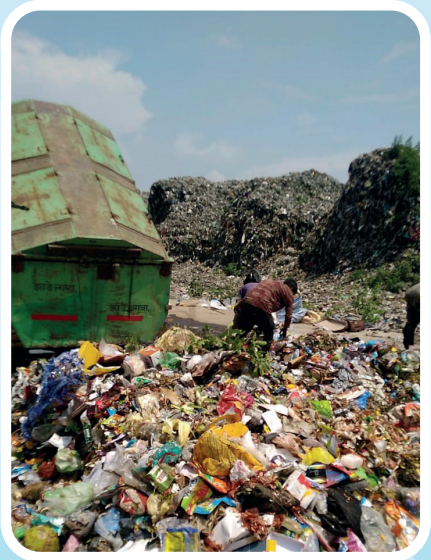
USED BEVERAGE CARTONS MANAGEMENT STUDY 2025



Tetra Pak®

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Creating Innovative Solutions for a Sustainable Future

USED BEVERAGE CARTONS MANAGEMENT STUDY

2025

Prepared for

Tetra Pak®

Prepared by

teri THE ENERGY AND RESOURCES INSTITUTE

Creating Innovative Solutions for a Sustainable Future

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Preface

Tetra Pak commenced its operations in India in 1987, introducing advanced packaging technologies customized for the Indian market, while simultaneously generating significant employment opportunities. Over the past three decades, the organization has expanded its portfolio with a diverse range of packaging formats across multiple sizes and price points to meet the evolving preferences of Indian consumers.

With the growing demand and consumption of carton packages, environmental sustainability has emerged as a critical consideration—particularly concerns related to littering, energy use, and greenhouse gas emissions. In response, Tetra Pak has implemented proactive measures to collect, sort, and recycle used cartons, thereby diverting waste from landfills and contributing meaningfully to a circular economy.

In alignment with the Plastic Waste Management (Amendment) Rules, 2022, notified by the Ministry of Environment, Forest, and Climate Change, Tetra Pak now incorporates 5% certified recycled content using recycled polymers. This step not only reduces dependence on virgin materials but also conserves energy, curtails greenhouse gas emissions, and reaffirms the company's long-standing commitment to environmental stewardship.

Over the past 20 years, Tetra Pak has been instrumental in building and strengthening the collection and recycling ecosystem, collaborating with recyclers across South Asia to advance technologies for used beverage carton (UBC) recycling. To monitor progress and inform future strategies, the company conducts internal UBC management studies every three years.

While recycling has improved substantially, there remains a pressing need to enhance Extended Producer Responsibility (EPR) recognition for such initiatives to further incentivize brands and recyclers to invest in recycling infrastructure. Robust policy support is crucial to make recycling of these materials more efficient, viable, and widespread.

To advance this shared objective, The Energy and Resources Institute (TERI) has been engaged to conduct comprehensive surveys and analyses on UBC management across 24 Indian cities. Previous studies were undertaken by TERI in 2011, 2015, 2019, 2020, and 2022, and the present assessment represents a valuable continuation of this enduring collaboration. Using robust analytical, statistical tools, the study aims to evaluate current recycling performance across urban India and identify targeted opportunities for improvement.

We commend Tetra Pak for its leadership in commissioning these scientific assessments and for its commitment to evidence-based sustainability action. The findings of this report—developed in partnership with local collaborators and urban local bodies (ULBs)—offer insightful and actionable recommendations to strengthen recycling value chains, accelerate the transition towards circular economy, and contribute to the realization of the Sustainable Development Goals (SDGs).

Dr Vibha Dhawan
Director-General, TERI

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List of Abbreviations

CPCB	Central Pollution Control Board
CPPRI	Central Pulp & Paper research Institute
DWCC	Dry Waste Collection Centre
EPR	Extended Producer Responsibility
GHG	Greenhouse Gas
GMC	Guwahati Municipal Corporation
HPPCB	Himachal Pradesh Pollution Control Board
INR (₹)	Indian Rupee
JKSPCB	Jammu and Kashmir State Pollution Control Board
KMC	Kochi Municipal Corporation
MoHUA	Ministry of Housing and Urban Affairs
MoEFCC	Ministry of Environment, Forest and Climate Change
MLP	Multi-Layer Packaging
MSW	Municipal Solid Waste
NGO	Non-Governmental Organization
NMC	Nagpur Municipal Corporation
PCC	Post-Consumer Cartons
PE	Polyethylene
PMC	Pune Municipal Corporation
RCF	Recycled Cellulose Fibre
SDG	Sustainable Development Goals
TERI	The Energy and Resources Institute
TMC	Thiruvananthapuram Municipal Corporation
TPA	Tonnes per Annum
TPIPL	Tetra Pak India Private Limited
UBC	Used Beverage Carton
USD	United States Dollar
WtE	Waste to Energy


CROWN

Executive Summary

Liquid beverage cartons offer an efficient solution for safely distributing liquid and food products, preserving freshness, flavour, and nutrition in both ambient and chilled conditions. With the global beverage carton market expected to grow from USD 16.51 billion in 2020 to USD 22.44 billion by 2028, their importance is clear. Made of about 70% paperboard, 25% polymers, and 5% aluminium, these cartons are durable, recyclable, and can be repurposed into new paper goods and some amount of plastic-and aluminium based products—highlighting their role in a circular economy. Cartons do more than protect food—they support nutrition access, reduce food waste, and offer a lower climate impact compared to fossil fuel-based packaging, especially in the dairy and juice sectors. When effective recycling systems are in place, they also help keep valuable materials in circulation. As global populations rise and natural resources face increasing pressure, sustainable packaging becomes essential for food preservation and environmental protection.

Tetra Pak India Private Limited (TPIPL) commissions a UBC management study every three years. Conducted by The Energy and Resources Institute (TERI) in 2011, 2015, 2019 ,2022 and 2025 the study covers 24 Indian cities. It assesses waste collectors' perceptions, estimates UBC and volumes recycled (especially via mixed paper streams), and provides insights to inform strategies for increasing UBC recycling rates nationwide.

The study revealed that UBCs are collected by waste collectors, small and large-scale dealers, and are subsequently sent to recycling units. The findings highlight the proportion of UBCs present at various levels of the collection chain, offering insight into how much waste leaks into the environment at different stages. In cities across states like Uttar Pradesh and Karnataka, the recycling rate of UBCs is notably high, largely to the well-developed collection infrastructure. The survey found that large and small -scale dealers along with Material Recovery Facilities (MRFs) and substations are actively engaged in collecting both UBCs, which has led to improved collection rates. These materials are then sent to recyclers or paper mills for processing, significantly reducing the volume of UBCs that end up in landfills.

The objective of the study is to assess the management of UBCs based on the specified sample size, with the aim of determining recycling rates through a combination of secondary research and field surveys involving waste collectors, waste dealers, MRF, Substations, Landfill and recyclers.

According to the Ministry of Housing and Urban Affairs (MoHUA), paper and cardboard waste constituted approximately 7.35% of municipal solid waste (MSW) in 2024, with an estimated recovery rate of 57%.

As part of this study, the value chain and economics related to the collection and recycling of UBCs were analysed. It was observed that the recycling rate of UBCs has steadily increased over the years, from 29% in 2011 to 63.66% in 2025, at city level with intermediate rates of 43% (2015), 54% (2019), and 62% (2022).

The recycling rate of 63.67% of UBCs in 2025 can be attributed to informal recycling of 27.65%, and active/ formal recycling of 36.02%. The quantity of UBCs reaching landfills was estimated to be 5.65%, and 30.68% was unaccounted.

This improvement is largely attributed to Tetra Pak's interventions, including partnerships with recyclers and investments in infrastructure and technology to enhance the collection and recycling processes of UBCs. As a result, the volume of UBCs disposed of along with mixed paper at landfills decreased, while dedicated collection and recycling streams for UBCs have been significantly strengthened.

Based on the extrapolation of data along with secondary research and consideration of over 1000 cities, using Central Pollution Control Board (CPCB) data on pan-India waste generation, waste recovery, population census and considering the increasing trend of MSW increasing in last 3 years with reference to the consumption, informal and formal generation and collection in India the overall national recycling percentage is about 48.56%, implying that for every two UBC, one is recycled.

Policy interventions like Extended Producer Responsibility (EPR) can play a pivotal role in ensuring accountability across the recycling value chain. EPR can further strengthen these efforts by recognizing recyclers such as paper mills and chipboard manufactures, through appropriate credit mechanisms that incentivize the recycling of UBCs.

Based on the assessment of UBC (Used Beverage Carton) recycling performance across cities and the interventions undertaken by Tetra Pak, the following recommendations are proposed to strengthen the circular economy framework, enhance collection efficiency, and improve recycling outcomes:

» **Enhance Circular Economy Pathways:**

UBC recycling rates have improved from 2022–2024, but further development of circular economy systems is required. Introducing incentives for end-users and waste collectors to segregate and supply UBCs can increase collection volumes and improve system efficiency.

» **Review EPR Credit Mechanism for Category III Packaging:**

The current EPR credit system recognizes credits only for the recycling of the plastic content of multi-layer packaging under Category III. Recyclers currently receive 30% credit despite processing the full volume of Category III packaging like UBCas it contains only 30% polyAl content and remainder 70% paperboard recycled goes unrecognized, making compliance challenging. A revised, material-neutral credit calculation method or registration process for Category III plastic waste processors would better align credits with actual recycling processes.

» **Strengthen Markets for Recycled UBC Products:**

Stable recycling outcomes depend on consistent market demand for recycled UBC outputs. Enhancing market linkages, expanding applications of UBC-derived products, and supporting business development for recyclers can increase economic incentives across the value chain.

» **Improve Waste Dealer and Recycler Network Coordination:**

Strengthening coordination among waste collectors, aggregators, and recycling units is important. Ensuring reliable economic returns can encourage waste dealers to handle UBCs, supporting improvements in formal collection volumes and recycling efficiency.

» **Utilize Inactive Recycling Potential:**

With approximately 27.65% of UBCs already recycled inactively through mixed wastepaper streams, there is considerable untapped potential. Integrating these inactive recycling activities into active systems can substantially increase infrastructure of recycling and support improvement in national UBC recycling rates.

» **Scale Successful City Models Across India:**

Cities such as Lucknow, Kanpur, and Bengaluru exhibit strong recycling performance due to established UBC collection centres and mature local systems. Adopting similar models in other urban areas—especially those with less developed collection infrastructure, can support improvements in UBC recovery and recycling.

The following graph provides a clear picture of the recycling rate of UBCs in 24 cities:

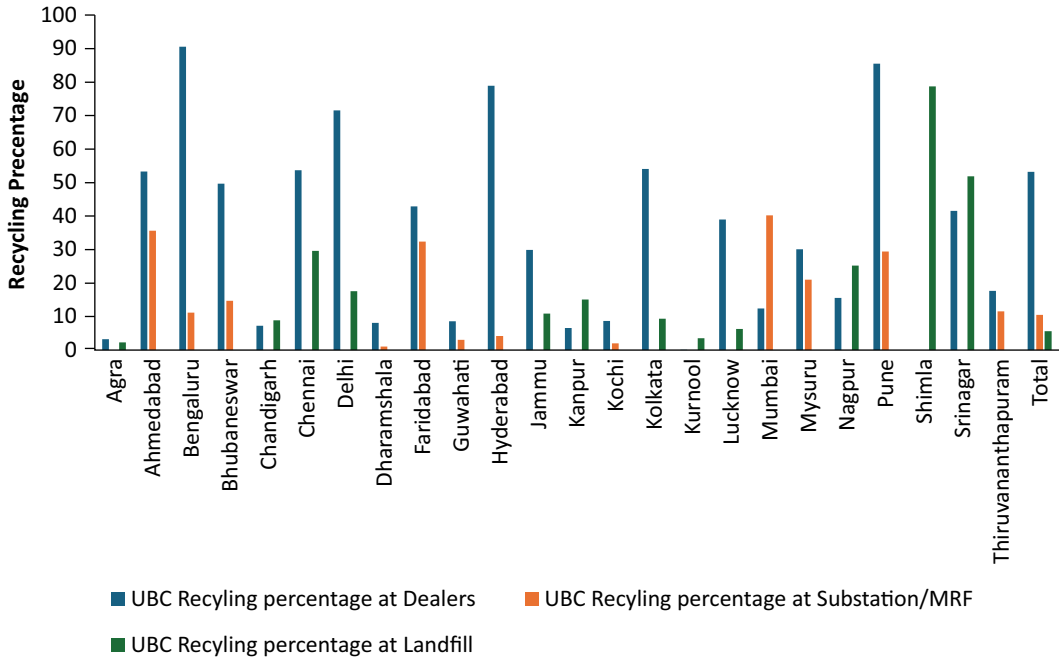

FIGURE 1 Recycling rates of UBC in 24 cities

Introduction

Tetra Pak is a world leading food processing and packaging solutions company, and a part of the Tetra Laval Group, with headquarters in Switzerland. The company offers packaging, filling machines and processing for dairy, beverages, cheese, ice-cream and prepared food, including distribution tools like accumulators, cap applicators, conveyors, crate packers, film wrappers, line controllers and straw applicators.

About Beverage Cartons

Every day, billions of liters of liquid food such as milk, juice, and water are consumed globally. Liquid foods are placed in beverage cartons, a type of packaging that is commonly used to protect fresh food and drinks. Beverage cartons can be recycled and are being recycled more frequently by recyclers across the world. Tetra Pak is a provider of food processing and packaging solutions that offer consumers high-quality, cutting-edge goods that are also environmentally friendly. Liquid beverage cartons enable the distribution of liquid and food items by prolonging its shelf life through maintaining the freshness, flavors, and nutritional content of such products. Long, strong paper fibers that can be recycled multiple times into other paper products make up more than 70% of the beverage cartons. Tetra Pak provides packaging supplies to more than 8,800 packaging machines across the world.[1]

We use beverage cartons every day, the need for which is driven by the rising popularity of packaged food and beverage products. The market for beverage cartons was valued at USD 16.51 billion globally in 2020, and it is anticipated to reach USD 22.44 billion by 2028.[2] With this rising demand, it is also important to take into account the environmental effects of UBCs, on aspects like littering, the energy consumed to produce virgin materials for making new cartons, the greenhouse gases (GHGs) emissions, and so on.

Tetra Pak aseptic paper-based beverage cartons are categorized as paper-based packaging since they constitute 70% paperboard, 5% aluminum, and 20% of polymers. The paperboard and other layers viz., aluminum and polymers or plastics are separated using re-pulping techniques. The layer of polymer (PE) and aluminium, also called polyAl , can be combined with other plastics to create new goods like roofing tiles, crates, carton boxes, and more, while the separated paper fibers can be turned into new paper products. Tetra Pak has consistently strived to improve its packaging and takes proactive measures to protect the environment. UBCs are collected and recycled worldwide, where waste management and recycling infrastructure is in place, including in India. Tetra Pak has helped establish UBC collection points in numerous cities and works to educate the public through initiatives that focus on education, information, and capacity building.

Beverage Carton Consumption in India

Tetra Pak Market Share in India

Liquid beverage cartons are composite packaging that provide durable and flexible aseptic packaging for juices, dairy, and other liquid food to ensure long shelf life and long-lasting freshness. In 2024, the leading category for Tetra Pak packaging materials' net sales were liquid dairy products making up 56.9% followed by juices & nectar at 19.7%. Liquid dairy products were

[1] https://www.tetrapak.com/en-in/solutions/packaging
[2] https://www.fortunebusinessinsights.com/beverage-cartons-market-105450

the leading category consuming Tetra Pak packaging materials followed by juices and nectars.[3]

In 2024, the Asia Pacific region contributed 32% of Tetra Pak's net sales by geography and 46,343 metric tons of Tetra Pak packaging material was consumed in the 24 surveyed cities.

Tetra Pak Packaging Options

Tetra Pak has spearheaded several innovations in packaging materials and formats for storing diverse food and beverage products, such as:

- Redesigned packages now feature:
  - New formats and additional materials, such as tethered caps.
  - QR codes that act as data carriers, enabling customer interaction and improving food safety.
- Enhanced sustainability efforts through:
  - Paper-based straws and plant-based plastic layers and caps made from sugarcane.
  - Increased renewable content in packaging materials.
- Improved functionality and consumer appeal with:
  - A variety of space-saving shapes designed to match consumer preferences.
  - Enhanced recyclability, contributing to better environmental performance and economic benefits.

Beverage cartons used in this study refer to aseptic packaging types.

The study categorizes UBCs into two main types based on volume:

1. Small cartons (<=500 ml)
2. Large cartons (>500 ml)

[3] https://www.tetrapak.com/sustainability/measuring-and-reporting/sustainability-reports?utm_source=google&utm_medium=cpc&utm_campaign=SMSuSR24In&utm_content=sustainability-report-group_tetra-pak-sustainability-report&gad_source=1&gad_campaignid=21347872284&gbraid=0AAAACTiZx1HJuelv01X90UwJVznRkeYv&gclid=EAIaIQobChMI-dWG5qTskAMVvKtmAh2VEBYsEAAYASAAEgIvy_D_BwE

TABLE 1 List of few products for which UBCs are manufactured

Category	Product
Dairy & Plant-Based Alternatives	Milk
	Condensed Milk
	Dairy Cream
	Recombined Milk
	Fermented dairy products
	Flavoured milk
	Plant-Based Milk
	Other Dairy Products
Beverages	Still Drinks
	Juices & nectars
	Coconut water
	Carbonated soft drinks
Food	Sauces & Purées
	Soups
	Baby Food
	Fruit Preparations
	Dessert
Others	Alcoholic Beverages

In India each packaging type serves distinctive purposes, small cartons are widely used for juices, dairy products and beverage packaging by leading FMCG players such as Amul, Nestlé, and Parle. Large cartons exceeding 500 ml capacity are primarily used for milk and other beverage packaging, with brands like Amul, Nestlé, Tropicana, and Parle.

Package Openings

Tetra Pak provides a variety of opening options tailored to different use cases, enhancing convenience:

- **Caps**

Ideal for liquid dairy products, plant-based alternatives, and beverages intended for multiple servings. Re-sealable caps offer easy pouring and secure closure.

» **Tear-Off Openings**

Designed for single-use applications, allows consumers to easily tear open the carton.

» **Drinking Straws**

Available in both plastic and paper varieties, is designed for small cartons containing beverages meant for immediate consumption. These straws are typically attached to the pack for quick and easy access.

Manufacturing Process of Beverage Cartons

Tetra Pak cartons are multi layered, with each layer serving a vital role in ensuring the contents are protected against light, oxygen, and harmful microorganism while maintaining structural integrity throughout its journey from the factory to the consumer. Together, these layers ensure food retains its quality and shelf life, thereby reducing food wastage.

Liquid beverage cartons are composed of six protective layers:

» Polyethylene (PE) waterproof layer on the external surface that also makes the product's contents antibacterial;

» Paperboard to boost the package's stability and resistance;

» A layer of PE acting as a binding layer;

» Aluminum layer to prevent oxygen, light, and smell permeation;

» A binding layer of PE;

» Finally, a layer of PE protects the product's contents.

Paperboard, which is derived from wood pulp, is one of the most crucial and significant parts of a carton. Using a paperboard machine, the pulp is washed and then combined together to create multiple layers. The control processes in place are used to assess the material's thickness, stiffness, and smoothness. There are several types of paperboards available depending on the size of the carton, the distribution method

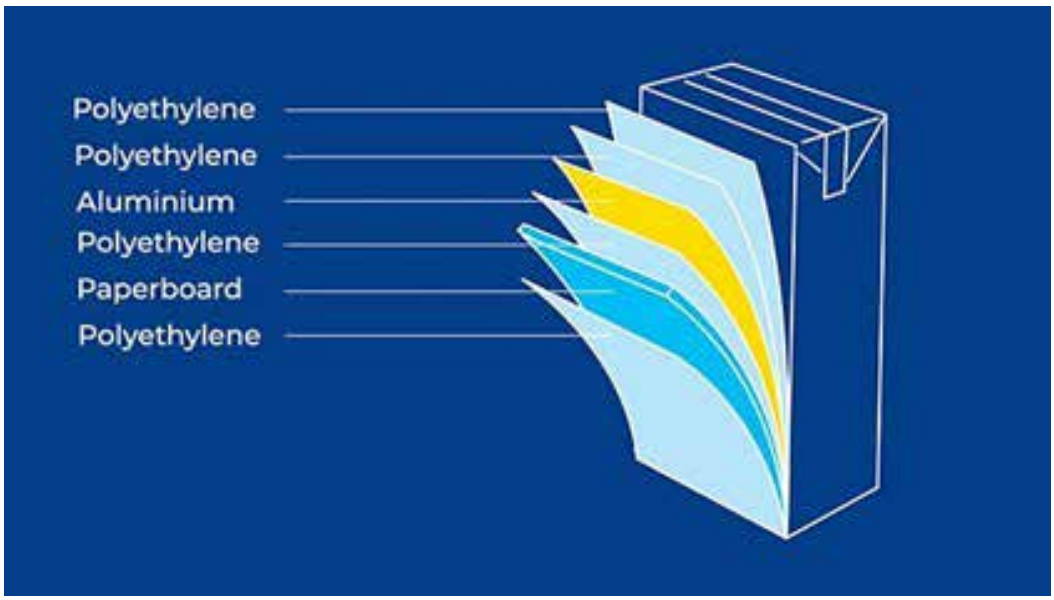

FIGURE 2 Different layers of Tetra Pak packages

Source: Tetra Pak

(whether refrigerated or ambient), and the shelf life of the product to be made.

Processed contents are then filled into cartons using suitable high precision filling machines. The filled cartons are then move to final stages of packaging, including straw/ cap applicators, wrapping, and boxing ready to be shipped to the market.

Post consumption recycling: flow

Recycling Process

1. Hydra-pulping at papermills

Hydra pulping is the most adopted recycling method for UBCs, which is based on a similar approach to conventional paper recycling to produce high quality secondary fibers. The feedstock generally consists of white records (office paper), color records, kraft paper and corrugated sheets, to which UBCs are added on a calculated basis depending on the desired quality of final product. Shredded feedstock is dropped into a large tank where under action of high-speed mixer or rotary drum in the presence of water at temperature from ambient to 50°C cellulose fiber absorbs water and form pulp. The mixture containing pulp and PE-Al laminate is then separated by sieving off un-defibered material.

Depending on the particular system, additional steps might be taken in terms of pulp/PE-Al further purification. In modern technologies, fibre content in PE-Al products settles between 1 to 5%.[4] The pulp sheets are then used to make different grades of paper and paper products like notepads, envelopes, and tissue paper. The PE-Al or polyAl material is generally dried, baled, and sent for further processing in polyAl recycling facilities or sent to cement factories for co-processing.

2. Chipboard production

Chipboards can be produced by shredding Tetra Pak post-consumer cartons. This process utilizes a hydraulic press to generate and control the required pressure for the sheet making process. The hot press is equipped with heating elements which provide the necessary heat for the bonding process with requisite temperature and pressure control systems to maintain precise parameters throughout the pressing cycle.

Composite obtained in the process is light and water-resistant with varying levels of flexibility. The most suitable raw material in this process is obtained from post-production waste, as the contamination from residual food products and high humidity are undesirable. Chipboard production leaves no waste due to usage of all shredded UBCs.[5]

[4] https://scispace.com/pdf/tetra-pak-recycling-current-trends-and-new-developments-13tvabtyry.pdf

[5] https://www.indiamart.com/proddetail/tetrapak-waste-recycled-chipboard-making-plant-labh-group-2851155987448.html

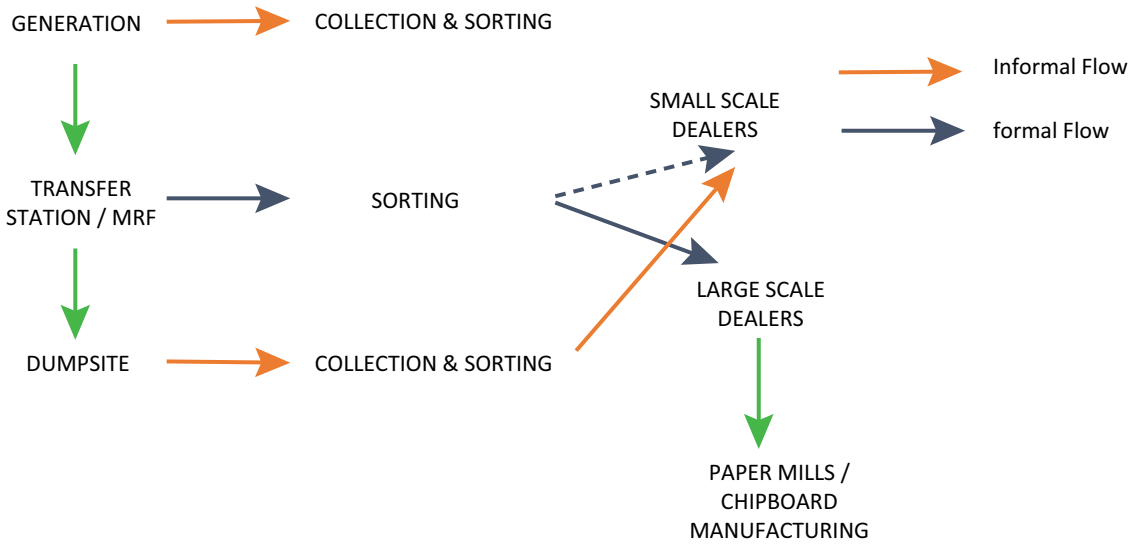

FIGURE 3 Tetra Pak post-consumption flow

Objectives and Research Methodology

The primary objective of this report is to present the observations recorded by the TERI team during field visits to 24 cities and 10 recyclers across India.

Objective

The objective of this study is to assess the recycling rate of UBCs waste through detailed characterization at various levels, including small- and large-scale dealers, transfer stations, and landfills. This assessment is supported by a questionnaire-based survey conducted among waste collectors in selected cities across India, with necessary approvals obtained from the respective Municipal Corporations. The study aims to enhance the recycling process by identifying paper waste and UBCs within mixed waste streams, while also capturing insights from informal waste collectors regarding current collection and disposal practices. By analysing the existing mixed waste system, future waste projections, and the feasibility of standalone recycling facilities, the research aims to provide actionable recommendations and a strategic roadmap for developing an enabling framework. Ultimately, the study seeks to promote a sustainable approach to waste management that minimizes environmental impact and aligns with broader objectives related to waste reduction and resource recovery.

The sample size considered for the survey is provided in the Table 2.

Under the guidance of TPIPL, the 24 identified cities are listed below:

The report is divided into five main sections, each dedicated to a specific aspect of the study.

TABLE 2 Details of sample size considered

Sectors	Samples per city	Remarks
Waste Collectors	22	Spread across the city
Small Scale Scrap Dealers	14	Spread across the city
Large Scale Scrap Dealers	07	Spread across the city
Landfills/ Secondary Collection points	01	Three samples' trucks from residential, commercial and institutional areas (450 Kg)
Total	44	Sample Size
Recyclers		
Total Sample Size	10	Spread across India

- **Section 01:** This section represents background overview of the project and serves as a guide to understanding the structure and content of the report.
- **Section 02:** The second section outlines the objectives of the project and detailed methodology employed to carry out the field activities.
- **Section 03:** The third section presents detailed findings and observations across various stakeholder levels, including waste collectors, small- and large-scale dealers, along with landfill analysis conducted in all 24 cities.

TABLE 3 Details of partners involved

S.No	City	Duration of visit	Local partner
1	Agra	22nd - 25th April 2025	Nirman Dhara
2	Ahmedabad	1st – 4th July 2025	Shriman Enterprises
3	Bengaluru	31st - 3rd June 2025	Isha Fibers
4	Bhubaneswar	17th - 21st April 2025	Nature Next Foundation
5	Chandigarh	14th - 17th April 2025	ZWC PVT LMT
6	Chennai	26th May - 30th May 2025	Earth Recyclers
7	Delhi	2nd, 5th – 6th May 2025	Bal Vikas Dhara
8	Dharamshala	9th - 12th June 2025	Waste Warriors
9	Faridabad	2nd ,17th -18th July 2025	Bal Vikas Dhara
10	Guwahati	5th - 9th May 2025	Nirman Dhara
11	Hyderabad	27th – 30th May	Sukuki Exonora
12	Jammu	11th - 15th April 2025	Umeed Welfare Foundation
13	Kanpur	3rd - 6th June 2025	Vishwam Foundation
14	Kochi	15th - 18th July 2025	Shreejee Foundations
15	Kolkata	22nd -25th April 2025	Nature Next Foundation
16	Kurnool	31st - 3rd June 2025	Dalit Bahujan Resource Centre
17	Lucknow	10th - 13th June 2025	The Kabadiwala
18	Mumbai	22nd - 25th June 2025	Shriman Enterprises
19	Mysuru	26th - 29th May 2025	Isha Fibers
20	Nagpur	5th - 8th May 2025	The Kabadiwala
21	Pune	17th -21st June 2025	Shriman Enterprises
22	Shimla	17th - 20th June 2025	ZWC PVT LMT
23	Srinagar	7th April - 10th April 2025	Umeed Welfare Foundation
24	Thiruvananthapuram	10th - 14th July 2025	Shreejee Foundations

» **Section 04:** The fourth section presents the details of recyclers covered during the study with its observations and inputs along with the sampling results.

» **Section 05:** The fifth and final section offers key recommendations for strengthening the UBC value chain and way forward.

Methodology

The Energy and Resources Institute (TERI) adopted a systematic and collaborative approach to meet the sample size requirement outlined in the study proposal, aimed at identifying recycling rates for UBCs Conducted between **April 2025 and August 2025**, the study covered **24 cities across India** and involved the

collection of **44 data points**. These include data from **7 large-scale vendors, 14 small-scale vendors, 22 waste collectors, and 1 landfill/sub-aggregation station**. The study was carried out in close collaboration with on-ground partners, ensuring comprehensive data collection, effective stakeholder engagement, and representation of diverse regional recycling practices. The methodology followed is as described below:

1. Waste collectors:

A questionnaire-based survey was conducted among waste collectors to gather information on waste collection pricing, quantity, place of collection, and the behaviour of people regarding waste disposal. The study focused on the collection and disposal processes of UBC waste.

Data was collected from a total of 22 waste collectors per city, across various regions of the selected study area.

2. Large-scale and small scrap dealers

As per the proposed sample size, TERI and its team, in collaboration with local on-ground partners, completed the assessment of 7 large-scale scrap dealers (handling over 1000 kg of waste per day) and 14 small-scale scrap dealers (handling less than 1000 kg per day) in each city. The team engaged these vendors and initiated sampling of UBCs from the stored baled waste.

A total of 150 kg of mixed paper waste was examined by unwrapping three 50-55 kg bales, enabling detailed analysis and identification of UBCs within the sample. UBCs were further classified into two categories: small packets (typically less than 500 ml) and large packets (500 ml or more).

To ensure sustainability of the UBCs recovery cycle in the market, it is essential that these waste types are systematically accepted for recycling and supported with appropriate incentives.

3. Landfill/ Substations

The physical waste characteristics of mixed waste were assessed using the coning and quartering method, as prescribed by CPCB guidelines. In this process, the gross sample is first formed into a cone, flattened, and divided into four equal quarters. Two diagonally opposite quarters are discarded, and the process is repeated until a representative sample is obtained. At the landfill, three samples of approximately 150 kg each were collected from three different waste transportation vehicles using this method considering Sampling of compactor vehicle at landfills equivalent to 2% of the total compactor Than samples were manually sorted to identify components such as wastepaper, UBC waste. Basic information about the waste sources was obtained from the vehicle drivers. The sorting process followed the standard steps for manual segregation.

- **Select Sorting Location:** Choose a precise spot for the sorting and weigh scale setup.
- **Site cleanliness for sampling:** Clean the area and place a cover sheet and arrange necessary equipment.
- **Label & Record Containers:** Mark waste containers with numbers and record their empty (tare) weights.
- **Position Pre-Weighed Bins:** Place pre-weighed bins near the sorting table for sorted materials.
- **Sample Collection:** Collect the sample of UBC by quartering for landfill and weighing and unload for sorting.
- **Assign Segregation Tasks:** Team members sort specific subcategories of waste.
- **Manual Sorting:** Spread and hand-sort waste on the sorting box into designated bins.
- **Handle Remaining Waste:** Sweep residuals with no identifiable category into the 'mixed' fraction.
- **Weigh Sorted Waste:** Use a calibrated scale to obtain gross weight subtract tare weight to get net weight record data accurately.

» **Final Disposal:** Dispose of or divert sorted waste as per instructions.

4. Recyclers:

As per the proposed sample size, the TERI team has completed assessments of ten recyclers located across ten Indian cities. Pre-weighed baled paper waste was unloaded and unwrapped to conduct a detailed analysis and identification of UBCs from the samples. The UBCs were further classified into two categories: small packets (typically less than 500 ml) and large packets (more than or equal to 500 ml).

Along with the assessment, in-person interviews were carried out to gain a better understanding of the recycling processes and capacities, regions contributing waste materials, and the types of materials rejected along with their eventual fate.

UBC Management Chain

UBC Management Structure: Formal and Informal involvement

In India, there are between 1.5 and four million informal waste pickers, who recover, sort and sell on reusable and recyclable solid waste from streets, bins, landfills and material recovery facilities.[6]

Informal waste collectors typically operate without formal employment contracts or reliable sources of income. In contrast, formal waste workers are employed either directly by Urban Local Bodies (ULBs), private enterprises, non-governmental organizations (NGOs), or through contractual arrangements. Among informal workers, commonly referred to as kabadiwalas or door-to-door collectors, in regions like Karnataka, Kerala, and Maharashtra do not deal with municipal solid waste. Instead, they focus exclusively on recyclable scrap materials such as paper records, newspapers, and cardboard boxes, purchased directly from households and commercial establishments.

A wide range of recyclables such as paper, cardboard, plastic, metal, glass etc. collected from household, shops and other sources, and those recovered from municipal waste streams are sold to Scrap dealers with different handling capacities. For the purpose of this study, scrap dealers are broadly classified into two categories: small-scale dealers, who handle less than 1 ton of waste, and large-scale dealers, who deal more than 1 ton of materials on a daily basis.

These dealers operate through formal channels with necessary licenses and registrations for their operations or operating informally, generally at small scale. Registered large scale dealers act as final collection points where segregated material arrives in bales or is baled into bales using industrial baling machines before being transported to paper mills and recyclers across the country.

The fate of UBCs differs significantly across Indian cities due to the diversity in waste collection systems, levels of awareness, and recycling infrastructure. While cities like Chandigarh, Kurnool and Shimla have minimal or no informal sector involvement in UBC collection, others such as Delhi and Pune and Bengaluru show high rates of recovery and recycling. Cities like Jammu and Nagpur experience seasonal fluctuations in both consumption and collection of UBCs, influenced by demand cycles and waste market dynamics.

The key factors that will boost UBC collection and recycling include:

» **Awareness levels** among stakeholders, especially waste generators and collectors.

» **Availability of local markets** and access to recycling units.

Stakeholders Involved in UBC Collection and Recycling

In cities where UBC recycling is prevalent, several stakeholders play an important role in the collection chain:

» Street Waste Picking: UBCs are retrieved from mixed waste on streets or community bins by informal waste pickers. This practice is common in cities where UBCs are accepted by waste dealers.

[6] https://www.britsafe.in/safety-management-news/2025/india-s-waste-pickers-indispensable-but-invisible

» **Door-to-Door Waste Collection:** Collectors recover UBCs along with other recyclables during routine collection and transfer them to dhalaos or community bins. This method is widely practiced in cities with organized door-to-door systems.

» **Hotels and Institutions:** Waste from airports, hotels, and institutional canteens is often segregated, and UBCs are sold to small and large dealers.

» **Waste collectors from Landfills:** At landfill sites, communities living nearby engage in waste picking, including UBC recovery, before final disposal.

UBC Waste Value Chain

The recycling chain of UBCs begins with waste pickers collecting them from streets, landfills, households, and bins. These are sold to **kabadiwalas** (informal scrap dealers), who offer immediate payment, providing financial incentive at the grassroots level.

» **Kabadiwalas** accumulate UBCs from various sources, including rag pickers and door-to-door collectors. However, due to the organic residues in UBCs, small-scale dealers often find it challenging to store them for long (typically 10–15 days), making bulk selling to large dealers difficult.

» Once an economically viable quantity is gathered, kabadiwalas sell to **larger dealers**, who often offer advance payments to secure supply. These large dealers, in turn, categorize waste according to material grade to maximize resale value.

» UBCs are either sold directly to **recyclers** or via **wholesalers**, depending on the pricing and payment terms.

Role of Recycling Units and Corporate Interventions

Recycling units use segregated UBCs to manufacture products such as kraft paper, molded pulp trays, and floating media paper. Notably, Tetra Pak has played a significant role in developing the UBC recycling ecosystem in India over the past 18 years. Through sustained interventions, it has helped establish UBCs—including cartons—as valuable raw materials for the paper recycling industry.

Tetra Pak has collaborated with various agencies that:

» Collect segregated UBCs from rag pickers and kabadiwalas across multiple regions.

» Aggregate and transport these to recyclers for recycling.

These partnerships have contributed to:

» Increased recycling rates of UBCs.

» Reduction in environmental impact through lower carbon footprints.

» Generation of livelihood opportunities across the waste management value chain.

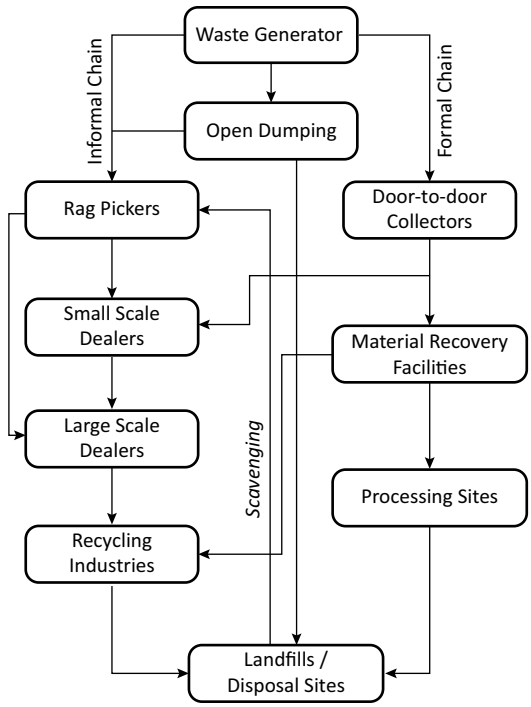

FIGURE 4 Dry waste management chain in India

Material Balance

Material Balance of UBC

The following diagram depicts the flow of post-consumer UBC through various recycling and disposal methods. Out of 100% of the post-consumer waste, 63.67% is successfully recycled through active and inactive recycling systems. However, 30.69% remains unaccounted and 5.65% ends up in landfills.

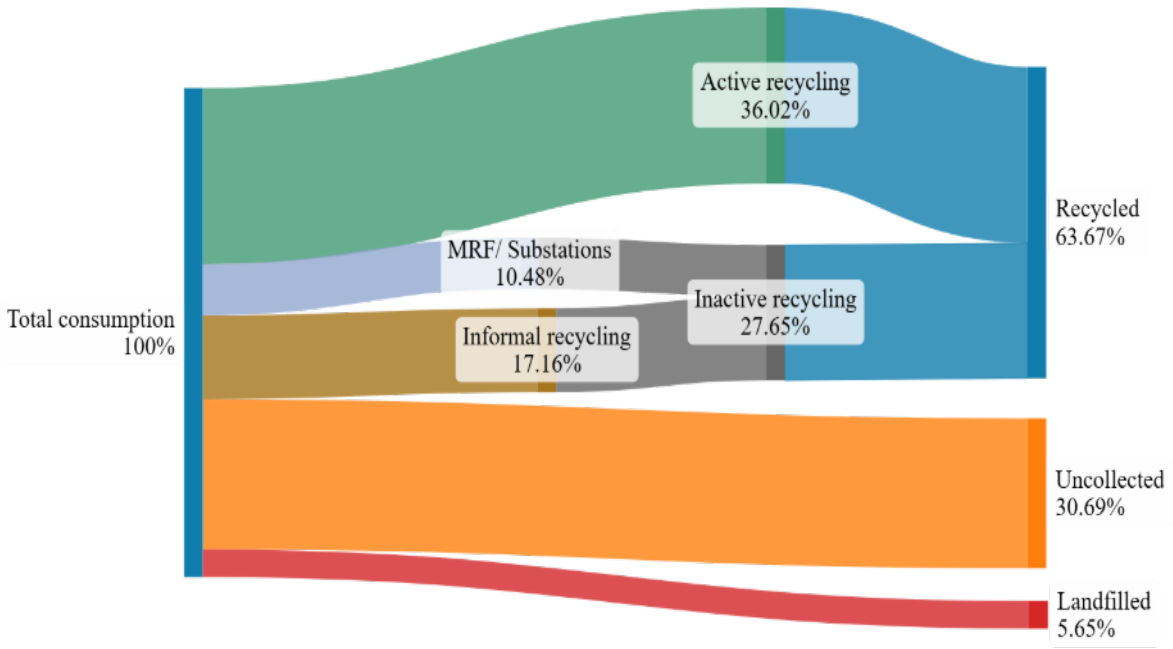

FIGURE 5 Material Flow Balance of total UBC in the value chain

Policy Intervention- EPR

The TERI team, after conducting extensive field survey across 24 cities and 10 recyclers in India, identified a significant gap in the implementation of EPR policy – particularly concerning the recycling of UBCs. UBCs typically comprise of approximately 70% paperboard, 25% polymer, and 5% aluminium. A type of composite packaging that is recognized as Category 3 under EPR guidelines 2022, under the Plastic Waste Management Rules. The guidelines set EPR targets for MLP on the basis of total weight of MLP and not on the weight of plastic content. Due to this categorization under EPR, even though paper mills are able to fully recycle UBCs via repulping and send polyAl for recycling, they can only receive 30% EPR credit for recycling of polyAl and not the entire UBC material recycled. This shortfall presents a major challenge to effective policy compliance and recycling of UBCs.

The TERI team, after conducting an extensive field survey across 24 cities and 10 recyclers in India, identified a significant gap in the implementation of Extended Producer Responsibility (EPR) policy– particularly concerning the recycling of Used Beverage Cartons (UBCs). UBCs typically comprise approximately 70% paperboard, 25% polymer, and 5% aluminium,

TABLE 4 EPR Targets

EPR Targets for Multi-Layered Packaging (MLP)		
S. No	**Year**	**Target in %**
1	2024-25	30%
2	2025-26	40%
3	2026-27	50%
4	2027-28 and onwards	60%

a type of composite packaging that is recognized as Category 3 under EPR guidelines 2022 as per Plastic Waste Management Rules. Due to this categorization under EPR, even though paper mills are able to fully recycle UBCs via repulping and send polyAl for recycling, they can only received 30% EPR credit for recycling of polyAl and not the entire UBC material recycled. This shortfall presents a major challenge to effective policy compliance and recycling of UBCs

According to the EPR Guidelines (February 2022), accepting paper waste Beverage Cartons is considered under Category III and the guidelines set EPR Target for category 3 on the basis of the total weight of package and not only the weight of

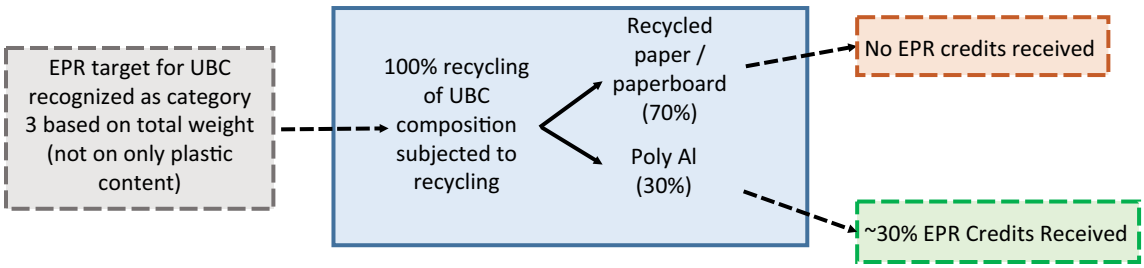

FIGURE 6 EPR functioning for UBCs

plastic content. 21. However, paper mills are unable to achieve the target as they receive only 30% credit despite processing 100% of the UBC waste.

Challenges and recommendations to achieve the targets: -

» Due to only partial credit recognition, achieving EPR target will prove to be difficult.

» Recyclers receive credits proportionate to recovery (i.e. 70% for paper, and EPR credit for processing of remaining 30% PolyAl)

» Once the credit line is applicable for 100% recycling, it will automatically incentivize recyclers.

Survey Analysis

A breakdown of the field survey has been tabulated in this segment. The first is the fraction of the dealers accepting UBC along with the total percentage of the UBC found with small- and large-scale dealers in each of the 24 cities.

Considering the fraction of wastepaper analysed being around 6- 20% of paper and cardboard market share, the quantity of waste generated in each city, the fraction of paper waste being generated and the percentage of waste collected by informal sector for recycling; informal recycling rates have been established. Also it is important to note that the average weight of a beverage carton is 7.5-8 grams (Tetra Pak).

TABLE 5 The Fraction of dealers accepting UBC along with the Average in surveyed cities

Fraction of UBCs in Paper Waste							
	Small Scale			Large Scale			
City	Load analysed (kg)	Fraction of dealers accepting UBC	% UBC	Load analysed (kg)	Fraction of dealers accepting UBC	% UBC	Average % UBC
Agra	1227	0.786	0.17	700	0.857	0.6	0.385
Ahmedabad	693.25	0.214285	0.11	739.5	0.857142	0.292	0.201
Bengaluru	1272	0.857	1.71	450.2	0.286	5.98	3.845
Bhubaneswar	943.01	0.928571	3.21	1268.4	1	2.02	2.615
Chandigarh	1192.5	0	0	893	0	0	0
Chennai	2179	0.642857	0.146	3330	1	0.43	0.288
Delhi	716.25	0.714	0.97	430.25	1	0.99	0.98
Dharamshala	350.9	0.071428	0.003	286.6	0.285714	1.97	0.9865
Faridabad	770	0.714	0.26	261	0.571	0.99	0.625
Guwahati	2257	1	1.8	1815	0.714285	1.38	1.59
Hyderabad	430	0.357	0.35	698	0.857	1.35	0.85
Jammu	563.57	0.428571	0.2	333.45	0.428571	1.5	0.85
Kanpur	1417	0.571	3.47	1238	0.857	0.76	2.115
Kochi	2500	0.5	0.56	3350	0.857142	0.38	0.47
Kolkata	1068.92	0.714	3.08	1235.1	0.857	0.39	1.735

Fraction of UBCs in Paper Waste							
	Small Scale			Large Scale			
City	Load analysed (kg)	Fraction of dealers accepting UBC	% UBC	Load analysed (kg)	Fraction of dealers accepting UBC	% UBC	Average % UBC
Kurnool	467.9	0	0	292.4	0.142857	0.11	0.055
Lucknow	709.76	0.857	1.8	641.37	0.571	1.85	1.825
Mumbai	1535	0.714285	0.45	4025	0.428571	0.1	0.2735
Mysore	465.29	0	0	653.55	0.286	2.77	1.385
Nagpur	850	0.714285	0.27	305	0.428571	0.24	0.255
Pune	2380	0.357	0.31	1119	0.857	0.27	0.291
Shimla	253.12	0	0	171.8	0	0	0
Srinagar	912.58	0.429	0.13	764.8	0.286	2.33	1.227
Thiruvananthapuram	3235	0.714285	0.49	3055	0.714285	1.17	0.83

UBC Recycling Rate-City Wise

The informal recycling rates for Indian cities are given in Table 6.

Further the above table reflects total UBC found at Landfill at city level across the India - 5.65% and the summary of the data for Active, Inactive, Landfill and others are provided in Table 8.

Environmental Sustainability Goals

Tetra Pak embodies its sustainability purpose through a commitment to making food safe and available, everywhere and to protect what's good: food, people and the planet. Based on materiality there are five key areas of sustainability agenda: food systems, sustainability, climate, nature and circularity these areas are interconnected and independent. The company makes sure that food, people and planet are protected, and it directs its efforts towards the Sustainable Development Goals (SDGs).

Tetra Pak aims to reduce their food waste generated by its operation by 50% by 2030. As the population around globe is increasing rapidly so does the demand for food. However, uncertainties such as extreme weather events caused by climate change and global health emergencies are creating complex challenges to food systems. Aseptic processing and packaging address these challenges by keeping perishable foods safe for six to twelve months without the need for refrigeration or preservatives-while retaining their colour, texture, taste and nutrition.

Tetra Pak is enhancing the circularity of their packaging by incorporating the use of circular raw materials, increasing the recyclability of their packaging and expanding collection and recycling initiatives. Effective collection and efficient recycling of used materials is important part for circular economy. In 2024, Tetra Pak invested €42 million for global collection of UBCs which resulted in increased rate of recycling to 28%, with over 1.3 million tonnes of UBCs collected and sent for recycling. They reduce their total waste from operation in 2024 by 4% than the previous year, which 95% was recycled, and less than 1% was sent to landfill.

Post-Consumer recycling and awareness initiatives

Tetra Pak India is driving impactful circularity and recycling initiatives through multi-stakeholder collaborations. The Go-Green with Tetra Pak program, launched in Mumbai in partnership with RUR Green life, Sahakari Bhandar, and Reliance Smart & Fresh, enables consumers to deposit used cartons at over 230 drop-off points. To date, the initiative has collected over 17 million cartons and donated more than 800 school desks, garden benches, and 120,000 other items—fully made from recycled cartons—to underprivileged schools and communities.[7]

The Alag Karo – Har Din Teen Bin initiative, in collaboration with Coca-Cola India, GIZ, and SAAHAS, promotes waste segregation in Delhi-NCR. Between 2017 and 2023, it educated over 260,000 people, with 60,000 households and businesses diverting 60 tons of waste daily. In Phase 2, the program reached 28,609 waste generators, trained 308 waste workers (243 of whom received ID cards), and successfully diverted

[7] https://www.tetrapak.com/content/dam/tetrapak/publicweb/gb/en/sustainability/reporting-and-performance-data/TetraPak_Sustainability_Report_FY24.pdf?utm_source=website&utm_medium=banner&utm_campaign=SRFY24&utm_term=website&utm_content=header

TABLE 6 Tetra Pak UBC recycling rates in Indian cities

Active and Inactive dealers												MRF/Substation						
City	Consumption of UBC in TPA (2024)	MSW generated TPA	% paper waste (2nd. Lit.)	paper waste generated (TPA)	paper recovered 57% as for Mouha	Fraction of UBC waste as per analysis	UBC collected by informal sector (inactive)	Active re-cycling (TPA)	Re-cycling TPA	% of Infor-mal	Re-cycling %	Total Dry waste (TPA)	Truck load (TPA)	Truck load % of total dry waste	Truck load (TPA)	UBC % ana-lysed	UBC found in TPA	% of UBC Found in MRF/ Substation
Agra	1416.32	337260	7.35%	24788.61	14129.51	0.0033	46.63	0.00	46.63	3.29%	3.29	MRF/Substation not Covered						
Ahmedabad	515.79	1346485	11%	148113.4	84424.61	0.0015	126.64	148.51	275.15	24.55%	53.34	172350.08	1642.5	0.95	164.25	0.107%	183.84	35.64%
Bengaluru	12683.95	2007500	12%	240900	137313	0.0107	1472.46	10012.28	11484.74	11.61%	90.55	72270	2190	3.03	164.25	1.96%	1413.72	11.15%
Bhubaneswar	430.65	189800	7.35%	13950.3	7951.67	0.025	201.18	12.82	214.00	46.72%	49.69	2119.92	2080.50	98.14	186.52	3.00%	63.59	14.77%
Chandigarh	576.35	187245	7.35%	13762.51	7844.62	0	0.00	42.14	42.14	0.00%	7.31	MRF/Substation not Covered						
Chennai	861.67	2244750	8.38%	188110.1	107222.7	0.0032	342.25	120.75	463.00	39.72%	53.73	MRF/Substation not Covered						
Delhi	7181.13	4134720	7.35%	303901.9	173224.1	0.0097	1680.27	3457.80	5138.07	23.40%	71.55	MRF/Substation not Covered						
Dharamshala	154.53	6570	13.00%	854.1	486.837	0.0089	4.33	8.21	12.54	2.80%	8.12	840.96	346.75	41.23	164.25	0.20%	1.68	1.09%
Faridabad	253.88	292000	9.53%	27827.6	15861.73	0.0044	70.12	38.85	108.97	27.62%	42.92	35040	602.25	1.72	164.25	0.23%	82.31	32.42%
Guwahati	2970.21	200750	16.41%	32943.08	18777.55	0.0127	238.47	18.37	256.84	8.03%	8.65	30222	784.75	2.60	256.96	0.30%	90.67	3.05%
Hyderabad	1932.50	3285000	8.13%	267070.5	152230.2	0.0097	1476.63	48.16	1524.79	76.41%	78.90%	203232	474.5	0.23	164.25	0.04%	81.29	4.21%
Jammu	397.50	86870	7.35%	6384.94	3639.41	0.0069	24.94	94.04	118.98	6.28%	29.93%	MRF/Substation not Covered						
Kanpur	1907.17	103295	7.35%	7592.18	4327.54	0.022	95.71	29.86	125.58	5.02%	6.58%	MRF/Substation not Covered						
Kochi	287.20	118990	8.00%	9519.2	5425.94	0.004617	25.049	0.00	25.05	8.72%	8.72%	4055.55	1569.5	0.387	1569.5	0.13%	5.27	2%
Kolkata	1749.36	1642500	6.07%	99699.75	56828.86	0.0164	930.79	15.84	946.63	53.21%	54.11%	MRF/Substation not Covered						
Kurnool	445.52	120450	7.35%	8853.07	5046.25	0.00004	0.20	0.00	0.20	0.05%	0.045%	MRF/Substation not Covered						
Lucknow	2121.02	766500	7.35%	56337.75	32112.52	0.0183	586.82	240.81	827.63	27.67%	39.02%	MRF/Substation not Covered						
Mumbai	4384.34	2190000	8.00%	175200	99864	0.002024	202.15	340.96	543.11	4.61%	12.39%	569400	821.25	0.14	821.25	0.31%	1765.14	40.26%
Mysore	3537.08	164250	7.35%	12072.38	6881.254	0.0162	111.32	954.75	1066.07	3.15%	30.14%	23944	2737.5	11.43	209.14	3.11%	744.66	21.05%
Nagpur	555.42	529250	7.35%	38899.88	22172.93	0.0027	59.87	26.89	86.75	10.78%	15.62%	MRF/Substation not Covered						
Pune	1365.33	857750	8.00%	68620	39113.4	0.002986	116.79	1050.89	1167.69	8.55%	85.52%	34310	6497	18.94	164.25	1.17%	401.42	29.40%
Shimla	77.84	45625	13.00%	5931.25	3380.81	0	0.00	0.00	0.00	0.00%	0.00%	MRF/Substation not Covered						
Srinagar	320.48	219000	7.35%	16096.5	9175.00	0.01132	103.86	29.35	133.21	32.41%	41.57%	MRF/Substation not Covered						
Thiruvananthapuram	217.69	118625	6.94%	8232.57	4692.56	0.008219	38.57	0.00	38.57	17.72%	17.72%	441.77	10950	2478.63	419.02	5.7%	25.18	11.57%
TOTAL	46342.93						7955.09	16691.25	24646.34	17.17%	53.18%	TOTAL					4858.79	10.48%

TABLE 7 Tetra Pak UBC found in landfill in Indian cities

Landfill									
City	Consumption of UBC in TPA (2024)	Total MSW generated TPA	Total waste in Landfill (TPA)	Total Dry waste (TPA)	Total truck load (TPA)	Truck load % of dry waste	Total sample load (TPA)	UBC % analysed	UBC found in TPA
Agra	1416.32	337260	26980.8	10792.32	8760	81.17	164.25	0.30%	32.37696
Ahmedabad	515.79	1346485	Landfill Not covered						
Bengaluru	12683.95	2007500	Landfill Not covered						
Bhubaneswar	430.65	189800	Landfill Not covered						
Chandigarh	576.35	187245	127750	51100	410.62	0.8	164.25	0.10%	51.1
Chennai	861.67	2244750	912500	365000	9935.3	2.72	167.9	0.07%	255.5
Delhi	7181.13	4134720	216715.1	86686.04	8760	10.11	164.25	1.46%	1265.62
Dharamshala	154.53	6570	Landfill Not covered						
Faridabad	253.88	292000	Landfill Not covered						
Guwahati	2970.21	200750	Landfill Not covered						
Hyderabad	1932.5	3285000	Landfill Not covered						
Jammu	397.5	86870	36051.05	14420.42	1460	10.12	193.08	0.30%	43.26
Kanpur	1907.17	103295	29955.55	11982.22	1350.5	11.27	168.37	2.40%	287.57
Kochi	287.2	118990							
Kolkata	1749.36	1642500	241447.5	96579	171.55	0.18	171.55	0.17%	164.1843
Kurnool	445.52	120450	35773.65	14309.46	803	5.61	164.25	0.11%	15.74
Lucknow	2121.02	766500	222285	88914	8760	9.85	177.025	0.15%	133.371
Mumbai	4384.34	2190000	Landfill Not covered						
Mysore	3537.08	164250	Landfill Not covered						
Nagpur	555.42	529250	206407.5	82563	876	1.06	164.25	0.17%	140.36
Pune	1365.33	857750	Landfill Not covered						
Shimla	77.84	45625	25550	10220	1317.65	12.89	164.25	0.60%	61.32
Srinagar	320.48	219000	173375	69350	876	1.26	170.45	0.24%	166.44
Thiruvananthapuram	217.69	118625	Landfill Not covered						
TOTAL	46342.93		TOTAL						2616.84

TABLE 8 Summary of UBC Analysis

Total Recycling	Inactive recycling (Mixed)		Mixed	Active	Final Recycling	Landfill	Total Unaccounted
	Informal Dealers	Inactive collection at MRF/substation					
	17.16%	10.48%	27.65%	36.02%	63.66%	5.65%	30.69%

34.5 MT of daily waste from landfills in Gurugram's Ward 32.

Through its partnership with Bal Vikas Dhara, Tetra Pak supports autonomous waste pickers and cooperatives across 24 low-income areas in Delhi-NCR, enhancing access to welfare schemes and education.

SDGs addressed by Tetrapak

Recommendations

1. This report is evidence of the efforts and intervention made by Tetra Pak due to which recycling rate of UBCs across cities has been improving gradually year by year. Despite this, there is a strong need to promote circular economy pathways around UBCs. Circular Economy (CE) can be strengthened by incentivising collection of UBC's from end users.
2. For streamlining the UBCs in Circular economy, there should be innovative recycled product development out of used UBCs. Technology innovation is required for such product development.
3. It is essential to develop markets and create opportunities for products made from recycled UBCs. Strengthening the end-use ecosystem will incentivize collection efforts and contribute to a higher recycling rate for UBCs.
4. Active collection and fostering collaboration with recycling units can further improve the overall efficiency and scale of UBC recycling. Therefore, building a robust network of waste dealers is essential, as waste collectors are more likely to collect UBCs when they are assured of better economic returns.
5. About 27.65% of the generated UBCs are getting recycled inactively in the informal chain along with other mixed wastepaper categories, which demonstrates the high recycling potential of the used cartons.
6. Cities such as Lucknow, Kanpur and Bengaluru exhibit high recycling rates—both through formal and informal channels—well developed collection ecosystem. Notably, these cities have established dedicated UBC collection centres, which significantly support the recycling ecosystem. Replicating this model in other cities could potentially yield similar success.
7. The most critical factor in ensuring a consistent supply of UBCs is the final acceptance by end recyclers such as paper mills and recycling factories. Strengthening the capacity and reliability of paper mills is essential to establishing a sustainable market for UBCs among waste dealers. With the implementation of EPR this is expected to improve.
8. Additionally, raising consumer awareness, promoting source-level segregation by ULB's and investing in improved technological solutions and infrastructure are key to creating a viable and efficient recycling ecosystem.
9. To effectively track progress in the collection and recycling of UBCs, a comprehensive study and assessment should be conducted every three years. This will help evaluate improvements in both active and inactive recycling rates, enabling Tetra Pak to enhance operational efficiency. Such efforts will also align with the Government of India's broader sustainability and circular economy objectives.

10. Government-led market support through centralized procurement for recycled UBC products can act as a powerful catalyst to boost demand. Paper mills dealing with UBC have some key challenges of observation and recommendation as well:

» Mixed Material Complexity: Difficulty in recycling due to layered construction of paper, plastic, and aluminium.

» Inadequate Recycler Incentives: Current EPR credits do not fully reward recyclers for processing multi-material packaging.

11. Adjust EPR Credit Mechanism: If UBC's are collected in scale with well leverage of EPR further increase in viability and process of paper mills making a attractive feedstocks. Innovation in papermills to conduct: Innovation in UBC product paper mills including R&D for developing premium applications as well as creating demand for the products.

UBCs have a great scope for recovery and recycling into high-value end products. Continuous innovation in has resulted in new recycled UBC products that are manufactured with minimal wastage, contributing to a low-carbon circular economy that keeps valuable materials in use.

City Wise Detail Study

Agra

Agra, the most populous city in Uttar Pradesh, spans an area of 4,027 square kilometres. Located on the western bank of the Yamuna River, it lies approximately 200 kilometres from Delhi and 378 kilometres west of the state capital, Lucknow. Geographically, Agra falls at 27°12' N latitude and 78°12' E longitude.8 With a population of 4,418,797, the city generates approximately 750 metric tons of waste daily.9

A survey conducted in Agra among various stakeholders in the waste management sector revealed key insights into the collection and recycling of UBCs. Among 22 waste collectors surveyed, 41% reported collecting UBCs along with mixed paper, while the remaining 59% did not collect UBCs at all.

In the case of 14 small-scale scrap dealers, only 29% accepted UBCs, whereas 71% did not. From a total of 1,227 kg of baled material analysed, 2.075 kg of UBCs were found, resulting on an average UBC recycling rate of 0.17%, In contrast, 7 large-scale scrap dealers showed greater engagement, with 57% accepting UBCs and 43% not. Analysis of 700 kg of baled material from this group revealed 4.22 kg of UBCs, indicating a higher recycling rate of 0.60%.

Additionally, a landfill analysis was conducted at the Kuberpur Integrated Waste Management Facility in Agra, where three trucks representing residential, commercial, and institutional waste sources were sampled, each with 150 kg of waste. The analysis found a total of 17.75 kg of paper waste and 1.345 kg of UBCs, indicating an average UBC presence of 0.90%.

TABLE 9 Bale analysis of small-scale dealers conducted in Agra

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale	110	0.045	0.041 %
Scrap Dealers	100	0.15	0.150 %
	50	0.065	0.130 %
	100	0.65	0.650 %
	100	0.035	0.035 %
	100	0.22	0.220 %
	110	0	0.000 %
	90	0.01	0.011 %
	100	0	0.000 %
	100	0.345	0.345 %
	97	0	0.237 %
	100	0.245	0.245 %
	50	0.01	0.020 %
	20	0.07	0.350 %
Total	1227	2.075	0.17 %

8 https://agrasmartcity.in/pdf/wc7509216%20MSW.pdf
9 https://www.ijset.in/wp-content/uploads/IJSET_V9_issue3_304.pdf

TABLE 10 Bale analysis of Large-scale dealers conducted in Agra

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	88	1.61	1.83%
	100	0.005	0.01%
	100	0	0.00%
	100	2.22	2.22%
	102	0.01	0.01%
	100	0.12	0.12%
	110	0.255	0.23%
Total	**700**	**4.22**	**0.60%**

TABLE 11 Landfill analysis conducted in Agra

Type	Weight of Sample analysed	Paper Waste (In Kg)	UBC (In Kg)	Percentage of UBC
Residential	150	7.175	0.775	0.52%
Commercial	150	5.32	0.22	0.15%
Institutional	150	5.25	0.35	0.23%
Total	450	17.745	1.345	0.90%

FIGURE 7 Analysis of UBC during survey, Agra

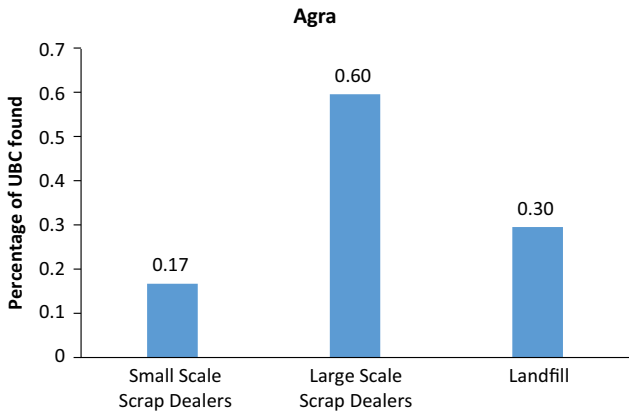

FIGURE 8 Detail graph of UBC at different dealers in Agra

Ahmedabad

Ahmedabad city situated in Gujarat is the 7th largest metropolis in India, has a population of 55,77,940 and spans 466 Sq. km5. The city generates about 4100 metric tons of solid waste daily, including 1000 tons of construction and demolition (C&D) waste.[10]

Among the 22 waste collectors surveyed, all reported collecting UBCs along with mixed paper. Many of them mentioned that the collection and segregation of UBCs is a labour-intensive process. To make this process more effective and sustainable, they emphasized the need for a higher price incentive.

In the case of 14 small-scale scrap dealers, only 29% accepted UBCs, whereas 71% did not from a total 693.25 Kg of baled material analysed, 0.074 kg of UBCs were found, resulting in an average UBC recycling rate of 0.011%. Among the surveyed 7 large-scale scrap dealers showed greater engagement, with 86% accepting UBCs and 14% not. Analysis of 739.5 kg of baled material from this group revealed 2.163 kg of UBCs, indicating a recycling rate of 0.29%.

An analysis was conducted at the Khadiya Refuse Transfer Station (RTS) in Ahmedabad, by unloading 150 kg of samples from each of three trucks carrying waste from Residential, Commercial and Institutional areas and analysing them for UBCs. The analysis found a total of 88.7 kg of paper waste and 0.48 kg of UBCs, indicating an average UBC presence of 0.106%.

TABLE 12 Bale analysis of Small-scale dealers conducted in Ahmedabad

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	32.35	0	0
	10	0	0
	24	0	0
	37	0	0
	11.75	0.03	0.254 %
	19.4	0.019	0.097 %
	15.75	0.025	0.158 %
	74.8	0	0
	54.5	0	0
	132.45	0	0
	100.5	0	0
	52.9	0	0
	48.5	0	0
	79.35	0	0
Total	693.25	0.074	0.011 %

TABLE 13 Bale analysis of Large-scale dealers conducted in Ahmedabad

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	38	0.018	0.047%
	150	0.030	0.003%
	150	0.417	0.278%
	150	0.9	0.600%
	24.5	0	0
	158	0.198	0.125%
	69	0.6	0.870%
Total	739.5	2.163	**0.292**%

[10] https://ahmedabadcity.gov.in/Images/_SWM%20Dept_SWM%20BREIF%20NOTE%20IN%20ENGLISH.pdf

TABLE 14 MRF analysis conducted in Khadiya, Ahmedabad

Type	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	% UBC in Sample
Residential	150	36.6	0.167	0.11%
Commercial	150	41.6	0.281	0.19%
Institutional	150	10.5	0.032	0.02%
Total	450	88.7	0.48	0.106%

FIGURE 9 Detail Analysis of UBC during survey, Ahmedabad

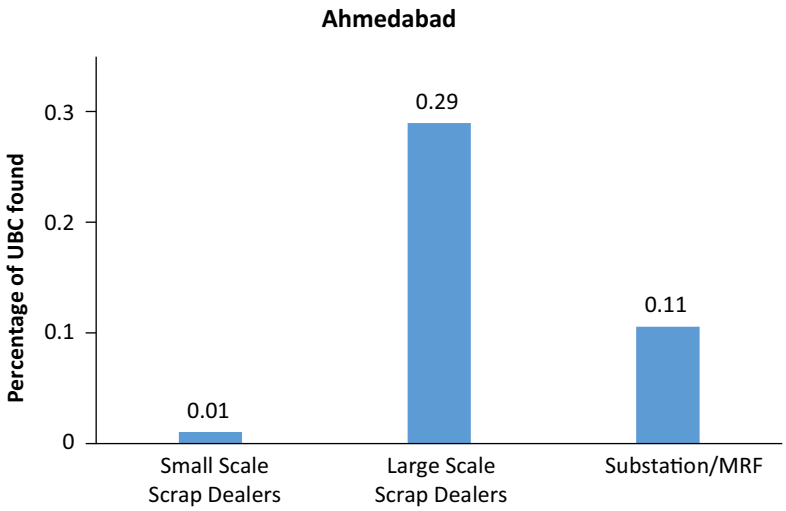

FIGURE 10 Details of graph representing UBC at different dealers in Ahmedabad

Bengaluru

Bengaluru, the capital of Karnataka, is a sprawling metropolis often referred to as India's "Silicon Valley" due to its prominence in the IT industry. Under the administration of the Bruhat Bengaluru Mahanagara Palike (BBMP), spans an area of 713 sq. km and is home to a total population of approximately 1.3 crore (13 million), encompassing over 29 lakh (2.9 million) households distributed across 8 zones, 27 divisions, and 198 wards. The per capita waste generation from regular households is measured at 309g, while households in slum areas generate slightly less at 300g per person.11

Among 22 waste collectors surveyed in Bengaluru, 59% reported collecting UBCs along with mixed paper, while the remaining 41% did not collect UBCs at all.

In the case of 14 small-scale scrap dealers, 79% accepted UBCs, whereas 21% did not. From a total of 1,272 kg of baled material analysed, 137.78 kg of UBCs were found, resulting in an average UBC recycling rate of 10.83%. Among 7 large-scale scrap dealers showed greater engagement, with 86% accepting UBCs and 14% not. Analysis of 450 kg of baled material from this group revealed 26.9 kg of UBCs, indicating a higher recycling rate of 5.98%.

Additionally, an analysis was conducted at the Peenya MRF and Malleshwaram MRF in Bengaluru, where three trucks representing residential, commercial, and institutional waste sources were sampled. At Peenya MRF, a sample size of 335 kg was analysed, revealing a total of 61.35 kg of mixed paper waste and 11.95 kg of UBCs, indicating an average UBC presence of 3.57%. Similarly, the analysis at Malleshwaram MRF, with a sample size of 281.45 kg, reported 99.25 kg of mixed paper waste and 0.098 kg of UBCs, indicating an average UBC percentage of 0.035%.

[11] https://site.bbmp.gov.in/departmentwebsites/swm/

TABLE 15 Bale analysis of small-scale dealers conducted in Bengaluru

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	25.85	0.025	0.10 %
	58.75	0.06	0.10 %
	32	0.041	0.13 %
	38	0.062	0.16 %
	81.05	0.114	0.14 %
	84	1.8	2.14 %
	20.6	0	0.00 %
	300	88.5	29.50 %
	300	42.5	14.17 %
	59.5	4.5	7.56 %
	54	0.11	0.20 %
	42	0	0.00 %
	35	0.008	0.02 %
	50	0	0.00 %
	91.25	0	0.00 %
Total	1272	9.185	10.83 %

TABLE 16 Bale analysis of Large-scale dealers conducted in Bengaluru

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	92.35	0	0
	37.5	21.9	58.4
	150	1.5	1
	52.3	2.4	4.59
	57.25	0	0
	10.2	0.45	4.41
	50.6	0.65	1.28
Total	450.2	26.90	5.98

TABLE 17 MRF analysis conducted at Peenya MRF, Bengaluru

Truck	Total Truck Load (Kgs)	Sample Size (Kgs)	Paper Waste (In Kg)	UBC (In Kg)	Percentage of UBC
Residential	1000	130.00	40.95	2.05	1.58
Commercial	1000	105.00	12.6	5.3	5.05
Institutional	1000	100.00	7.8	4.6	4.60
Total	3000	335.00	61.35	11.95	3.57

TABLE 18 MRF analysis conducted at Malleshwaram MRF, Bengaluru

Truck	Total Truck Load (Kgs)	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	% UBC in Sample
Residential	1000	115.95	24.15	0	0
Commercial	1000	92.3	34	0.06	0.065
Institutional	1000	73.2	41.1	0.038	0.052
Total	3000	281.45	99.25	0.098	0.035

FIGURE 11 Detail Analysis of large-scale dealer in Bengaluru

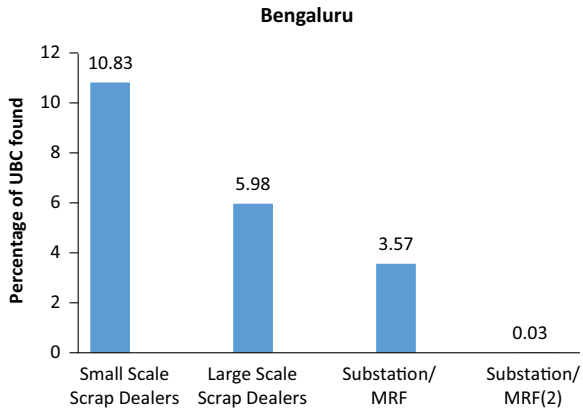

FIGURE 12 Details of graph representing UBC at different dealers in Bengaluru

Bhubaneswar

Bhubaneswar is the capital of Odisha. It is the state's largest city and the centre for economic and religious activities within the region. This city occupies an area of 186 square kilometres and a population, according to census 2011, of 843,402.[12]

In Bhubaneswar among the 22 waste collectors surveyed, 23% reported collecting UBCs, while the remaining did not collect UBCs at all.

In the case of 14 small-scale scrap dealers across residential, commercial, and institutional areas of the city, 36% accepted UBCs, whereas 64% did not. From a total of 943.01 kg of baled material analysed, 30.29 kg of UBCs were found, resulting in an average UBC recycling rate of 3.21%. Among 7 large-scale scrap dealers none of them were actively purchasing UBC, while some of them acknowledged that UBCs occasionally arrive mixed with other paper waste. Analysis of 1268.43 kg of baled material from this group revealed 25.7 kg of UBCs, indicating a recycling rate of 2.026%.

Additionally, an analysis was conducted at the Jharapada landfill in Bhubaneswar, where three trucks representing residential, commercial, and institutional waste sources were sampled. A sample size of 511 kg was analysed, revealing a total of 172.7 kg of mixed paper waste and 15.24 kg of UBCs, indicating an average UBC presence of 3%.

TABLE 19 Bale analysis of small-scale dealers conducted in Bhubaneswar

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	47	0	0
	60	2.4	4.00%
	38.61	1.5	3.89%
	55	0.5	0.91%
	76	3	3.95%
	82.6	1.1	1.33%
	67.1	3	4.47%
	80	5.1	6.38%
	69	4.29	6.22%
	52.3	3.7	7.07%
	125	4.7	3.76%
	83.78	1	1.19%
	66.62	0	0
	40	0	0
Total	943.01	30.29	**3.21**%

TABLE 20 Bale analysis of Large-scale dealers conducted in Bhubaneswar

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	185.8	4.2	2.260%
	174	3.2	0.018%
	138	1.7	0.012%
	125	2.7	0.022%
	500	7.8	0.016%
	69.1	3.4	0.049%
	76.53	2.7	0.035%
Total	1268.43	25.7	2.026%

[12] https://www.bmc.gov.in/about/profile

TABLE 21 Substation analysis conducted in Bhubaneswar

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage UBC in Sample
Residential	148	62.70	3.95	81.35
Commercial	195	70.00	7.29	117.71
Residential	168	40	4.00	124
Total	511	172.7	15.24	3.0%

FIGURE 13 UBC analyses at MRF and sub-stations during survey, Bhubaneswar

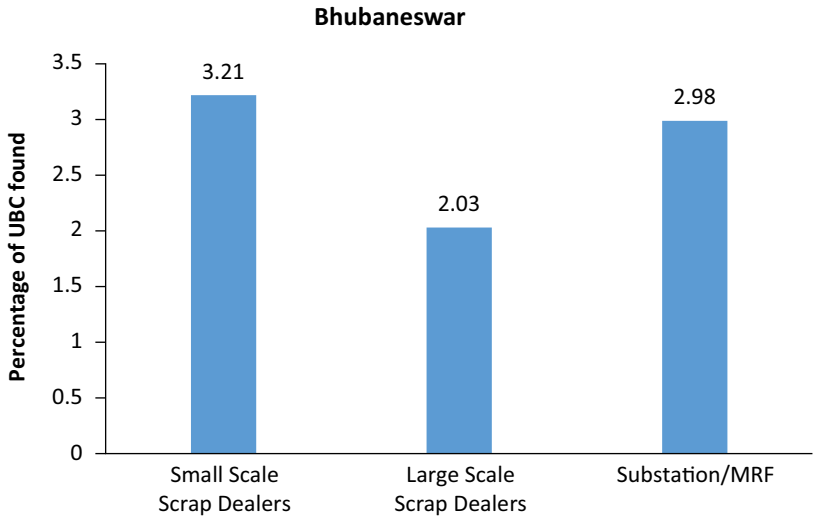

FIGURE 14 Details of graph representing UBC at different dealers in Bhubaneswar

Chandigarh

Chandigarh, located in northern India, is a Union Territory that serves as the capital of both Punjab and Haryana. This city occupies an area of 114 square kilometres and has a of population in 2011 was 1,055,450.[13]

In Chandigarh, the survey revealed that only 36% of waste collectors were collecting UBCs, while the remaining were not collecting UBCs at all. Survey indicated the need for strengthening the UBC value chain. Also, survey conducted among small-scale and large-scale scrap dealers bale analysis of 1192.5 Kg and 893 Kg respectively revealed that currently, no UBC recycling is taking place in Chandigarh.

TABLE 22 Bale analysis of small-scale dealers conducted in Chandigarh

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	48	0	0
	50	0	0
	63	0	0
	35	0	0
	61	0	0
	38	0	0
	120	0	0
	115	0	0
	121	0	0
	130	0	0
	29	0	0
	110	0	0
	112	0	0
	160.5	0	0
Total	**1192.5**	**0**	0

[13] https://chandigarh.gov.in/

Additionally, Landfill analysis was conducted at Daddu Majra landfill. Three trucks carrying municipal solid waste from residential, commercial, and institutional areas were identified for this purpose. Each truck was unloaded separately, and 150 Kg of waste was manually sorted. The analysis indicated an average UBC recycling rate of 0.11%.

TABLE 23 Bale analysis of Large-scale dealers conducted in Bhubaneswar

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	180	0	0
	120	0	0
	110	0	0
	105	0	0
	118	0	0
	125	0	0
	135	0	0
Total	**893**	**0**	0

TABLE 24 Landfill analysis conducted in Chandigarh

Type	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage UBC in Sample
Residential	150	0	0.23	0.153
Commercial	150	0	0.1	0.067
Institutional	150	0	0.156	0.104
Total	450	0	0.486	0.108

FIGURE 15 Landfill Analysis at Achan landfill, Chandigarh

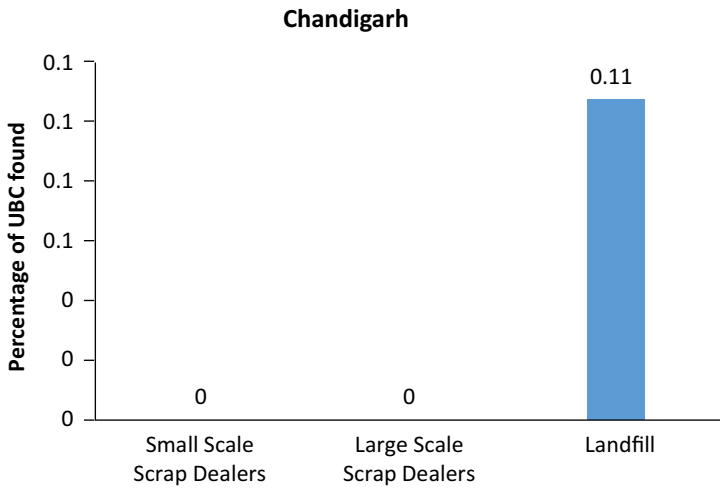

FIGURE 16 Details of graph representing UBC at different dealers at Chandigarh

Chennai

Chennai also known as Madras is the capital city of the Indian state of Tamil Nadu. According to the 2011 census, the city had 4.68 million residents making it the sixth most populous city in India; the urban agglomeration, which comprises the city and its suburbs, was home to approximately 8.9 million, making it the fourth most populous metropolitan area in the country and 31st largest urban area in the world. The Chennai Metropolitan Development Authority (CMDA) is the nodal agency responsible for planning and development of Chennai Metropolitan Area, which is spread over an area of 1,189 sq.km.[14]

In Chennai among the 22 waste collectors surveyed, 36% reported collecting UBCs, while the remaining 64% did not collect UBCs at all.

In the case of 14 small-scale scrap dealers surveyed across residential, commercial, and institutional areas of the city, all of them were accepting UBCs. From a total of 2179 kg of baled material analysed, 3.2 kg of UBCs were found, resulting in an average UBC recycling rate of 0.15%, Among 7 large-scale scrap dealers none of them were actively purchasing UBC. An analysis of 3330 kg of baled material from this group revealed 14.39 kg of UBCs, indicating a recycling rate of 0.43%.

Additionally, an analysis was conducted at the Kodungaiyur landfill in Chennai. Three trucks representing residential, commercial, and institutional waste sources sampled. A sample size of 27220 kg was analysed, revealing a total of 460 kg of mixed paper waste and 18.9 kg of UBCs, indicating a UBC percentage of 4.04%.

TABLE 25 Bale analysis of small-scale dealers conducted in Chennai

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	175	0.33	0.19
	145	0.1195	0.08
	155	0.002	0.00
	149	0	0.00
	150	0	0.00
	145	0.48	0.33
	195	0.034	0.02
	160	0.0688	0.04
	145	0	0.00
	175	0	0.00
	200	0	0.00
	120	0.2583	0.22
	120	0.0021	0.00
	145	1.9	1.31
Total	2179	3.1947	0.15

TABLE 26 Bale analysis of Large-scale dealers conducted in Chennai

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	165	0.146	0.09
	190	3.78	1.99
	175	2.5	1.43
	400	3.68	0.92
	1000	1.5	0.15
	600	0.5	0.08
	800	2.284	0.29
Total	3330	14.39	0.43

[14] https://cdn.s3waas.gov.in/s313f3cf8c531952d72e5847c4183e6910/uploads/2018/06/2018062956.pdf

TABLE 27 Landfill analysis conducted in Chennai

Type	Total Truck Load (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage UBC in Sample
Residential	8390	150	3.83	2.55
Commercial	12590	165	9.28	5.62
Institutional	6240	145	5.50	3.79
Total	27220	460	18.91	11.96

FIGURE 17 Analysis of UBC during survey, Chennai

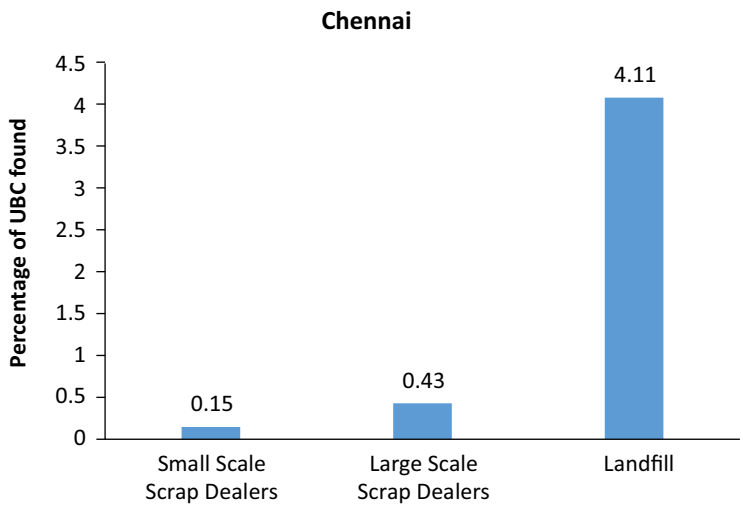

FIGURE 18 Detail graph of UBC at different dealers in Chennai

Delhi

New Delhi is the national capital of India and part of the National Capital Territory of Delhi. This Union Territory covers an area of 1,483 square kilometres, making it the largest city in terms of area in the country, with a population of 16,753,235.[15]

In Delhi, the survey among 22 waste collectors revealed that 82% of them collect UBCs while rest 18% were not collecting.

Among 14 small-scale scrap dealers surveyed across residential, commercial, and institutional areas of the city, 86% were accepting UBC rest 14% were not accepting. From a total of 716.25 kg of baled material analysed, 6.9 kg of UBCs were found, resulting in an average UBC recycling rate of 0.97%. Among 7 large-scale scrap dealers none of them were actively purchasing UBC. An analysis of 430.25 kg of baled material from this group revealed 4.25 kg of UBCs, indicating a recycling rate of 0.99%.

Additionally, an analysis was conducted at the Ghazipur Landfill in Delhi. Three trucks representing residential, commercial, and institutional waste sources sampled. A sample size of 450 Kg was analysed, revealing a total of 36.5 kg of mixed paper waste and 6.55 Kg of UBCs, indicating an UBC percentage of 1.46%.

TABLE 28 Bale analysis of small-scale dealers conducted in Delhi

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	27	0.41	1.52
	34.5	0	0.00
	42.5	0	0.00
	35	0	0.00
	53.6	0.495	0.92
	66.7	1.08	1.62
	80	0.565	0.71
	61	0.445	0.73
	81	0	0.00
	51.4	0.25	0.49
	51	1.57	3.06
	60.9	0.56	0.92
	44.75	1.54	3.44
	26.65	0.026	0.10
Total	716.25	6.941	0.97

TABLE 29 Bale analysis of Large-scale dealers conducted in Delhi

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	73.3	0.7	0.95
	49.7	1	2.01
	44.8	0.525	1.17
	62.4	0.56	0.90
	53.4	0.215	0.40
	75.9	1.03	1.36
	70.75	0.22	0.31
Total	430.25	4.25	0.99

[15] https://delhi.gov.in/page/about-us

TABLE 30 Landfill analysis conducted in Gazipur- New Delhi

Type	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage UBC in Sample
Residential	150	12	2.3	1.53%
Commercial	150	17.5	4.25	2.83%
Institutional	150	7	0	0.00%
Total	450	36.5	6.55	1.46%

FIGURE 19 Analysis of UBC during survey, Delhi

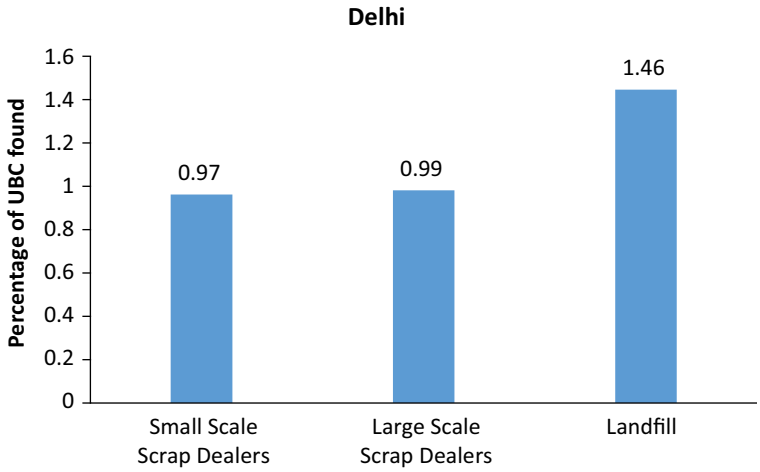

FIGURE 20 Detail graph of UBC at different dealers in Delhi

Dharamshala

Dharamshala is a town located in the Kangra district of Himachal Pradesh, approximately 18 kilometres uphill from Kangra city. The total area of Dharamshala Municipal Corporation is 27.6 Sq. Km, and the total population of the city is 53543.[15]

The survey revealed among 22 respondents revealed that 86% of waste collectors were collecting UBCs. A key challenge faced by the city being fluctuation in waste and UBCs generation with seasons, as Dharamshala is a popular tourist destination

In the case of 14 small-scale scrap dealers surveyed across residential, commercial, and institutional areas of the city, no one collects UBCs at their shop. From a total of 351 kg of baled material analysed, 0.013 kg of UBCs were found, resulting in an average UBC recycling rate of 0.004%. Among 7 large-scale scrap dealers 29% of the respondents were collecting UBCs, while the rest of 71% were not dealing with UBC. An analysis of 286.6 kg of baled material from this group revealed 5.66 kg of UBCs, indicating a recycling rate of 1.98%.

Additionally, a MRF analysis was conducted at the Dharamshala MRF. Three trucks representing residential, commercial, and institutional waste sources sampled. A sample size of 450 kg was analysed, revealing a total of 37.1 kg of mixed paper waste and 0.968 kg of UBCs, indicating an average UBC presence of 0.215%.

TABLE 31 Bale analysis of small-scale dealers conducted in Dharamshala

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	29.6	0	0.000%
	14	0	0.000%
	20	0.013	0.065%
	10	0	0.000%
	17	0	0.000%
	35	0	0.000%
	20	0	0.000%
	40	0	0.000%
	18	0	0.000%
	21	0	0.000%
	25	0	0.000%
	18.3	0	0.000%
	51	0	0.000%
	32	0	0.000%
Total	350.9	0.013	0.004%

TABLE 32 Bale analysis of Large-scale dealers conducted in Dharamshala

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	17	0	0.00%
	36	0	0.00%
	45	0.0102	0.02%
	16	0	0.00%
	53.6	5.65	10.54%
	19	0	0.00%
	100	0	0.00%
Total	286.6	5.6602	1.98%

[15] https://edharamshala.in/Content/AboutUs

TABLE 33 MRF analysis conducted in Dharamshala

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage UBC in Sample
Residential	150	13.3	0.394	0.26%
Commercial	150	8.8	0.1741	0.12%
Institutional	150	15	0.4	0.27%
Total	450	37.1	0.9681	0.215%

FIGURE 21 Analysis of UBC during survey, Dharamshala

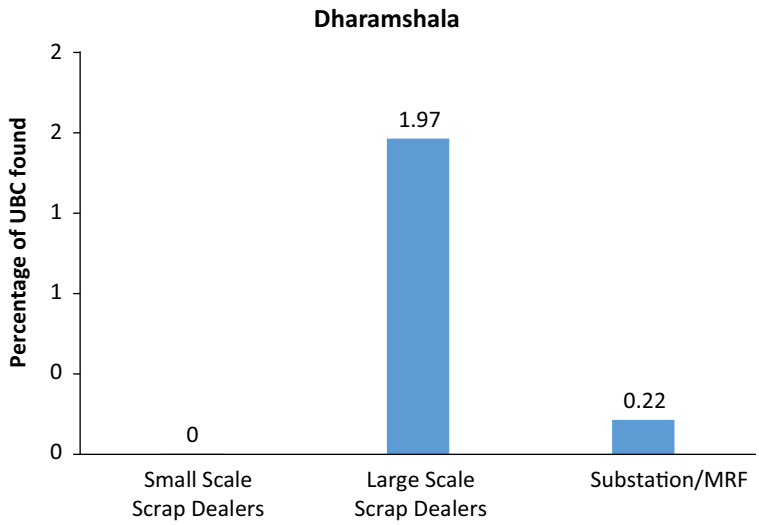

FIGURE 22 Detail graph of UBC at different dealers in Dharamshala

Faridabad

Faridabad is a major industrial city located in the southeastern part of Haryana State spanning approximately 741 Sq.km. Bordered by Delhi to the north, Gurugram district to the west, and Uttar Pradesh to the east, Faridabad forms part of the National Capital Region (NCR).

The survey revealed among 22 respondents revealed that all the waste collectors were engaged in UBC collection.

In the case of 14 small-scale scrap dealers surveyed across residential, commercial, and institutional areas of Faridabad, 93% no one collects UBCs at their shop. From a total of 770 kg of baled material analysed, 1.98 kg of UBCs were found, resulting in an average UBC recycling rate of 0.26%. Among 7 large-scale scrap dealers all the respondents were collecting UBCs. An analysis of 261 kg of baled material from this group found out 2.57 kg of UBCs, indicating a recycling rate of 0.99%.

Additionally, a sub-station analysis was conducted at Sector 37 Transfer Station. The activity involved unloading waste from waste collection vehicles and analysis of 150 kgs of samples from each of the 3 trucks. A sample size of 450 kg was analysed, revealing a total of 9 kg of mixed paper waste and 1.057 kg of UBCs, indicating an average UBC presence of 0.013%.

TABLE 34 Bale analysis of small-scale dealers conducted in Faridabad

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	100	0	0.00
	60	0.081	0.14
	70	0.263	0.38
	50	0	0.00
	40	0.25	0.63
	50	0.34	0.68
	50	0.172	0.34
	30	0.05	0.17
	50	0.1	0.20
	50	0.48	0.96
	20	0	0.00
	100	0.008	0.01
	50	0	0.00
	50	0.24	0.48
Total	770	1.984	0.26

TABLE 35 Bale analysis of Large-scale dealers conducted in Faridabad

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	15	0	0.00
	50	1.65	3.30
	50	0.53	1.06
	26	0	0.00
	40	0.045	0.11
	50	0.349	0.70
	30	0	0.00
Total	261	2.574	0.99

TABLE 36 Substation analysis conducted in Faridabad

Truck	Sample Size (Kgs)	Mixed Paper Waste in (Kgs)	UBC Found (Kgs)	Percentage of UBC
Residential	150	5	0.659	0.44
Commercial	150	1	0.168	0.11
Institutional	150	3	0.23	0.15
Total	450	9	1.057	0.235

FIGURE 23 Analysis of UBC during survey, Faridabad

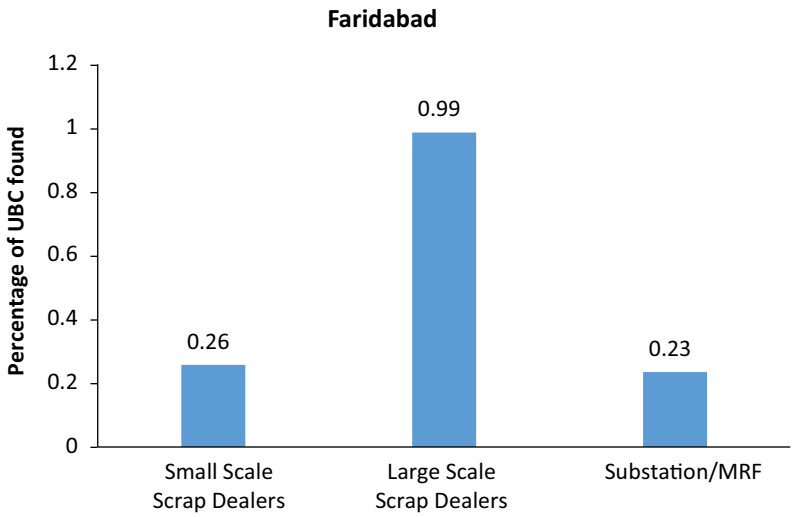

FIGURE 24 Detail graph of UBC at different dealers in Faridabad

Guwahati

Guwahati, the largest city in Assam with a population of about 1.2 million, is managed by the Guwahati Municipal Corporation, which oversees 60 wards for solid waste management. In 2023–2024, the city generated around 550–575 metric tons of municipal solid waste daily, with full door-to-door collection coverage and about 45% of households practicing source segregation. Waste is processed at key facilities including a 5 TPD biomethanation plant, a 150 TPD compost/RDF plant, smaller organic waste converters, and several material recovery facilities, while legacy waste biomining of about 3.61 lakhs MT of legacy waste has been completed in the Boragaon dump site in the 1st phase during Jan 2021-April 2022.

The survey conducted among the 22 waste collectors revealed that 73% of them are collecting UBCs out of which 44% waste collectors were collecting UBC along with the mixed paper and 56% collected separately.

The survey among 14 small-scale scrap dealers, 59% reported that thy are collecting UBC while 31% were not dealing with UBC at their shops. Out of the 2257 Kg of bale analysed 26.6 Kg of UBC was found, indicating UBC percentage at 1.18%. Among the 7 large-scale scrap dealers surveyed, about 50% of these dealers collected UBC either separately or mixed with other paper. From the bale of 1815 Kg of paper 25.1 Kg was found to be, indicating UBC percentage found at 1.38%.

Two sub-station analysis were conducted at Chabipur Sub-station, covering a total of 2150 Kg of sample size, resulted 704 Kg of Paper waste and 5.5 Kg of UBC indicating an UBC present of 0.3% and at Kamakhya, with a sample size of 747 kg. The analysis revealed 470 kg of mixed paper waste and 4.32 kg of UBCs, indicating a UBC presence of 0.6%.

TABLE 37 Bale analysis of small-scale dealers conducted in Guwahati

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	145	0.75	0.52
	125	1.25	1
	40	2.35	5.88
	140	1.25	0.89
	170	2.35	1.38
	225	1.25	0.56
	300	7.5	2.5
	150	0.925	0.62
	165	0.72	0.44
	142	1.7	1.2
	195	2.75	1.41
	110	1.82	1.65
	125	1.15	0.92
	225	0.85	0.38
Total	2257	26.615	1.18

TABLE 38 Bale analysis of Large-scale dealers conducted in Guwahati

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	170	5.7	3.35%
	145	1.9	1.31%
	150	0	0.00%
	125	0	0.00%
	225	2.95	1.31%
	200	6.65	3.33%
	800	7.9	0.99%
Total	1815	25.1	1.38%

TABLE 39 Substation analysis conducted in Guwahati

Truck	Total Truck Load (Kgs)	Mixed Paper Waste (Kgs)	UBC Found (Kgs)	Percentage of UBC
Residential	650	209.00	3.95	0.608%
Commercial	750	265.00	1.00	0.133%
Institutional	750	230	0.54	0.072%
Total	2150	704	5.486	0.3%

TABLE 40 MRF analysis conducted in Guwahati

Truck	Total Truck Load (Kgs)	Mixed Paper Waste (Kgs)	UBC Found (Kgs)	Percentage of UBC
Residential	400	398.04	1.06	0.265%
Commercial	135	70	3.26	2.415%
Institutional	212	0	0	0.000%
Total	747	468.04	4.32	0.6%

FIGURE 25 Analysis of UBC during survey, Guwahati

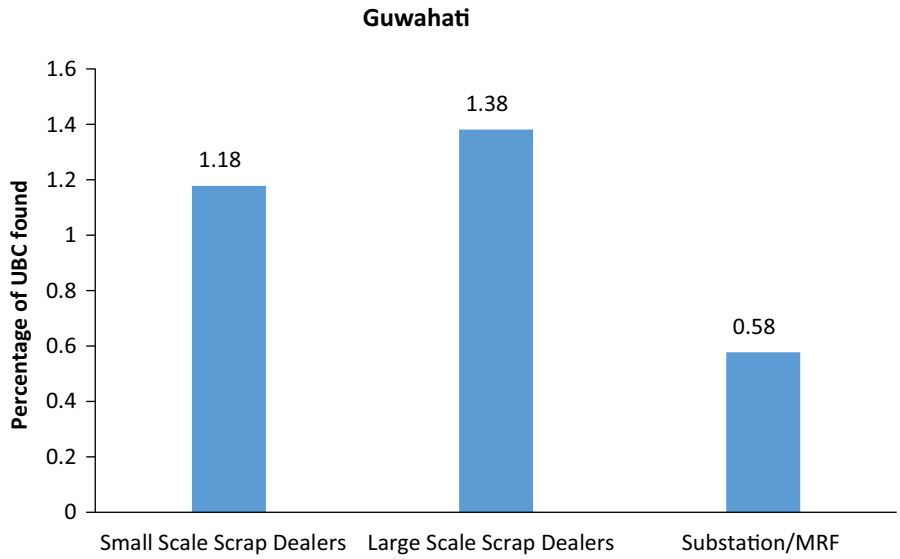

FIGURE 26 Detail graph of UBC at different dealers in Guwahati

Hyderabad

Hyderabad, the capital and largest city in the State of Telangana, is in south-central India on the Deccan Plateau. Greater Hyderabad Municipal Corporation covers an area of 650 sq.km. with a population of 6.7 million.[17]

The survey conducted among the 22 waste collectors revealed that 86% of them are collecting UBCs while rest 14% were not collecting them.

Among 14 small-scale scrap dealers surveyed,43% reported that they are collecting UBC while 57% were not dealing with UBC. Out of the 430 Kg of bale analysed 1.506 Kg of UBC was found, indicating UBC percentage at 0.35%. Among the 7 large-scale scrap dealers surveyed, about 71% of these dealers collected UBC either separately or mixed with other paper. From the bale of 698 Kg of paper 9.45 Kg was found to be UBC, indicating UBC percentage found at 1.35%.

Sub-station analysis conducted at Yusufguda Transfer Station, covering a total of 450 Kg of sample size, resulted 17.9 Kg of Paper waste and 0.18 Kg of UBC indicating an UBC present of 0.04%.

TABLE 41 Bale analysis of small-scale dealers conducted in Hyderabad

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	50	0.373	0.74%
	70	1.046	1.48%
	48	0.0	0
	20	0.0	0
	0	0.0	0
	30	0.007	0.023%
	10	0.0	0
	17	0.01	0.05%
	21	0.07	0.33%
	34	0.0	0
	12	0.0	0
	27	0.0	0
	31	0.0	0
	40	0.0	0
Total	430	1.506	0.350%

TABLE 42 Bale analysis of Large-scale dealers conducted in Hyderabad

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	110	0.45	0.40%
	40	0	0
	110	0.5	0.45%
	100	5	5.0%
	108	2	1.85%
	110	1	0.90%
	120	0.5	0.41%
Total	698	9.45	1.354%

[17] https://csr.ghmc.gov.in/Home/AboutGhmc

TABLE 43 Substation analysis conducted in Hyderabad

Type	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	150	3.4	0.011	0.01%
Commercial	150	10	0.1475	0.10%
Institutional	150	4.5	0.023	0.02%
Total	450	17.9	0.1815	0.04%

FIGURE 27 Analysis of UBC during survey, Hyderabad

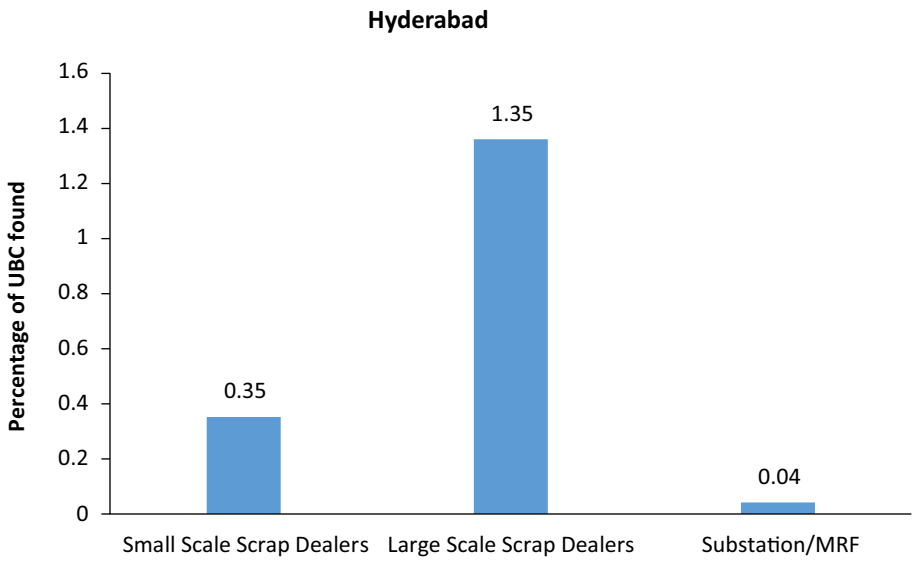

FIGURE 28 Detail graph of UBC at different dealers in Hyderabad

Jammu

Jammu, the winter capital of the Union Territory of Jammu and Kashmir, is characterized by a blend of permanent residents and a significant floating population. As of 2023, the city's population is estimated at 13,76,478.

The survey conducted among 14 waste collectors revealed that 14% of them are collecting UBCs with mixed paper waste 86% were not engaged in collecting UBCs.

TABLE 44 Bale analysis of small-scale dealers conducted in Jammu

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small scale scrap dealers	48.85	0.072	0.15
	21.8	0	0.00
	14	0	0.00
	46.35	0	0.00
	51.3	0	0.00
	35.9	0.558	1.55
	48.6	0	0.00
	29.15	0.3173	1.09
	60.1	0.0834	0.14
	48	0	0.00
	41	0.075	0.18
	15.7	0.04	0.25
	43.1	0	0.00
	60.16	0	0.00
Total	563.57	1.1457	0.20

Among 14 small-scale scrap dealers surveyed,7% reported that they are collecting UBC while rest were not dealing with UBC. Out of the 563.5 Kg of bale analysed 1.15 Kg of UBC was found, indicating UBC percentage at 0.20%. Among the 7 large-scale scrap dealers surveyed, only 14% were collecting UBC either separately or mixed with other paper. From the bale of 333.45 Kg of paper 5 Kg was found to be UBC, indicating UBC percentage found at 1. 5%.

Landfill analysis conducted at Kot Bhalwal landfill, covering a total of 529 Kg of sample size, resulted 3.34 Kg of Paper waste and 1.65 Kg of UBC indicating an UBC present of 0.31%.

TABLE 45 Bale analysis of Large-scale dealers conducted in Jammu

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large-scale scrap dealers	44.55	0	0.00
	45	0.9912	2.20
	33.5	0	0.00
	75	0	0.00
	25	0	0.00
	65.8	3.66	5.56
	44.6	0.351	0.79
Total	333.45	5.0022	1.50

TABLE 46 Landfill analysis conducted in Jammu

Truck	Sample Size (Kgs)	Mixed Paper Waste (Kgs)	UBC Found (Kgs)	Percentage UBC in Sample
Residential	177	1.388	0.26	0.15
Commercial	165	Compacted waste	0.96	0.58
Institutional	187	1.949	0.44	0.23
Total	**529**	**3.337**	**1.6591**	**0.31**

FIGURE 29 Analysis of UBC during survey, Jammu

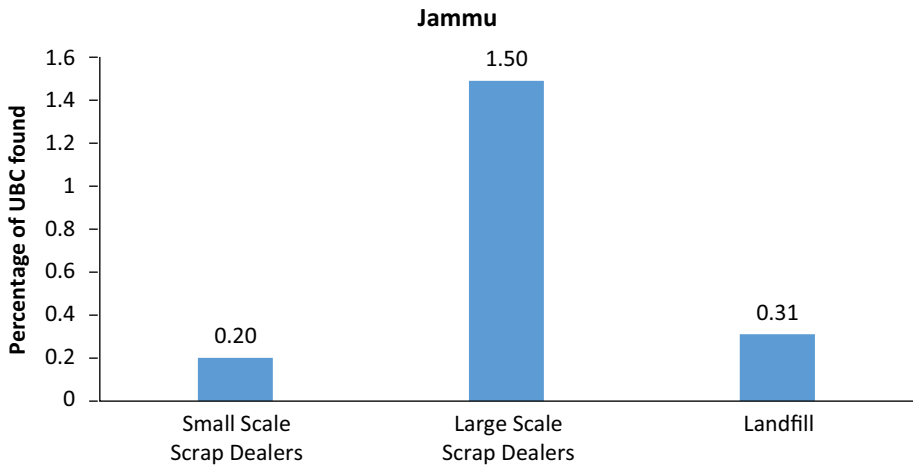

FIGURE 30 Detail graph of UBC at different dealers in Jammu

Kanpur

Kanpur, one of the largest industrial cities in Uttar Pradesh, spans over 403 square kilometers with a population of approximately 31 lakh (as per 2011 Census) that is currently estimated to have grown to over 35 lakhs. The city is administratively managed by the Kanpur Municipal Corporation (KMC), which oversees municipal solid waste (MSW) collection, transport, and disposal.

Across 22 surveyed waste collectors only 18% were collecting UBC. Among 14 small-scale scrap dealers surveyed, only one dealer (7%) reported that they are collecting UBC while rest were not dealing with UBC. Out of the 1417 Kg of bale analysed 49.23 Kg of UBC was found, indicating UBC percentage at 3.47%.

TABLE 47 Bale analysis of small-scale dealers conducted in Kanpur

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small scale scrap dealers	150	8	5.33
	125	4.42	3.54
	95	0.16	0.17
	85	0.27	0.32
	40	0.168	0.42
	60	1.04	1.73
	50	0	0.00
	50	0	0.00
	75	0	0.00
	250	0	0.00
	100	0	0.00
	112	0	0.00
	150	0.174	0.12
	75	35	46.67
Total	1417	49.232	3.47

Among the 7 large-scale scrap dealers surveyed, 43% was collecting UBCs (UBC) either separately or mixed with other paper. From the bale of 1238 Kg of paper 9.5 Kg was found to be UBC, indicating UBC percentage found at 0.76%.

Landfill analysis conducted at Panki landfill, covering a total of 529 Kg of sample size, resulted 3.33 Kg of Mixed paper wate and 1.5 Kg of UBC indicating an UBC present of 0.97%.

TABLE 48 Bale analysis of Large-scale dealers conducted in Kanpur

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large-scale scrap dealers	90	0.85	0.94
	200	5	2.50
	220	0.645	0.29
	150	0.116	0.08
	125	2	1.60
	3	0.881	29.37
	450	0	0.00
Total	1238	9.492	0.77

TABLE 49 Landfill analysis conducted in Panki, Kanpur

Truck	Sample Size (Kgs)	Mixed Paper Waste (Kgs)	UBC Found (Kgs)	% UBC in Sample
Residential	153.70	3.63	0.59	0.38
Commercial	160.00	3.835	0.5088	0.32
Institutional	147.60	3.565	0.406	0.28
Total	461.30	11.03	1.5048	0.3

FIGURE 31 Analysis of UBC during survey, Kanpur

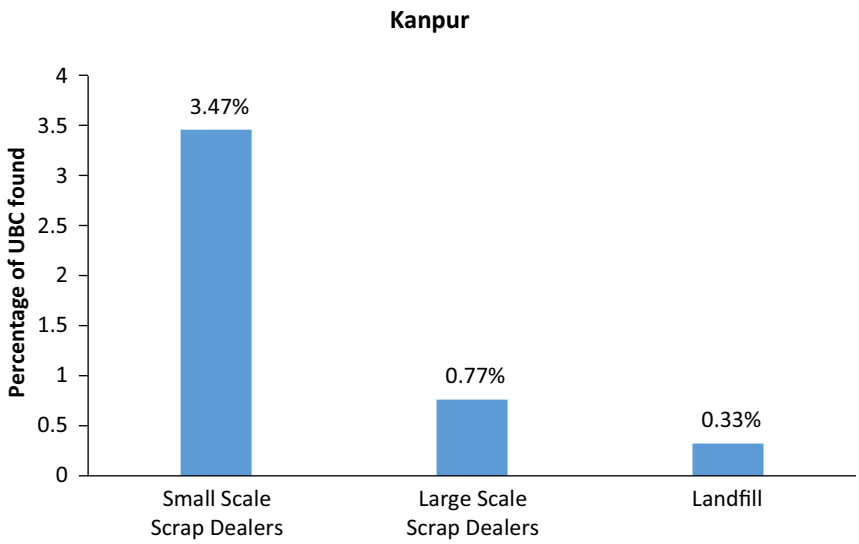

FIGURE 32 Detail graph of UBC at different dealers in Kanpur

Kochi

Kochi is a coastal city in the district of Ernakulam, Kerala. The city has a total area of 36.6 square miles and a population of 602,046[18] people in 2011. It is the largest urban agglomeration in Kerala, but the city itself is the second largest, earning it Tier II status from the Government of India.

All of the 22 surveyed waste collectors collect UBCs, 14% collected UBCs separately, while 86% collected them mixed with other paper waste.

TABLE 50 Bale analysis of small-scale dealers conducted in Kochi

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small scale scrap dealers	300	2.000	0.667%
	150	0.000	0.000%
	200	0.000	0.000%
	250	0.000	0.000%
	150	0.000	0.000%
	100	1.500	1.500%
	450	7.500	1.667%
	350	0.970	0.277%
	200	0.000	0.000%
	250	1.682	0.673%
	150	0.310	0.207%
	200	0.270	0.135%
	300	0.000	0.000%
	200	0.000	0.000%
Total	2500	14.232	0.569 %

Among 14 small-scale scrap dealers surveyed,43% reported that they are collecting UBC while rest were not dealing with UBC. Out of the 2500 Kg of bale analysed 14.23 Kg of UBC was found, indicating UBC percentage at 0.57%. Among the 7 large-scale scrap dealers surveyed, 100% collected UBCs either separately or mixed with other paper. From the bale of 3350 Kg of paper 12.77 Kg was found to be UBC, indicating UBC percentage found at 0.381%.

Analysis conducted at Kochi RRF, revealed 5.45 kgs of UBCs present in the sample size of 450 kgs the sample size (0.13%).

TABLE 51 Bale analysis of Large-scale dealers conducted in Kochi

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large-scale scrap dealers	600	3.75	0.63%
	750	2.75	0.37%
	600	0.75	0.13%
	500	0.375	0.08%
	400	0	0.00%
	250	3.15	1.26%
	250	2	0.80%
Total	3350	12.775	0.381%

[18] https://www.seoulsolution.kr/sites/default/files/gettoknowus/5.Kerala_Kochi.pdf

TABLE 52 MRF analysis conducted in Kochi

Truck	Sample Size (Kgs)	Mixed Paper Waste (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	3000	500	0.0936	0.00%
Commercial	800	750	0.552	0.07%
Institutional	500	400	4.8	0.96%
Total	4300	1650	5.4456	0.13%

FIGURE 33 Analysis of UBC during survey, Kochi

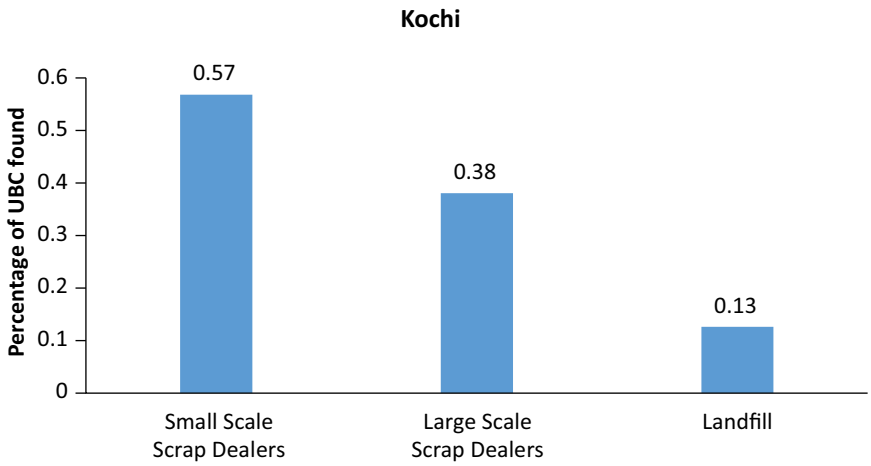

FIGURE 34 Detail graph of UBC at different dealers in Kochi

Kolkata

Kolkata, formerly known as Calcutta, is the capital and largest city in West Bengal State. Kolkata is the seventh most populous city in India with an estimated city proper population of 4.5 million[19] and a floating population of 60,00,000 per day covering an area of 1480 Sq.km.[20]

TABLE 53 Bale analysis of small-scale dealers conducted in Kolkata

Category	Weight of bale analysed	UBC found in Bale (in kgs)	Percentage UBC(%)
Small Scale Scrap Dealers	43.6	0	0.00
	55.1	4.7	8.53
	33.97	3.6	10.60
	45	2.9	6.44
	100	5.6	5.60
	50.45	0	0.00
	40	0.95	2.38
	100	7.9	7.90
	100	1.9	1.90
	160	2.7	1.69
	101	1.4	1.39
	100	1.25	1.25
	100	0	0.00
	40	0	0.00
Total	1068.92	32.9	3.08

The survey among 22 number of waste collectors in Kolkata reported that 36% collected UBCs.

Out of 14 small-scale scrap dealers 29% of the dealers reported collecting UBCs along with mixed paper. Out of the 1069 Kg of bale analysed 32.9 Kg of UBC was found, indicating UBC percentage at 3.08%. Among the 7 large-scale scrap dealers surveyed, 100% was collecting UBCs mixed with other paper. From the bale of 1235 Kg of paper 33.8 Kg was found to be UBC, indicating UBC percentage found at 2.74%.

Landfill analysis conducted at Dhapa dumping ground, the 470 kg sample consisted of 17.2 Kg of mixed paper and 0.81 Kg of UBC indicating (0.2%).

TABLE 54 Bale analysis of Large-scale dealers conducted in Kolkata

Category	Weight of bale analysed	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	86	7.2	8.37%
	130	3.7	2.85%
	150	1.56	1.04%
	160	4.7	2.94%
	500	14	2.80%
	69.1	0	0.00%
	140	2.7	1.93%
Total	1235.1	33.86	2.74%

[19] https://www.kmcgov.in/KMCPortal/jsp/BasicStatistics.jsp
[20] https://www.kmcgov.in/KMCPortal/jsp/KolkataStatistics.jsp

TABLE 55 Landfill analysis conducted in Dhapa, Kolkata

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	162	5.00	0.65	0.401%
Commercial	160.58	5.20	0.05	0.030%
Institutional	147.4	7	0.12	0.078%
Total	469.98	17.2	0.8127	0.2%

FIGURE 35 Analysis of UBC during survey, Kolkata

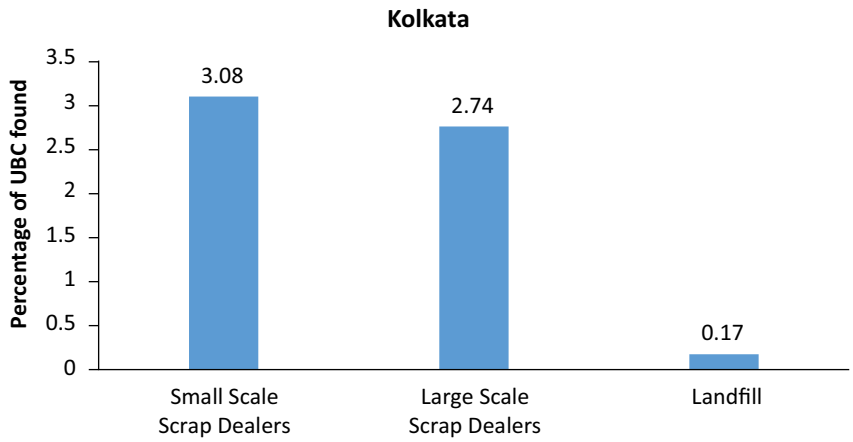

FIGURE 36 Detail graph of UBC at different dealers in Kolkata

Kurnool

Kurnool District is situated between the northern latitudes of 14°54' and 16°18' and the eastern longitudes of 76°58' and 79°34' on Indian state of Andra Pradesh. The district's altitude begins at approximately 100 feet above mean sea level. According to the 2011 Population Census, the district has a population of 22,71,686 people and spans an area of 9,681 square kilometres.

TABLE 56 Bale analysis of small-scale dealers conducted in Kurnool

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	20	0	0
	26	0	0
	50	0	0
	35	0	0
	40	0	0
	42	0	0
	32	0	0
	40	0	0
	14.9	0	0
	37	0	0
	18	0	0
	25	0	0
	30	0	0
	58	0	0
Total	467.9	0	0

The survey among 22 number of waste collectors in Kurnool reported that currently, UBCs are not being collected.

From the survey and sampling conducted among 14 small-scale scrap dealers in Kurnool, it was found that one dealer (5%) is currently accepting Used Beverage Cartoons (UBC). However, no UBC was present in the 468 kgs of sample analyzed. Out of the 468 Kg of bale analysed no UBC. Among the 7 large-scale scrap dealers surveyed, only 14% was collecting UBCs mixed with other paper. From the bale of 292.4 Kg of paper 0.03 Kg was found to be UBC (0.011%).

A Landfill analysis was conducted at Gargeyapuram Dumpyard in Kurnool, covering a total of 450 Kg of sample size, resulted 17.76 Kg of mixed paper and 0.49 Kg UBC indicating an UBC present of 0.109%.

TABLE 57 Bale analysis of Large-scale dealers conducted in Kurnool

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	30	0.032	0.11%
	93	0	0.00%
	44	0	0.00%
	35	0	0.00%
	37.4	0	0.00%
	37	0	0.00%
	16	0	0.00%
Total	292.4	0.032	0.011%

TABLE 58 Landfill analysis conducted in Gargeyapuram, Kurnool

Truck	Sample Size (Kgs)	Mixed Paper Waste (Kgs)	UBC Found (Kgs)	Percentage of UBC
Residential	150	4.82	0.2116	0.14%
Commercial	150	4.94	0.1279	0.09%
Institutional	150	8	0.1551	0.10%
Total	450	17.76	0.4946	0.109%

FIGURE 37 Analysis of UBC during survey, Kurnool

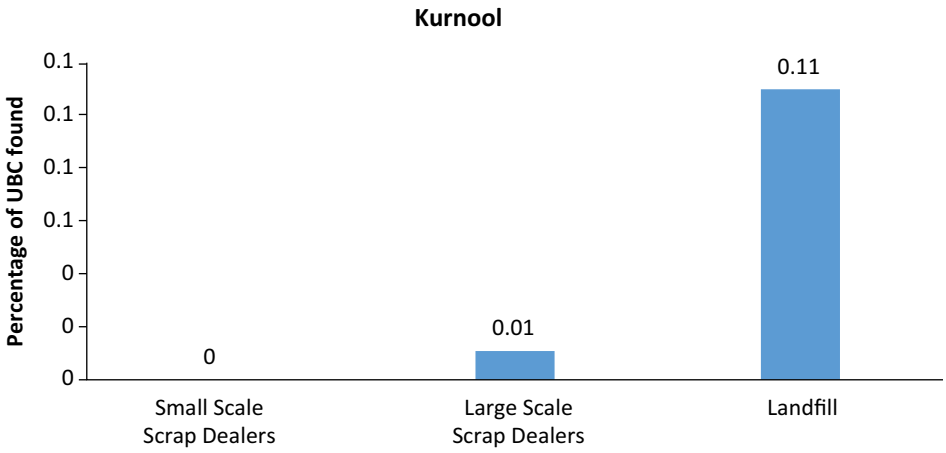

FIGURE 38 Detail graph of UBC at different dealers in Kurnool

Lucknow

Lucknow city is situated at a height of around 123 metres (404 feet) above sea level. It lies between 26°55'North latitude and 80°59' East longitude. Lucknow city covered an area of about 402 square km till December 2019. Lucknow District's population constitutes 2.30 percent of the total Uttar Pradesh population (Census of India, 2011). Around 1,550,737 people are living in rural areas and 3,037,718 in urban areas. In Lucknow, the generation of waste quantity is approximately 1500 Metric/day Lucknow Nagar Nigam (LNN), 2011.

TABLE 59 Bale analysis of small-scale dealers conducted in Lucknow

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	50	0.04	0.08
	73	15.04	20.60
	45	10	22.22
	33	10	30.30
	60	35	58.33
	30	5	16.67
	50	5	10.00
	19.52	7.1	36.37
	38.4	0.027	0.07
	65	14	21.54
	22.84	0	0.00
	82	48	58.54
	93	30	32.26
	48	0	0.00
Total	709.76	179.207	25.25

The survey among 22 number of waste collectors in Lucknow reported that 95% of them were collecting UBCs. The survey and sampling conducted at 14 small-scale scrap dealers in Kurnool, indicated 93% are currently accepting Used Beverage Cartoons (UBC). Out of the 709.7 Kg of bale analysed 179 Kg of UBC was found indicating UBC percentage at 25.25%. Among the 7 large-scale scrap dealers surveyed, 86% were collecting UBCs. From the bale of 641 Kg of paper 83.23 Kg was found to be UBC.

A Landfill analysis was also conducted at Shivari landfill site in Lucknow, covering a total of 486.18 Kg of sample size, resulted 210 Kg of mixed paper and 0.73 Kg UBC indicating an UBC present of 0.15%.

TABLE 60 Bale analysis of Large-scale dealers conducted in Lucknow

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	119	0	0.00
	150	25	16.67
	99.34	22	22.15
	100	0	0.00
	55	0	0.00
	33.75	33.75	100.00
	84.28	2.48	2.94
Total	641.37	83.23	12.97

TABLE 61 Landfill analysis conducted in Shivari, Lucknow

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	161.68	75	0.246	0.15
Commercial	171.14	80	0.101	0.06
Institutional	153.36	55	0.382	0.25
Total	486.18	210	0.73	0.15

FIGURE 39 Analysis of UBC during survey, Lucknow

FIGURE 40 Detail graph of UBC at different dealers in Lucknow

Mumbai

Mumbai is the most populous metropolis in India, with a population of over 1.24 crores (12.4 million) and spread over an area of 603.4 Sq. Km. The city is India's financial capital and a major hub for commerce, media, entertainment, and industry.

The survey among 22 number of waste collectors in Mumbai reported that 95% of them were collecting UBCs.

TABLE 62 Bale analysis of small-scale dealers conducted in Mumbai

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	40	0.0285	0.071%
	75	1.7	2.267%
	50	0	0.000%
	50	0.0525	0.105%
	75	0.08	0.107%
	150	0.0615	0.041%
	150	0.0285	0.019%
	70	4.45	6.357%
	40	0	0.000%
	35	0	0.000%
	450	0	0.000%
	250	0.15	0.060%
	75	0.25	0.333%
	25	0.064	0.256%
Total	1535	6.865	9.616%

From the survey and sampling conducted among 14 small-scale scrap dealers in Mumbai, it was found that only 36% is currently accepting Used Beverage Cartoons (UBC). Out of the 1535 Kg of bale analysed 6.8 Kg of UBC was found indicating UBC percentage at 0.45%. In contrast among the 7 large-scale scrap dealers surveyed, none were actively collecting UBC. From the bale of 1712.5 Kg of paper 2.16 Kg was found to be UBC, indicating UBC percentage found at 0.12%.

A Landfill analysis was also conducted at Mumbai, covering a total of 2250 Kg of sample size, resulted 346 Kg of mixed paper and 7.3 Kg UBC indicating an UBC percentage of 0.31%.

TABLE 63 Bale analysis of Large-scale dealers conducted in Mumbai

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	38	0.018	0.047
	1123	0.030	0.003
	150	0.417	0.278
	150	0.9	0.600
	24.5	0	0.000
	158	0.198	0.125
	69	0.6	0.870
Total	1712.5	2.163	0.126

TABLE 64 The Sub-station analysis conducted in Mumbai

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Institutional	800	135	1.5	0.19%
Residential	700	120	1.75	0.25%
Commercial	750	96	3.78	0.50%
Total	2250	346	7.03	0.94%

FIGURE 41 Analysis of UBC during survey, Mumbai

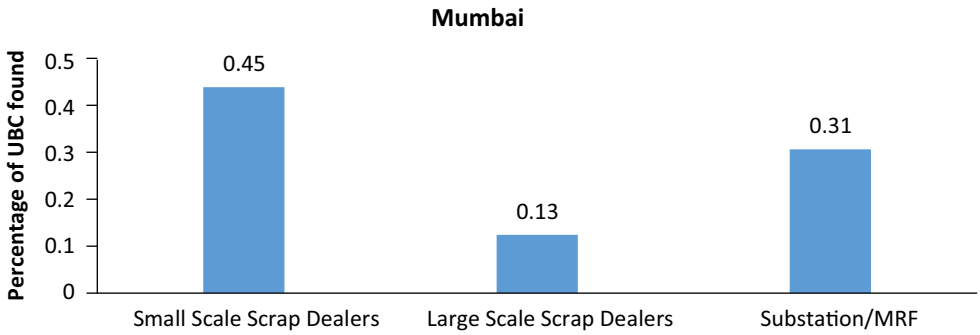

FIGURE 42 Detail graph of UBC at different dealers in Mumbai

Mysuru

Mysuru, a leading city in the Swachh Survekshan ranking list adopts a successful decentralized approach in waste management. The waste management activities of the city are managed by the Mysuru City Corporation (MCC), which oversees civic administration across its 65 wards. With an urban agglomeration estimated at around 209650 households, the city generates approximately 540 TPD of municipal solid waste (MSW).

TABLE 65 Bale analysis of small-scale dealers conducted in Mysuru

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	20.54	0	0.00
	38.9	0	0.00
	25.4	0	0.00
	31.7	0	0.00
	18.6	0	0.00
	13	0	0.00
	70	0	0.00
	55.5	0	0.00
	35	0	0.00
	19	0	0.00
	13	0	0.00
	39.15	0	0.00
	22	0	0.00
	63.5	0	0.00
Total	465.29	0	0.00

Among the surveyed 22 waste collectors in Mysuru 73% were collecting UBC and rest 27% were not dealing with UBCs.

From the survey and sampling conducted among 15 small-scale scrap dealers in Mumbai, it was found that only 13% is currently accepting Used Beverage Cartoons (UBC). No UBC was found in the 465 kgs of bale analysed at small scale dealers in Mysuru. Among the 7 large-scale scrap dealers surveyed, 43% were actively collecting UBC. From the bale of 653.5 Kg of paper 18.1 Kg was found to be UBC, indicating UBC presence of 2.77%.

Team conducted two MRF analysis in Mysuru. Analysis at Kumbarkoppal MRF covering a total of 320.1 Kg of sample size, resulted 52.2 Kg of mixed paper and 10.5 Kg UBC, indicating an UBC percentage of 3.27%.

Similarly, an analysis was also conducted at JP Nagar MRF.A total of 253 Kg of sample was analysed from three trucks, resulting 62 Kg of mixed wastepaper and 7.34 Kg of UBC, indicating an UBC percentage of 2.9%.

TABLE 66 Bale analysis of Large-scale dealers conducted in Mysuru

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	168.5	5.6	3.32
	109.5	0	0.00
	60.5	0	0.00
	51	0	0.00
	64	0	0.00
	50.05	0	0.00
	150	12.5	8.33
Total	653.55	18.1	2.77

TABLE 67 MRF analysis conducted in Kumbarkoppal, Mysuru

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	94.84	9.73	0.15	0.16
Commercial	109	15.5	0.04	0.04
Institutional	116.3	27	10.3	8.86
Total	320.14	52.23	10.49	3.277

TABLE 68 MRF analysis conducted in JP Nagar, Mysuru

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	55	22	0.04	0.07
Commercial	93	19	0	0.00
Institutional	105	21	7.3	6.95
Total	253	62	7.34	2.901

FIGURE 43 Analysis of UBC during survey, Mysuru

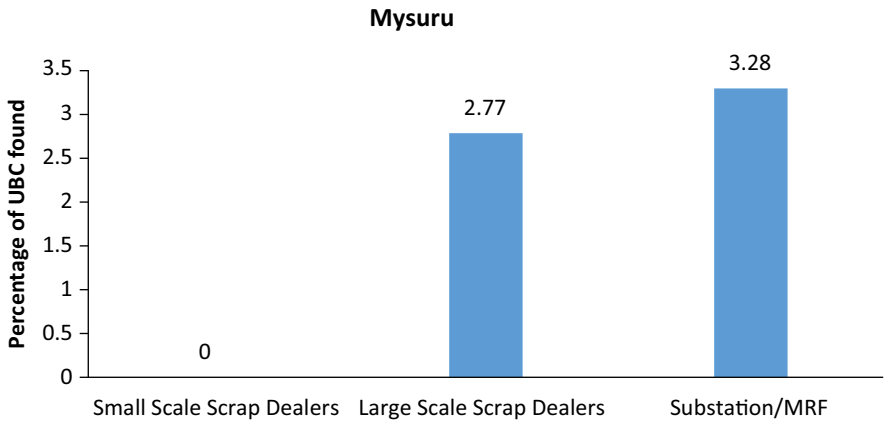

FIGURE 44 Detail graph of UBC at different dealers in Mysuru

Nagpur

Nagpur city, the winter capital of Maharashtra, has a population of 4,653,570. In addition to hosting the annual winter session of the Maharashtra State Assembly (Vidhan Sabha), Nagpur serves as a major commercial and political centre of the Vidarbha region. Among the surveyed 22 waste collectors in Nagpur all the respondents were reported collecting UBC.

TABLE 69 Bale analysis of small-scale dealers conducted in Nagpur

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	80	0	0
	50	0.020	0.040%
	200	1.440	0.720%
	30	0.550	1.833%
	40	0.088	0.220%
	30	0.007	0.023%
	40	0.016	0.040%
	45	0.010	0.022%
	60	0	0
	60	0.050	0.083%
	40	0.063	0.156%
	70	0.048	0.068%
	65	0.030	0.046%
	40	0	0
Total	850	2.3212	0.273%

From the survey and sampling conducted among 14 small-scale scrap dealers in Nagpur, it was found that all the respondents were accepting Used Beverage Cartoons (UBC). Out of the 850 Kg of bale analysed at small dealers 2.32 Kg of UBC was found, indicating 0.27% of UBC. Among the 7 large-scale scrap dealers surveyed, 100% were actively collecting UBC. From the bale of 305 Kg of paper 0.74 Kg was found to be UBC, indicating UBC percentage found at 0.244%.

Team conducted a landfill analysis at the Bhandewadi Landfill, Nagpur. Analysis covering a total of 450 Kg of sample size, resulted 16.5 Kg of mixed paper and 0.763 Kg UBC, indicating an UBC percentage of 0.17%.

TABLE 70 Bale analysis of Large-scale dealers conducted in Nagpur

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	30	0	0.00%
	30	0.662	2.21%
	70	0.0566	0.08%
	60	0	0.00%
	40	0	0.00%
	50	0.025	0.05%
	25	0	0.00%
Total	305	0.7436	0.244%

TABLE 71 Landfill analysis conducted Bhandewadi, Nagpur

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	150	4.5	0.063	0.04
Commercial	150	5	0.59	0.39
Institutional	150	7	0.11	0.07
Total	450	16.5	0.763	0.17

FIGURE 45 Analysis of UBC during survey, Nagpur

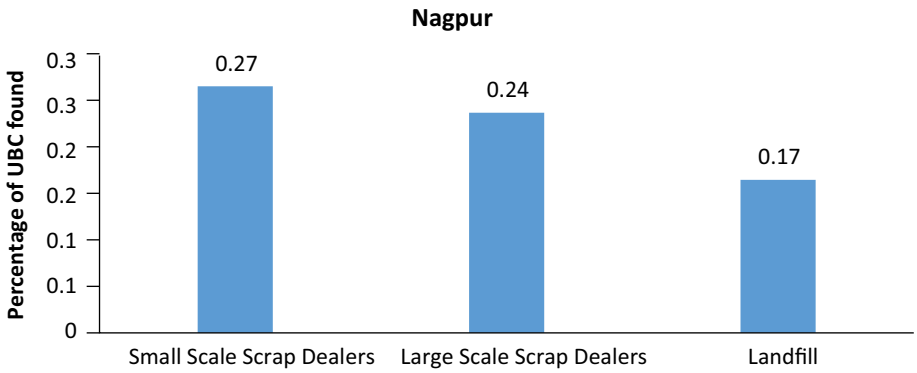

FIGURE 46 Detail graph of UBC at different dealers in Nagpur

Pune

The eighth largest metropolises in India, Pune is in the state of Maharashtra. It is the second largest city in the state after Mumbai. The city spans approximately 527 sq.km and has a population of about 94,26,959 as per 2011 census.[21]

Among the surveyed 22 waste collectors in Pune 55% were collecting UBC and rest 45% was not dealing with UBCs.

TABLE 72 Bale analysis of small-scale dealers conducted in Pune

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	150	0.7	0.467%
	150	0	0.000%
	175	1.107	0.633%
	150	0	0.000%
	150	0	0.000%
	500	0	0.000%
	150	0	0.000%
	150	0	0.000%
	150	0	0.000%
	165	2	1.212%
	145	0.4	0.276%
	130	0	0.000%
	65	0	0.000%
Total	2380	7.407	4.721%

From the survey and sampling conducted among 14 small-scale scrap dealers in Pune, it was found that all the respondents were accepting Used Beverage Cartoons (UBC). Out of the 2380 Kg of bale analysed at small dealers 7.4 Kg of UBC was reported, indicating 0.31% of UBC. Among the 7 large-scale scrap dealers surveyed, 57% were actively collecting UBC. From the bale of 1119 Kg of paper 3.04 Kg was found to be UBC, indicating UBC percentage found at 0.27%.

Team conducted landfill analysis at Adarsh landfill in Pune. Out of 450 Kg sample analysed,161.3 Kg was found to be mixed paper and 5.245 Kg was UBC, indicating percentage of UBC as 1.17%.

TABLE 73 Bale analysis of Large-scale dealers conducted in Pune

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	140	0.7	0.50%
	150	0.2185	0.15%
	229	1.123	0.49%
	150	0	0.00%
	150	0.904	0.60%
	150	0.046	0.03%
	150	0.05	0.03%
Total	1119	3.0415	1.80%

[21] https://www.pmc.gov.in/en/about-pmc

TABLE 74 The Sub-station analysis conducted in Adarsh, Pune

Type	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Institutional	6000	300	5	0.08%
Residential	5300	136	0.22	0.00%
Commercial	150	150	0.025	0.02%
Total	11450	586	5.245	0.10%

FIGURE 47 Analysis of UBC during survey, Pune

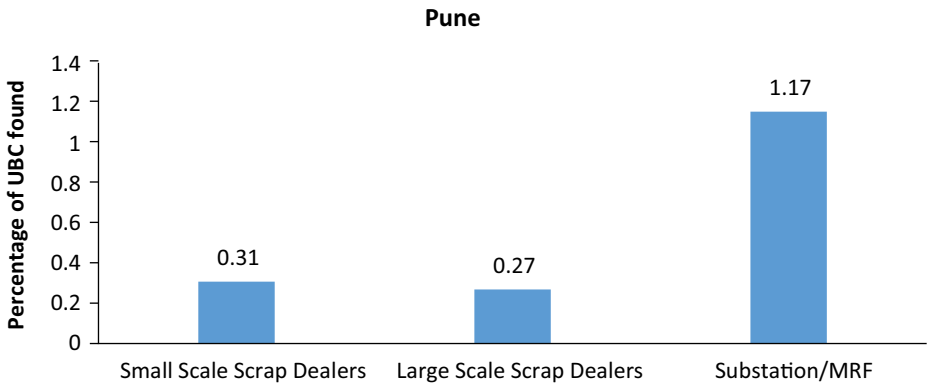

FIGURE 48 Detail graph of UBC at different dealers in Pune

Shimla

Shimla, the capital city of Himachal Pradesh, is in northern India, nestled in the western Himalayas. Positioned at an average altitude of 2,200 meters above sea level, it is celebrated for its cool climate, scenic beauty, and colonial architecture. Formerly the summer capital of British India, Shimla remains a prominent tourist destination and a key administrative centre. The Shimla district spans an area of 5,131 sq. km, while the city itself covers 35.34 sq. km, housing a population of approximately 160,000 people across 27,000 households.[22]

TABLE 75 Bale analysis of small-scale dealers conducted in Shimla

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	14	0	0
	6.2	0	0
	23.8	0	0
	16.5	0	0
	26	0	0
	17	0	0
	18	0	0
	17.7	0	0
	18	0	0
	15.72	0	0
	21	0	0
	27	0	0
	16.7	0	0
	15.5	0	0
Total	253.12	0	0

Among the surveyed 22 waste collectors in Shimla none of them reported collecting UBCs, primarily due to their low market value and reduced acceptance in the recycling chain. From the survey and sampling conducted among 14 small-scale scrap dealers in Shimla, it was found that none of the respondents were accepting UBCs. Out of the 253.12 kg of baled material analysed at these small dealers, no UBCs were found. Similarly, among the 7 large-scale scrap dealers surveyed, none were collecting UBCs.

Team conducted landfill analysis at Bharyal landfill in Shimla. Out of 450 Kg sample analysed,18.2 Kg was found to be mixed paper and 2.73 Kg was UBC, indicating percentage of UBC as 0.61%.

TABLE 76 Bale analysis of Large-scale dealers conducted in Shimla

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	19.9	0.0	0.0
	19.4	0.0	0.0
	16	0.0	0.0
	25	0.0	0.0
	29.5	0.0	0.0
	30	0.0	0.0
	32	0.0	0.0
Total	171.8	0.0	0.0

[22] https://shimlamc.hp.gov.in/News/Index/1055

TABLE 77 Landfill analysis conducted in Bharyal, Shimla

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	150	8	0.99	0.66%
Commercial	150	7.1	1.148	0.77%
Institutional	150	3.1	0.589	0.39%
Total	450	18.2	2.727	0.606

FIGURE 49 Analysis of UBC during survey Shimla

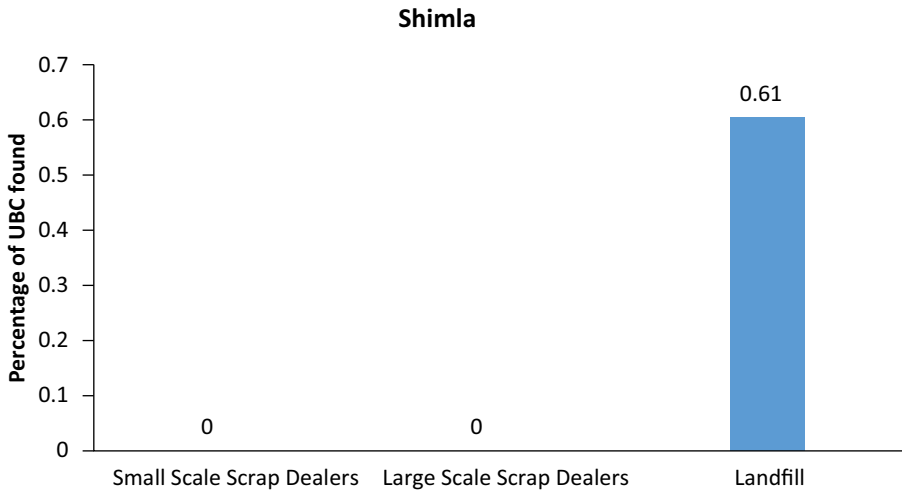

FIGURE 50 Detail graph of UBC at different dealers in Shimla

Srinagar

Srinagar, the largest city in the Union Territory of Jammu and Kashmir, spans an area of 246 square kilometers. Situated at an average elevation of 1,586 meters above sea level, the city lies along the banks of the River Jhelum. As of 2011 census, Srinagar city's population was 12,19,516 and Srinagar urban agglomeration had 1,236,829 population.[23]

Among the surveyed 22 waste collectors in Srinagar only 18% reported collecting UBCs, while the rest was not dealing with UBC.From the survey and sampling conducted among 14 small-scale scrap dealers in Srinagar, it was found that 21% of respondents were accepting UBCs. Out of the 912.6 Kg of bale analysis at these small dealers ,15.8 Kg of UBC was found, Indicating the percentage of UBC as 1.73%. Similarly, among the 7 large-scale scrap dealers surveyed, only 14% was accepting UBCs. 764.8 Kg of bale was analysed in total, 125 Kg of UBC was found from the bale, indicating percentage of UBC as 16%.

Team conducted landfill analysis at Achan landfill in Srinagar. Out of 469 Kg sample analysed,11.03 Kg was found to be mixed paper and 1.16 Kg was UBC, indicating percentage of UBC as 0.25%.

TABLE 78 Bale analysis of small-scale dealers conducted in Srinagar

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small scale scrap dealers	126.8	11.2	8.83
	45.98	0.062	0.13
	80.5	0	0.00
	54.4	0.27	0.50
	50	0	0.00
	75	1.04	1.39
	71.7	0	0.00
	63.5	0	0.00
	53.7	0.1271	0.24
	42	0	0.00
	67	0	0.00
	64	0	0.00
	63	0	0.00
	55	3.117	5.67
Total	912.58	15.8161	1.73

TABLE 79 Bale analysis of Large-scale dealers conducted in Srinagar

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large-scale scrap dealers	101	0	0.00
	62.6	0	0.00
	125	0	0.00
	112.8	0	0.00
	124.7	0	0.00
	88.7	0.013	0.01
	150	125	83.33
Total	764.8	125.013	16.346

[23] https://srinagar.nic.in/demography/

TABLE 80 Landfill analysis conducted in Achan, Srinagar

Truck	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	149.00	3.63	0.395	0.27
Commercial	165.00	3.835	0.335	0.20
Institutional	155.00	3.565	0.43	0.28
Total	469	11.03	1.16	0.75

FIGURE 51 Analysis of UBC during survey Srinagar

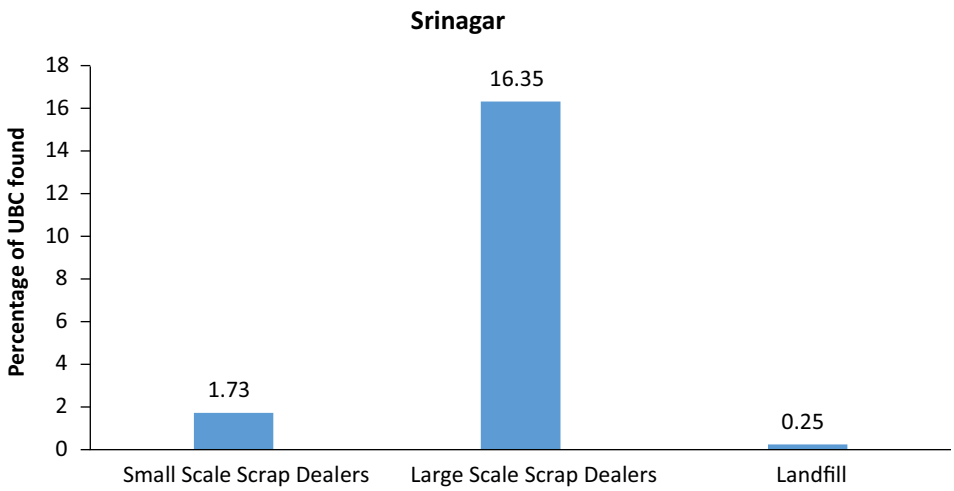

FIGURE 52 Detail graph of UBC at different dealers in Srinagar

Thiruvananthapuram

Thiruvananthapuram, also known as Trivandrum, is the capital and largest city of the Indian state of Kerala. It is the southernmost district of the state. The city has a population of 957,730, with a metropolitan population of 1.68 million.[24]

Among the surveyed 22 waste collectors 95% reported collecting UBCs.

From the survey and sampling conducted among 14 small-scale scrap dealers, it was found that only 14% of respondents were accepting UBCs. Out of the 3235 Kg of bale analysis at these small dealers 16.1 Kg of UBC was found, Indicating the percentage of UBC as 0.5%. Similarly, among the 7 large-scale scrap dealers surveyed, 57% was accepting UBCs. 3055 Kg of bale was analysed in total, 35.6 Kg of UBC was found from the bale, Indicating percentage of UBC as 1.17%.

Team conducted landfill analysis at Chenthitta Integrated Waste Management Facility. Out of 1148 Kg sample analysed, 490.3 Kg was found to be mixed paper and 65.48 Kg was UBC, indicating percentage of UBC as 5.7%.

TABLE 81 Bale analysis of small-scale dealers conducted in Thiruvananthapuram

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Small Scale Scrap Dealers	50	0.000	0.000%
	110	1.740	1.582%
	150	0.000	0.000%
	150	0.000	0.000%
	200	2.100	1.050%
	300	4.200	1.400%
	150	0.000	0.000%
	300	2.100	0.700%
	450	0.750	0.167%
	275	0.150	0.055%
	400	0.760	0.190%
	250	1.100	0.440%
	300	3.100	1.033%
	150	0.100	0.067%
Total	3235	16.1	6.683%

TABLE 82 Bale analysis of Large-scale dealers conducted in Thiruvananthapuram

Category	Weight of bale analysed (Kgs)	UBC found in Bale (Kgs)	Percentage UBC (%)
Large Scale Scrap Dealers	130	0.15041	0.12%
	75	1.9	2.53%
	700	30	4.29%
	500	0	0.00%
	600	1.8	0.30%
	300	1.75	0.58%
	750	0	0.00%
Total	3055	35.60041	7.82%

[24] https://trivandrum.nic.in/en/about-district/

TABLE 83 The Sub-station analysis conducted in Chenthitta, Thiruvananthapuram

Type	Sample Size (Kgs)	Mixed Paper Waste in Sample (Kgs)	UBC Found (Kgs)	Percentage of UBC in Sample
Residential	274	110	55.6	20.29%
Commercial	274	5.32	0.1798	0.07%
Institutional	600	375	9.7	1.62%
Total	1148	490.32	65.4798	21.97%

FIGURE 53 Analysis of UBC during survey Thiruvananthapuram

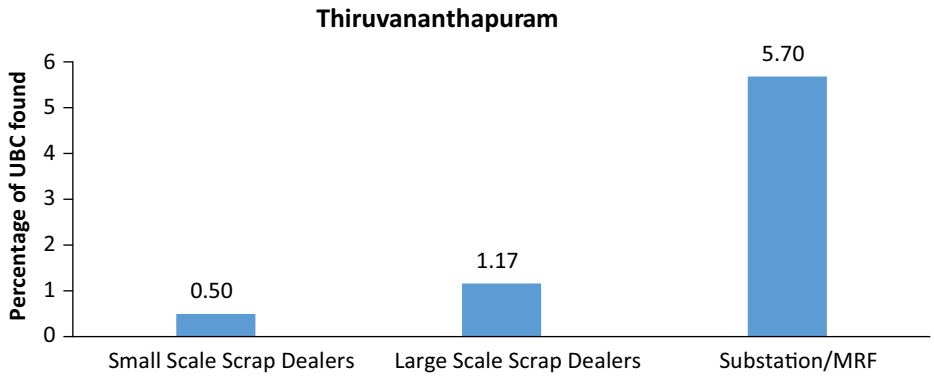

FIGURE 54 Detail graph of UBC at different dealers in Thiruvananthapuram

Recyclers

In coordination with Tetra Pak, TERI conducted a survey of ten recyclers located across Indian cities. The study revealed, out of 10 recyclers 2 recycled UBCs into chipboard and other construction materials. Whereas the remaining 8 recyclers were paper mills that converted them into paper products.

Other recyclers in India, predominantly smaller paper mill units employing rudimentary pulping methods, were not accepting UBCs due to the complexities associated with their multi-layered packaging. These layers significantly prolong the pulping process and result in plastic residues settling at the bottom of the pulper.

The volume of mixed paper waste collected and processed at these recyclers ranged from 2,000 kg per month to as much as 10,000 kg per day. The quantity of UBCs received per truckload varied widely—from as little as 0.25 kg to as much as 15,000 kg. This mixed paper waste, including UBCs, was sourced from residential, commercial, and institutional sectors. The procurement price for mixed paper waste ranged between ₹15 and ₹28 per kilogram.

The surveyed paper mill recyclers were engaged in the production of a variety of paper products, including white paper, kraft paper, floating media paper, moulded paper trays, and grey boards.

TABLE 84 Details of recyclers visited during survey

S.No	City	Date of visit	Details
1	Guwahati	7th May 2025	Ashoka Papermill – Kamlapur
2	Mysuru	26th May 2025	Balaji Malts Pvt. Ltd.
3	Bengaluru	31st May 2025	Jodhani Papers Pvt. Ltd.
4	Lucknow	11th June 2025	Vardhaman Industries
5	Pune	20th June 2025	Sadguru Board Mills
6	Cuttack	26th June 2025	Aaditya Kraft and Papers Pvt. Ltd.
7	Madurai	11th Aug. 2025	Visvas Paper Mill Private Limited
8	Hosur	12th Aug. 2025	Venkraft Paper Mills Pvt Ltd
9	Uttarakhand	30th September 2025	Khatema Fibers Limited
10	Muzaffarnagar	17th Nov. 2025	Shree Bhageshwari Papers Private Limited

Annexures

Annex I: Waste Collector

Questionnaire 1.0 (Waste Collector)		
S. No	Questions	
1	City	
2	Date of survey (DD/MM/YYYY)	
3	Category	Ragpickers
4	Name of Interviewer	
5	Name of Supervisor	
6	Name of Candidate surveyed	
7	Type of waste collector	
	a. rag picker	
	b. door to door collector	
8	Address	
9	Contact Number /cell number	
11	**Name of areas covered for collection of waste (also mention category: residential/commercial/institutional) and Ward and Zone of city**	
	a	
	b	
	c	
	d	
	e	
	f	
	g	
	h	
12	What all dry waste you collect for recycling	
	a. paper	
	b. plastic	
	c. glass	
	d. metal	
	e. cardboard	
	f. styrofoam	
13	Do you collect Used beverage carton (UBC)?	
	a. Yes	
	b. No	

Questionnaire 1.0 (Waste Collector)	
S. No	**Questions**
14	If answer to Question (13) is (a). How do you collect UBC?
	a. Separate UBC collected
	b. UBC collected mixed with paper/cardboard
15	If answer to Question (13) is (b). Why is UBC not collected?
	a. no one returns UBC to us
	b. there is no incentive for UBC collection
	c. there is no buyer/market for UBC collection
	d. other. (please specify)
16	Average UBC collected per month (kg)?
17	Average mixed wastepaper collected per month (including UBC) (kg)?
18	Per kg selling price of UBC?
19	Per kg selling price of mixed paper?
20	Source of procurement of mixed wastepaper (including UBC)
	a. Household
	b. street
	c. Waste bins
	d markets
	d. Others
21	From where do you get UBCs?
	a. Upper- and middle-class localities
	b. Lower income localities
	c. Commercial or Business establishments
22	Condition of UBC collected
	a. Most do not contain leftover juice
	b. Most often soiled
	c. Clean and Ready for sale
23	Fate of straw with UBC (small)
	a. often found with packs (inside)
	b. sometimes found with packs (inside)
	c. normally not found with pack and is not collected
	d we collect straw separately for selling
24	Specify the fate of straw
25	Specify the fate of UBC (if collected)
26	Anything that discourages you from dealing in UBCs
27	Any comment on how the collection and recycling of UBCs be improved.
28	What can motivate you for collecting UBCs

Annex II: Small Scale Waste Dealers

Questionnaire 2.0 (Small Scale Waste Dealer who supplies to large scale dealers and Quantity handled <50 Tonnes/month of mixed paper			
S.No		**Questions**	
1		City	
2		Date of survey (DD/MM/YYYY)	
3		Category	Small scale scrap dealer
4		Name of Interviewer	
5		Name of Supervisor	
6		Name of Candidate surveyed	
7		Type of waste collector	
8		Address	
9		Contact Number/Cell number	
10		Type of areas and zones covered for collection of waste (residential, commercial, institutional)	
	a		
	b		
	c		
	d		
11		No. of kabadi/rag picker contributing (from where you purchase it)	
12		Total average mixed paper waste collected per month (kg)	
13		Do you collect the Used beverage carton (UBC)?	
	a	If yes? Do you collect separately or with mixed paper?	
	b	If no? reason for not collecting	
14		UBC collected per month (kg)	
15		Per kg purchase price of UBC (per kg)?	
16		Per kg purchase price of mixed paper (per kg)?	
17		What is the selling price of UBC you get (per kg)?	
18		What is the selling price you get for paper (per kg)?	

Questionnaire 2.0 (Small Scale Waste Dealer who supplies to large scale dealers and Quantity handled <50 Tonnes/month of mixed paper	
S.No	**Questions**
19	Source of procurement of UBC
	a. household
	b. rag picker
	c. door to door collector
	d. intermediate kabadi
	e. others (hotels, shopping malls, markets etc.)
20	Condition of UBC collected
	a. Most contain leftover juice
	b. Most often soiled
	c. Clean and ready for sale
21	Do you process/treat UBC before selling
	a. Yes, (if yes, what processing do you do?)
	b. No
22	Specify the fate of UBC you get?
	a. Sell this to larger dealer
	b. Sell this to recycler,
	c. Sell this along with mixed paper,
	d. other....(please specify)
23	Specify the fate of straw?
	a. often found with packs (inside)
	b. sometimes found with packs (inside)
	c. normally not found with pack and is not collected
	d. you collect straw separately for selling
24	Anything that discourages you from dealing in UBC?
25	Any comment on how the collection of UBC be improved?
26	Bale analysis: (4 bales to be analysed of about 100-150 kg each)
	a. kg of mixed paper waste bales
	b. kg of UBC

Annex III: Large Scale Dealers

Questionnaire 3.0 (Large Scale Waste Dealer- who supplies to recycler and Quantity handled = >50Tonnes/ month of mixed paper		
S.no	Questions	
1	City	
2	Date of survey (DD/MM/YYYY)	
3	Category	Large scale scrap dealer
4	Name of Interviewer	
5	Name of Supervisor	
6	Name of Candidate surveyed	
7	Type of waste collector	
8	Address	
9	Contact Number/Cell number	
10	Type of areas and zones covered for collection of waste (residential, commercial, institutional)	
	a	
	b	
	c	
	d	
11	No. of kabadi/rag picker contributing (from which you purchase)	
12	Total average mixed paper waste collected per month (kg)	
13	Do you collect the Used beverage carton (UBC)?	
a	If yes? Do you collect separately or with mixed paper?	
b	If no? reason for not collecting	
14	UBC collected per month (kg)	
15	Per kg purchase price of UBC (per kg)?	
16	Per kg purchase price of mixed paper (per kg)?	
17	What is the selling price of UBC you get (per kg)?	
18	What is the selling price you get for paper (per kg)?	

Questionnaire 3.0 (Large Scale Waste Dealer- who supplies to recycler and Quantity handled = >50Tonnes/ month of mixed paper	
S.no	**Questions**
19	Source of procurement of UBC
	a. household
	b. rag picker
	c. door to door collector
	d. intermediate kabadi
	e. others (hotels, shopping malls,, markets etc.)
20	Condition of UBC collected
	a. Most contain leftover juice
	b. Most often soiled
	c. Clean and ready for sale
21	Do you process/treat UBC before selling
	a. Yes, (if yes, what processing do you do?)
	b. No
22	Specify the fate of UBC you get?
	a. Sell this to larger dealer
	b. Sell this to recycler,
	c. Sell this along with mixed paper,
	d. other....(please specify)
23	Specify the fate of straw?
	a. often found with packs (inside)
	b. sometimes found with packs (inside)
	c. normally not found with pack and is not collected
	d. you collect straw separately for selling
24	Anything which discourages you from dealing in UBC?
25	Any comment on how the collection of UBC could be improved?
26	Bale analysis: (4 bales to be analysed of about 100-150 kg each)
	a. kg of mixed paper waste bales
	b. kg of UBC

Annex IV: Landfill/Sub-station

Questionnaire 4.0 (Landfill/Sub-station Analysis)	
S. No	**Questions**
1	City
2	Date of survey (DD/MM/YYYY)
3	Name of Interviewer
4	Name of Supervisor
5	Name of ULB official present (with designation)
6	Truck Registration Number
7	Type of waste collected
	a. residential
	b. commercial
	c. institutional
8	Route of present waste collection
9	Location of Survey (dump site name)
10	Latitude & Longitude of survey
11	Driver details
12	Cell Number
13	Average quantity of waste collected per truck per trip (short description)
14	Total no of trips per day
15	Total number of trips per month
16	Time of survey and comment
17	Total waste load in kg
18	Total mixed paper load (kg)
19	Total Quantum of UBC in kg
20	Any other observations

Annex V: Recyclers

Questionnaire 5.0 (Recyclers)		
S. No		Questions
1		City
2		Date of survey (DD/MM/YYYY)
3		Name of paper mill and contact person
4		Address
5		Contact number and email
6		Cell number
7		Name of interviewer
8		Total average mixed paper waste collected and processed per month (in kg)
9		Type of paper and board manufactured
10		Price of mixed paper you buy (INR/kg)
11		Price of UBC you buy (INR/kg)
12		Who all are your suppliers of Mixed Wastepaper and UBC?
13		Which sources contribute mixed wastepaper UBC to your suppliers?
	a	Institution
	b	Commercial
	c	Residential
	d	Other
14		Which region contributes UBC and mixed paper to your paper mill?
15		Total mixed paper load in the truck (in kg)
16		Total quantity of UBC in kg found in mixed paper truck at paper mill
17		Total quantity of rejected material from pulper in a paper mill (kg/month)
18		Total quantity of UBC rejected during pulping (kg/month)
19		Fate of pulper rejected material
20		Fate of UBC rejected material
21		Other observations
22		Anything that discourages you from dealing in UBCs
23		What are the challenges to segregate the UBC from the mix?
24		If a segregation machine is installed in the paper mill, what will be the additional expenditure cost?
25		What do you do with the poly-Al if separated (during processing)?
26		Any comment on how the collection of UBC could be improved


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