detrimental effects of improper e-waste disposal on health and the environment. Residents in KRC and NRC camps received information on the harmful effects of e-waste through door-to-door campaigns, leaflet distributions, and block-level efforts led by trained refugee volunteers. Additionally, the involvement of community leaders was instrumental in gaining broader acceptance and understanding of e-waste issues. Multiple open-yard community awareness sessions were conducted throughout the collection process which successfully conveyed the importance of responsible e-waste management.

Collection process

Following the awareness raising, e-waste collection occurred at the block level using two methods: daily temporary collection points and on-site collection directly from household premises. As such, designated teams, comprising NGO Forum supervisors and trained community volunteers, collected e-waste from households through door-to-door visits and centralized collection desks which operated on specific days of the week. This dual approach ensured maximum coverage and convenience for the community members.

Cash-based intervention

To incentivise the community to participate in the e-waste collection scheme, a Cash for Work mechanism was implemented. The monetary value of the collected e-waste was determined based on a market assessment of common e-waste prices in the informal scrap market. For example, a smartphone was valued at 200 BDT, while e-waste with high iron content was purchased at 40 BDT per kg. Community members received cash for the e-waste they provided, which they could exchange for cash on designated dates. This cash-based incentive aimed to mitigate the issue of improper e-waste disposal and provide a small income for the community members.

Data storage and management

A comprehensive **logbook system** was established to document the e-waste collection process. This logbook recorded essential details such as date, time, block, shed, room, type and quantity of e-waste, and household ID. This system ensured transparency and accountability, allowing the project team to track progress, manage funds, and analyse data on existing e-waste within the camps.

E-waste storage and assessment

Once collected, the e-waste was transported to dedicated storage facilities in the camps, specifically designed to meet international e-waste storage standards. These facilities were managed by the NGO Forum as an extension of their local camp-based offices and were equipped with fire detection and prevention features to mitigate risks of accidental incidents. The collected items were then assessed to determine whether they could be repaired or needed to be sent for recycling. Repairable items were stored for future repair activities planned to take place in the GIH, while non-repairable items were sent to the authorised e-waste recycling company, Azizu, based in Dhaka.

A summary of the key phases of the e-waste take-back and storage process can be seen in **Figure 4** below.

Figure 4. E-waste take-back and storage process

5. Achievements and challenges

The e-waste management programme achieved significant milestones in a highly challenging environment. A notable success was the engagement of **4,253 or 49.4%[1] of Rohingya refugee households** across the KRC and NRC, who actively participated in the programme, leading to the **collection of over 9.4 tons of e-waste**. Comprehensive awareness and education campaigns played a key role in this success and helped mitigate improper e-waste management practices and their associated health hazards.

The programme saw a **positive shift in community behaviour towards e-waste management** along with a **significant reduction in visible e-waste within the camps.** Previously harmful practices, such as burning cables and improper disposal of lead-acid battery water, significantly decreased. The community's increased interest in proper e-waste management and repair activities, as well as their active participation in the program, marked significant progress. More than **80% of people in the targeted camps** are now familiar with the e-waste concept and they practice adhering to the process of safe disposal and recycling shared by the NGO Forum team.

As the project progressed, the camp also witnessed **notable reduction in waste,** particularly in the solid waste management facility within the camp. Previously, broken parts and small cables were frequently visible in the camp and drainage areas. However, these instances significantly decreased since the initiation of the programme. Communities also showed an increased tendency to store various types of e-waste, with some actively repairing damaged electronics and expressing interest in learning diverse repair techniques.

Moreover, a significant highlight of the project was the development of the GIH, which was utilised to provide **technical knowledge and hands-on training** related to electrical items and e-waste repair. This facility, equipped with training equipment for solar home systems and electrical wiring donated by the Schneider Electric Foundation and supported by Electriciens sans Frontières, aimed to **upskill the refugee community and promote entrepreneurship**. During the pilot phase (2022-2023), a comprehensive curriculum was developed to train community members on solar repair and maintenance, including solar lanterns, streetlights, home systems, mini-grids, and e-waste. The collaboration with stakeholders, including government representatives and agency partners, further strengthened the programme's impact. These stakeholders were engaged through meetings to secure their support and raise awareness about the e-waste collection process and its environmental benefits. Additionally, the collected e-waste was handed over to Azizu for ethical recycling, ensuring responsible disposal in compliance with safety and environmental standards.

1 The total population for KRC and NRC is 43,056 individuals or roughly 8,611 households.

Alongside the achievements and community engagement, the programme faced the following key challenges that provide valuable lessons:

- **Collection and documentation issues:** Initially, the household-to-household collection method proved **time-consuming and difficult due to the diverse range of e-waste** and the need for detailed paper-based documentation, especially during the monsoon season. To improve efficiency, temporary collection points were established at pre-designated block centres, utilising open yard meeting rooms and shop facilities. This adjustment significantly minimised the time required for waste collection and provided disposal sites near households rather than requiring them to walk long distances.

- **Competition with informal collectors:** Another challenge was the **competition from informal e-waste collectors** who offered higher prices to 'compete' with the e-waste collection process set up through the project, bringing more monetary value to the community.

- **Financial constraints:** Financial constraints also impacted the programme's sustainability. Providing cash incentives based on the weight of e-waste involved logistical challenges. Delays in payments due to rigorous paperwork and the need to adhere to Cash for Work modalities made it difficult to compete with local scrap dealers who could provide instant cash. During this pilot, the project provided a total of **BDT 2,322,639** in cash to refugees who returned e-waste. Azizu charged a total of BDT 242,800 for the recycling/disposal and transportation expenses incurred in collecting e-waste from Cox's Bazar to Dhaka.

- **Operational challenges:** Operational challenges included ensuring the safe storage of collected e-waste with fire detection and prevention features, which required significant resources and management. Additionally, coordination with other agencies, such as the International Organisation for Migration (IOM), which operated a solar lantern repair desk in an adjacent camp, required inter-agency discussions to optimise e-waste use and recycling, posing its own set of challenges.

- **Government and administrative restrictions:** Rohingya refugees are not legally allowed to work on the formal market so there was some resistance to developing a training and repair centre inside the camp. The **restrictions on refugees' rights to work and access to bank accounts** resulted in delays and hindered the establishment of a sustainable revenue stream for the GIH, limiting the project's financial sustainability. Despite the delays, once the project was underway, it generated considerable interest and acceptance from government authorities administering the camp due to the innovation and opportunities it brought to the community living there.

  These achievements and challenges highlight the programme's impact and the obstacles faced, providing valuable insights for future initiatives and replicability in similar settings.

6. Lessons learned

The implementation of the e-waste management project in KRC and NRC camps revealed several crucial insights. These lessons underline the complexity of managing e-waste in such settings and emphasise the need for adaptable and inclusive strategies. The key lessons learned from the programme, identified by stakeholders and implementors involved, are outlined below:

1. **Informal e-waste systems already existed:** Informal e-waste systems were already in place, with most e-waste purchased from local markets. When establishing formalised e-waste collection and recycling processes, it is important to acknowledge and integrate these existing systems. This approach ensures that different parts of the value chain are involved to avoid disrupting established dynamics. For example, existing repair shops could be consulted and included in e-waste training and repair activities to support their small income-generating activities and maintain local, small-scale livelihoods. This integration helps foster greater community acceptance and enhances the effectiveness of e-waste management initiatives.

2. **There is need for flexible funding:** There is a lack of funding for developing a circular business model and funding is hard to obtain for this topic. Managing e-waste is often challenging due to the high costs associated with this practice. Setting up collection points and storage facilities, incentivising people to relinquish their e-waste, and transporting the waste to recycling facilities – often located far away – are all costly endeavours. Therefore, there is a need for flexible, multi-year funding to adapt to evolving needs. The 18-month funding from the UNHCR Environment and Climate Action Innovation Fund was pivotal for the project's success.

3. **No standard models for incentivising e-waste return:** Incentivising the return of e-waste proved difficult due to government restrictions on cash payments and the lack of formal disposal systems. The project had to adopt 'Cash for Work' regulations, which led to some refugees preferring informal scrap dealers who offered immediate cash.

4. **There are limitations in circularity and repair models:** Delays in establishing the Green Innovation Hub and government restrictions hindered efforts to create a revenue stream from repaired e-waste. The multifaceted nature of e-waste infrastructure, which includes not just recycling but also repair and better product design, poses challenges in achieving sustainable practices. Consequently, sustaining e-waste collection and disposal would require additional grant funding to support these diverse aspects of circularity and repair models.

5. **E-waste recycling is dependent on in-country recycling capacity:** The project benefited from an ISO-certified recycling company in Dhaka, essential for end-of-life e-waste recycling. This partnership allowed valuable metals in e-waste to be discounted from overall disposal costs, minimising expenses. These factors reduce recycling costs and minimised the need for expensive cross-border waste disposal.

6. **Government and administrative challenges:** Legal restrictions on refugee employment and bureaucratic delays, exacerbated by frequent rotations of authorities responsible for project approvals, hindered the development of the GIH. Despite these challenges, the project's innovative approach and potential benefits to the community played a key role in eventually gaining interest and support from local authorities. This experience highlights the need for streamlined regulatory policies and frameworks to facilitate e-waste management initiatives, including regulations and supportive policies to provide clearer guidelines and incentives for sustainable e-waste management practices in refugee camps and beyond.

7. **Developing a public-private partnership is complex:** Developing effective public-private partnerships required significant time and resources. The collaboration among UNHCR, NGO Forum, UNITAR, Schneider Electric Foundation, and Electriciens sans Frontières evolved over two years, demonstrating the need for strong facilitation and sustained commitment.

8. **There are knowledge gaps in e-waste recycling:** There was a general lack of knowledge, research, and data on e-waste recycling practices. Research and learning from resources like GOGLA on circularity and e-waste recycling companies in Bangladesh were essential to set up effective e-waste collection, storage, and recycling processes. Setting up basic infrastructure for data collection (e.g., through regular surveys and evaluation and monitoring frameworks) is essential to address these knowledge gaps. Engaging NGOs, sellers of electrical and electronic equipment (EEE), and other stakeholders is key to scaling these efforts and improving recycling practices. Building partnerships and collaboration will help in gathering comprehensive data and improving recycling practices. Additionally, creating communities of practice or forums for continuous knowledge sharing among stakeholders can enhance learning and the dissemination of best practices in e-waste management.

9. **Community engagement and ownership took time:** Initially, the concept of e-waste was unfamiliar to the Rohingya community. Through extensive awareness campaigns, the project successfully educated over 80% of the targeted population on the importance of safe e-waste disposal and recycling. The involvement of community leaders, who are trusted within their communities, played a pivotal role in raising awareness and gaining broader acceptance of e-waste issues. Their structured approach and influence were instrumental in fostering understanding and encouraging active participation in the e-waste management initiatives.

UNHCR, Sumayet Naiyer Oshmita

The **State Fragility initiative** (SFi) is an International Growth Centre (IGC) initiative that aims to work with national, regional, and international actors to catalyse new thinking, develop more effective approaches to addressing state fragility, and support collaborative efforts to take emerging consensus into practice. SFi brings together robust evidence and practical insight to produce and promote actionable, policy-focused guidance in the following areas: state legitimacy, state effectiveness, private sector development, and conflict and security. SFi also serves as the Secretariat for the Council on State Fragility.

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