

CPD Study on

Integrating Electric Three-Wheelers into Urban Transport Network: Challenges and Way Forward

Presentation By

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- **Introduction**
- **Analytical Framework of the Study**
- **Urban Public Transport System of Dhaka**
- **E3Ws Legal Institutional and Operational Issues**
- **Technical Evaluation of E3Ws**
- **Socio-economic Aspects Related with E3Ws**
- **Health and Environmental Aspects of E3Ws**
- **E3Ws in Public Transport System: Lessons from ASEAN Countries**
- **Recommendations**

1. Introduction

- Over the last several years, Electric Three-Wheelers (E3Ws) are the in discussion for two different reasons –
 - Since it is battery driven, so it is called “**Banglar Tesla**” – viewed as environment friendly low-speed transport medium of urban people.
 - Over the last one year the E3Ws are in wide-discussion because of urban cooperation, health and environmental concerns of used lead acid batteries, passengers' safety concerns and social concerns.
- Given its multi-dimensional importance, **CPD-Power and Energy Study** have initiated a study on E3Ws for an urban transport system point of view incorporated with issues related to –
 - Technical
 - Health & Environmental
 - Economical
 - Safety and social concerns
- Urban Public Transport System (UPTS) represents a **fundamental pillar of a sustainable transport system** and a key subsystem within the broader mobility framework in urban environments.
- In Bangladesh, about **41% of the population now lives in urban areas**, further amplifying the need for effective and accessible transportation solutions (World Bank, 2024).

1. Introduction

- **Safety Concerns:** 16.5% of road accidents in 2024 were caused by electric three-wheelers and the death share by E3Ws is 21.01% which is one-fifth of the deaths by accidents (BRTA, 2024).
- E3Ws consumed nearly **5% of the country's total electricity generation**, approximately **750 MW per day** (The Daily Star, 2024).
- The primary concern lies in the **unauthorized charging practices**, where many operators draw electricity directly from local lines instead of approved charging stations.
 - In Dhaka, **48136 illegal charging points** whereas government **approved charging stations are 3300**.
 - This illegal charging stations accounts for the **loss of 4000 crore BDT annually** (The Daily Star, December 2025).
- E3Ws uses Lead Acid Batteries while it has severe health impacts during informal recycling of used lead acid batteries (ULABs).
 - Only **20% of the used lead acid batteries** (ULABs) are being **recycled formally** and consequently, the government incurs a significant tax revenue loss every year(SMEP, April 2024).
 - Currently, **1100+** used lead acid battery recycling informal factory in Bangladesh (Pure Earth, 2020).
 - **60% of children** in **South Asian countries** suffer from lead poisoning, and about **35 million children** in **Bangladesh** have dangerously high levels of lead exposure (UNICEF Bangladesh, November 2024).

1. Introduction

- Despite the **significant potential** of these E3Ws, their rapid and unregulated expansion has generated **multiple concerns**, highlighting the urgent **need for an organized, regulated**, and compliant urban transport system.

- The objective of the study are as follows:
 - To **review and identify the gaps in Dhaka's UPTS**, especially the slow-moving motorized rickshaws with their policy, law, institutions, authorizations, etc.
 - To **undertake critical analysis on technical and structural compliance** of existing electric rickshaws with a view to ensure –
 - ✓ Passengers' road safety.
 - ✓ Environmental compliance.
 - ✓ Urban transport system management.
 - To **analyze social and economic aspects related** to the battery rickshaws in Bangladesh considering the rising issues and concerns.
 - To **analyze environmental and health related consequences** of battery rickshaws in Bangladesh in view of growing concern related issues.
 - To **put forward a set of comprehensive recommendations** of battery rickshaws which will comply with **urban transport system, required standard for technical aspects, and cover the social, economic, health and environmental aspects.**

Analytical Framework

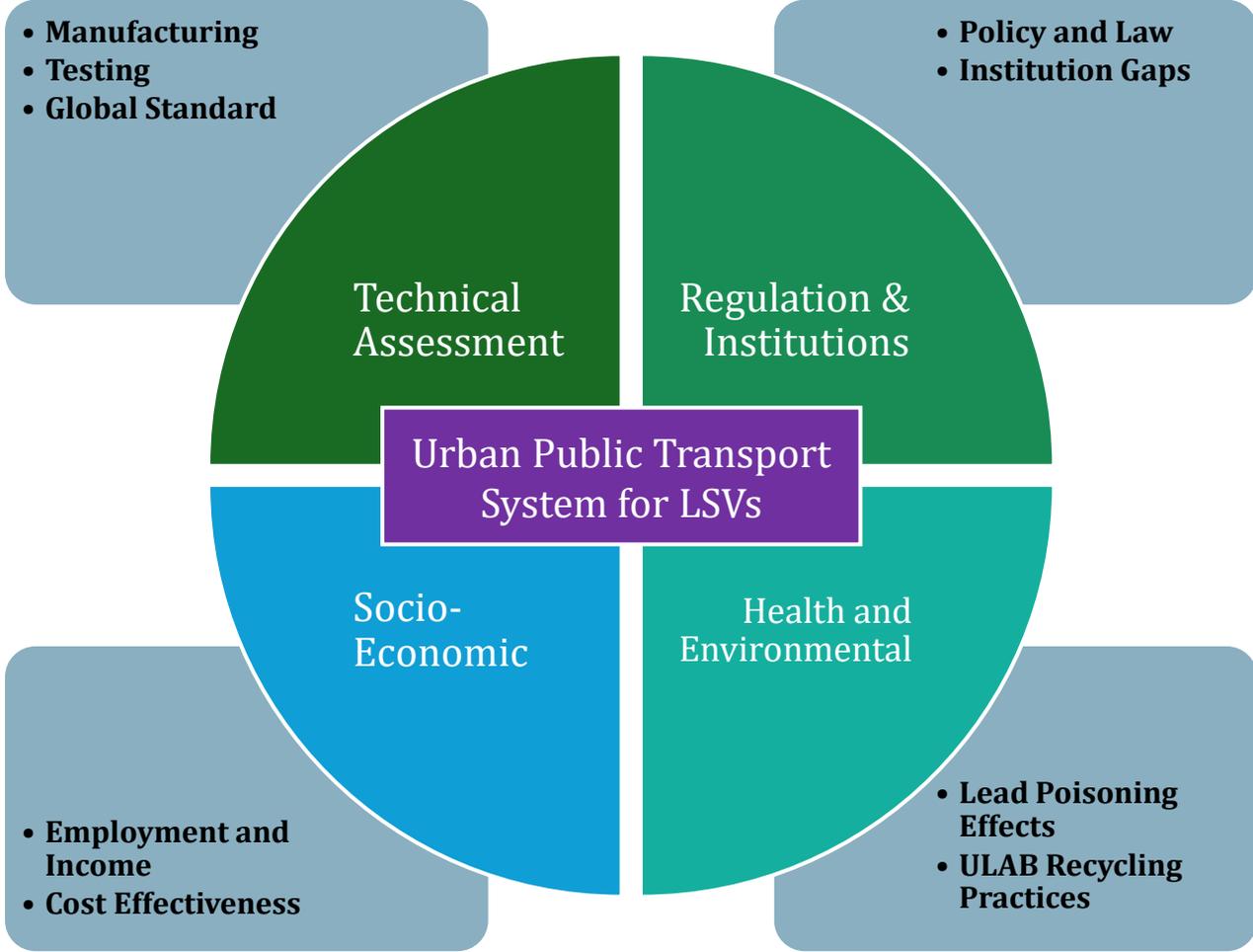
2. Analytical Framework of the Study

The study put focuses on four aspects of E3Ws (Figure 2):

- **Regulation and Institutions related to E3Ws**
 - Existing E3W regulations in Bangladesh, the current urban public transport scenario, and global best practices for LSV operation and management.
- **Technical Assessment**
 - Technical issues of vehicles, manufacturing guidelines and testing phases, and a comparison with global LSV manufacturing and testing standards.
- **Socio-economic Impacts of E3Ws**
 - Income of E3W drivers and garage owners, drivers' previous occupations and reasons for entering the sector, and the cost-effectiveness of E3Ws compared to other vehicle types.
- **Health and Environmental Impacts.**
 - Health and environmental impacts of lead poisoning from widespread use of lead-acid batteries in E3Ws, including lead contamination statistics, ULAB recycling practices, and associated economic losses from informal recycling.

Overall, these four aspects have been analyzed from the point of Urban Public Transport System for Low-Speed Vehicles.

Figure 2. Analytical Framework of the Study



Source: Author's Illustration

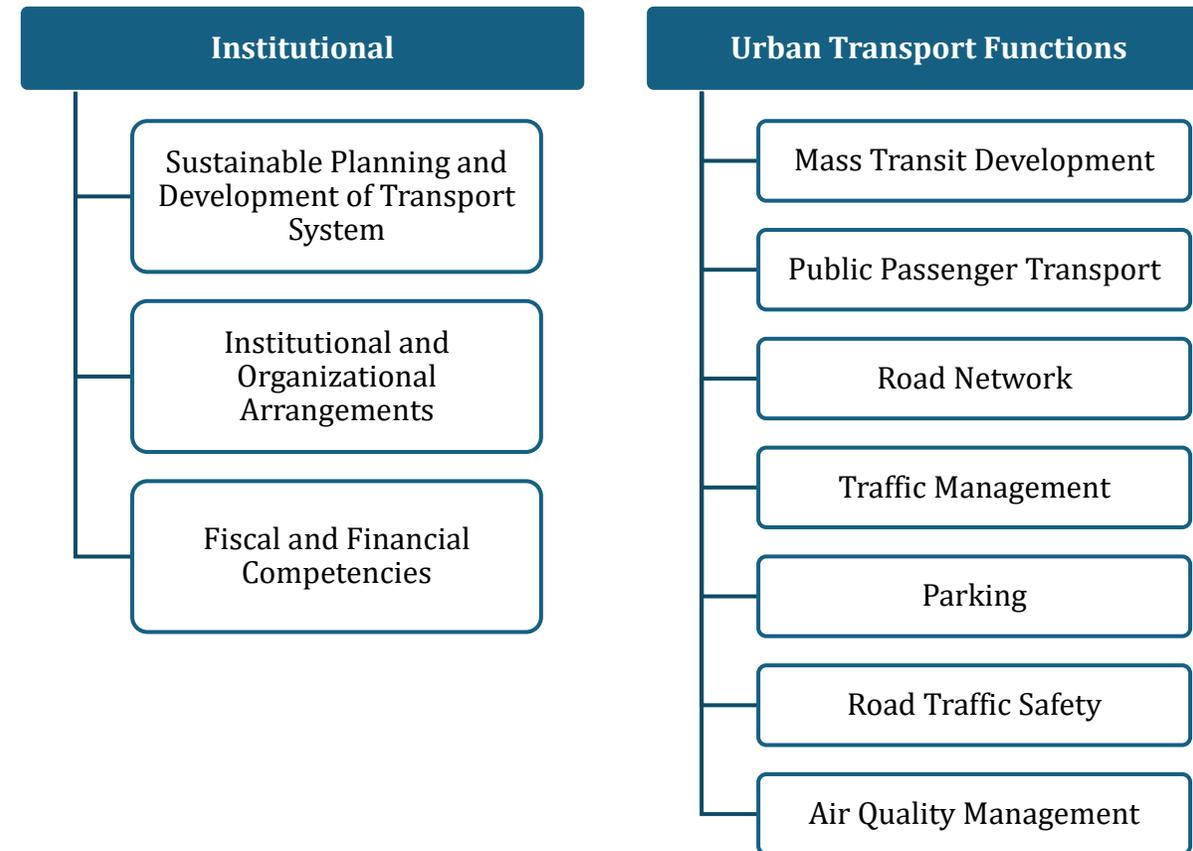
2. Analytical Framework of the Study

The **analysis frame** of a Standard Urban Transport System are as follows (Figure 3):

▪ Institutional

- **Sustainable Planning and Development of Transport System:** The formulation and implementation of long-term, environmentally sustainable, and socially inclusive transport strategies to ensure efficient urban mobility.
- **Institutional and Organizational Arrangements:** Institutional structures, mandates, and coordination for effective urban transport governance and management.
- **Fiscal and Financial Competencies:** The capacity of institutions to mobilize, allocate, and manage financial resources required for planning, operating, and maintaining the urban transport system.

Figure 3. Analysis Frame of a Standard Urban Transport System



Source: World Bank Reports (2013)

2. Analytical Framework of the Study

▪ Urban Transport Functions

- **Mass Transit Development:** Planning and management of high-capacity public transport (metro, BRT, commuter rail) to accommodate large passenger volumes.
- **Public Passenger Transport:** The oversight regulation, and provision of services that enables safe, affordable, and reliable mobility for the public through buses, minibuses, or other shared modes .
- **Road Network:** Development and maintenance of urban roads and infrastructure for smooth traffic and pedestrian flow.
- **Traffic Management:** The techniques and regulations are used to control vehicle flow, reduce congestion, and enhance safety through signal systems, lane management, and traffic control measures.
- **Parking:** The planning, regulation, and administration of on street and off-street parking facilities to ensure efficient land use and reduce traffic congestion.
- **Road Traffic Safety:** The policies and interventions aimed at reducing road crashes, injuries, and fatalities by improving infrastructure, enforcement, and user behavior.
- **Air Quality Management:** The monitoring and regulation of emissions from the transport sector to minimize air pollution and protect public health and environmental quality.

Urban Public Transport System of Dhaka

3. Urban Public Transport System of Dhaka

3.1 Overview

- Total vehicle registration in Dhaka between 2010 and June 2025 are **2270631 registered vehicles** (Table 1).
- This rapid expansion is **dominated by the Motorcycle** segment.
 - A cumulative total **exceeding 1.23 million**, accounts for **over half of the total registered fleet** (BRTA, 2025).
- Vehicle speeds in Dhaka have plummeted over time:
 - **Average speed dropped from 21 km/h** a decade ago to **as low as 4.5 km/h (or 4.8 km/h in some reports)** in recent years.
 - Contributing to severe congestion, **productivity losses** and **economic losses**.
- This **infrastructural gap** is causally linked to severe environmental externalities as follows:
 - **Heavy congestion**
 - **Air quality degradation with PM 2.5 and NO2 concentrations significantly exceeding** healthy limits.
 - **Road transport generating approximately 2,000 thousand tonnes of CO2 in 2022** (*Asian Transport Observatory, December 2024*).

Table 1. List of Registered of Vehicles in Dhaka

Type of Vehicles	Grand Total (From: Jan 2010 to June 2025)
Ambulance	6141
Auto Rickshaw	20980
Bus	43398
Cargo Van	9063
Covered Van	42968
Delivery Van	27365
Human Hauler	4752
Jeep (Hard/Soft)	86163
Microbus	103591
Minibus	10291
Motorcycle	1239548
Pick Up (Double/Single Cabin)	124086
Private Passenger Car	353539
Special Purpose Vehicle	2620
Tanker	3290
Taxicab	30136
Tractor	39213
Truck	87096
Others	34985

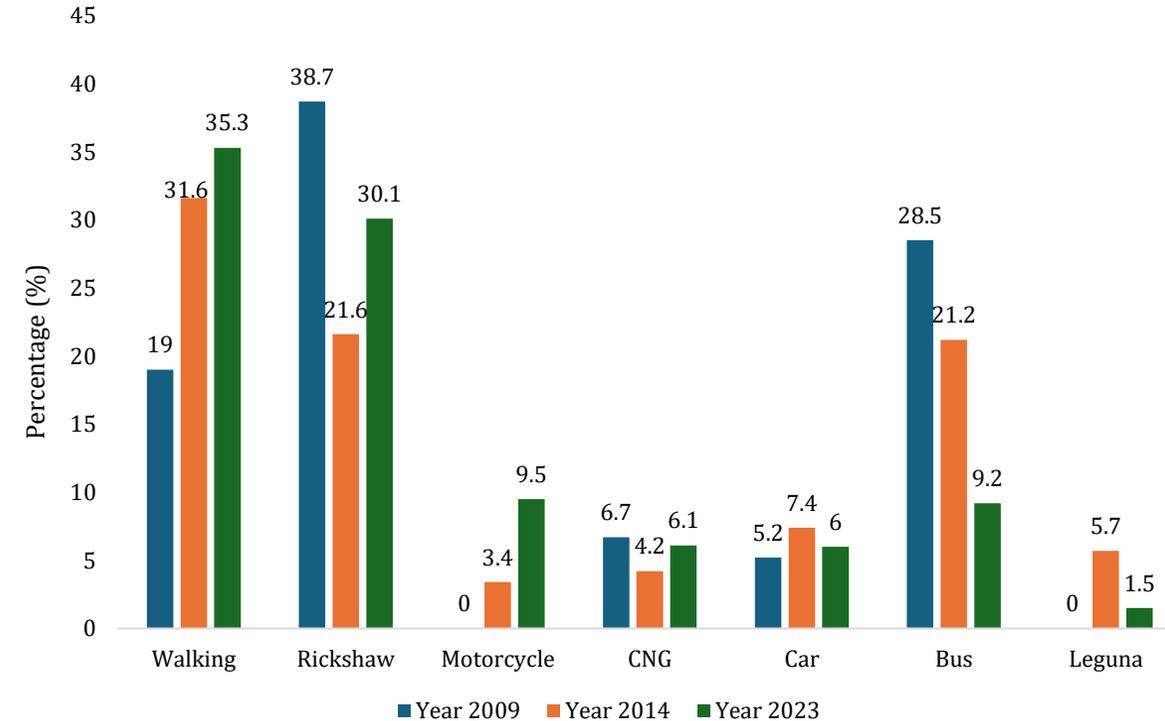
Source: BRTA (2025)

3. Urban Public Transport System of Dhaka

3.2 Modal Shares

- In 2009 JICA Dhaka Urban Transport Network Development Study (DHUTS) reported:
 - Modal shares of **38.7 % rickshaws, 28.5 % public buses, 19% walking, 6.7 % CNG, and 5.2 % cars** (JICA, March 2010).
- According to the URSTP Household Interview Survey conducted in 2023 shows that:
 - **Daily trip generation reached 38.7 million.**
 - Of which **35.3 % were walking trips, 30.1 % were by Rickshaw.**
 - **6.1 % by CNG, 9.5 % by motorcycles, 9.2 % by buses, 1.5% by legunas and 6 % by cars** (Figure 4).

Figure 4. Change of Modal Share from 2009 to 2023



Source: JICA (2023)

Poor urban transport management system increases congestion in the road, reduces the modal share of public busses and increases the modal share of rickshaw and motorcycles. The severe traffic congestion reduces the average speed of the vehicle.

3. Urban Public Transport System of Dhaka

3.3 Evaluation of Dhaka’s Transport System

Table 2. Key Observations on Dhaka’s Urban Transport System

Dimension	Aspects	Key Observations
Institutional	Sustainable Planning & Development	Guided by STP & URSTP; focus on mass transit, non-motorized transport, and sustainability; implementation slow, fragmented; weak integration with land use planning.
	Institutional & Organizational Arrangements	Multiple agencies (DTCA, BRTA, DMP, city corporations) with overlapping roles; poor coordination, delayed decisions, weak enforcement; limited capacity for data-driven policy.
	Fiscal & Financial Competencies	Public transport funding constrained; reliance on government budgets & international aid; capital-intensive projects with long payback; underutilized revenue mechanisms (tolls, congestion pricing).
Urban Transport Functions	Mass Transit Development	Metro rail partially operational; BRT and elevated expressways underway; buses remain main mode; private vehicles growing; network limited and unreliable.
	Public Passenger Transport	Buses, minibuses, auto-rickshaws dominate; fleet aging, irregular schedules, weak safety; passenger dissatisfaction high, especially among vulnerable groups.
	Road Network	Coverage 7–8% (3,000 km); Narrow, discontinuous, poorly maintained; weak hierarchical planning; encroachment reduces capacity.
	Traffic Management	Limited infrastructure and enforcement; peak-hour speeds 4–5 km/h; heterogeneous traffic worsens congestion and accidents.
	Parking	Severe shortage; dominated by on-street parking; off-street limited/expensive; illegal parking contributes to congestion.
	Road Traffic Safety	High accident rates; pedestrians and non-motorized users most vulnerable; insufficient footpaths, signage, crossings; inconsistent enforcement and incomplete accident data.
Air Quality Management	Severe vehicular pollution; PM2.5 exceeds WHO guidelines 3–5×; partial mitigation via electrification & CNG vehicles; weak monitoring, regulation, and incentives for cleaner tech (<i>Asian Transport Observatory, December 2024</i>). .	

Source: Author’s Compilation based on Obtained Data

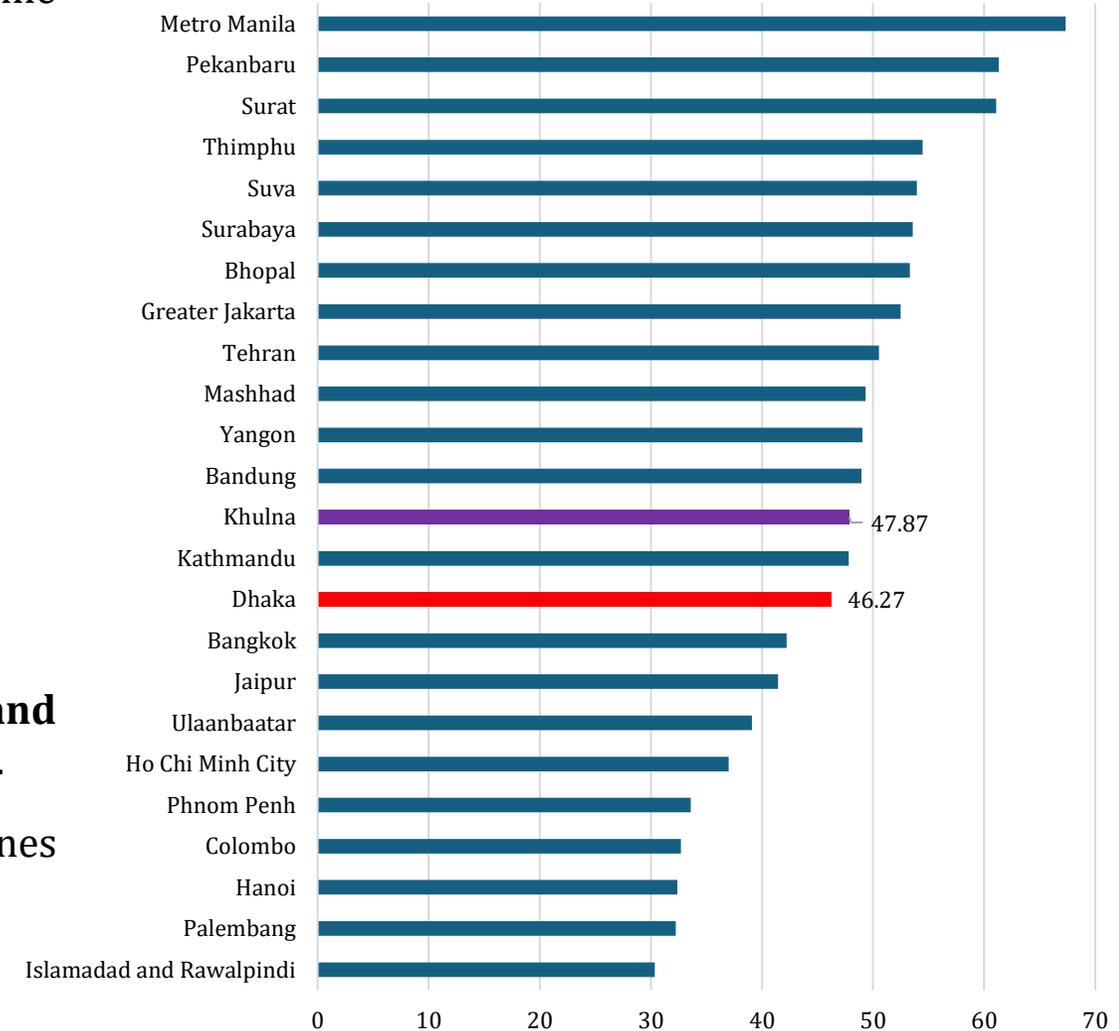
Multiple institutional overlapping roles slowed the progression of urban transport system. Roads are partially filled with temporary shops which makes the roads narrow and creates traffic jam. Air quality decreasing day by day and lack of planning to move towards Electric Vehicle.

3. Urban Public Transport System of Dhaka

3.4 Sustainable Urban Transport Index (SUTI) Score Comparison

- The **aggregate SUTI** score has been calculated based on the data of some **specific indicators** (ESCAP, 2022) which are as follows:
 - City mobility & public transport plan
 - Modal share of active and public transport
 - Accessibility to public transport
 - Quality & reliability of public transport
 - Traffic fatalities
 - Affordability of public transport
 - Operational costs of public transport
 - Investment in public transport
 - Air quality (PM10)
 - Greenhouse gas emissions from transport
- Under this measurement, Dhaka and Khulna cities positions are **10th and 12th** obtaining the SUTI score **46.27 and 47.87** respectively (Figure 5).
- Among these analyzed countries, the **Metro Manila** city of Philippines ranks highest among all of them.

Figure 5. SUTI Score of Major Asian Cities



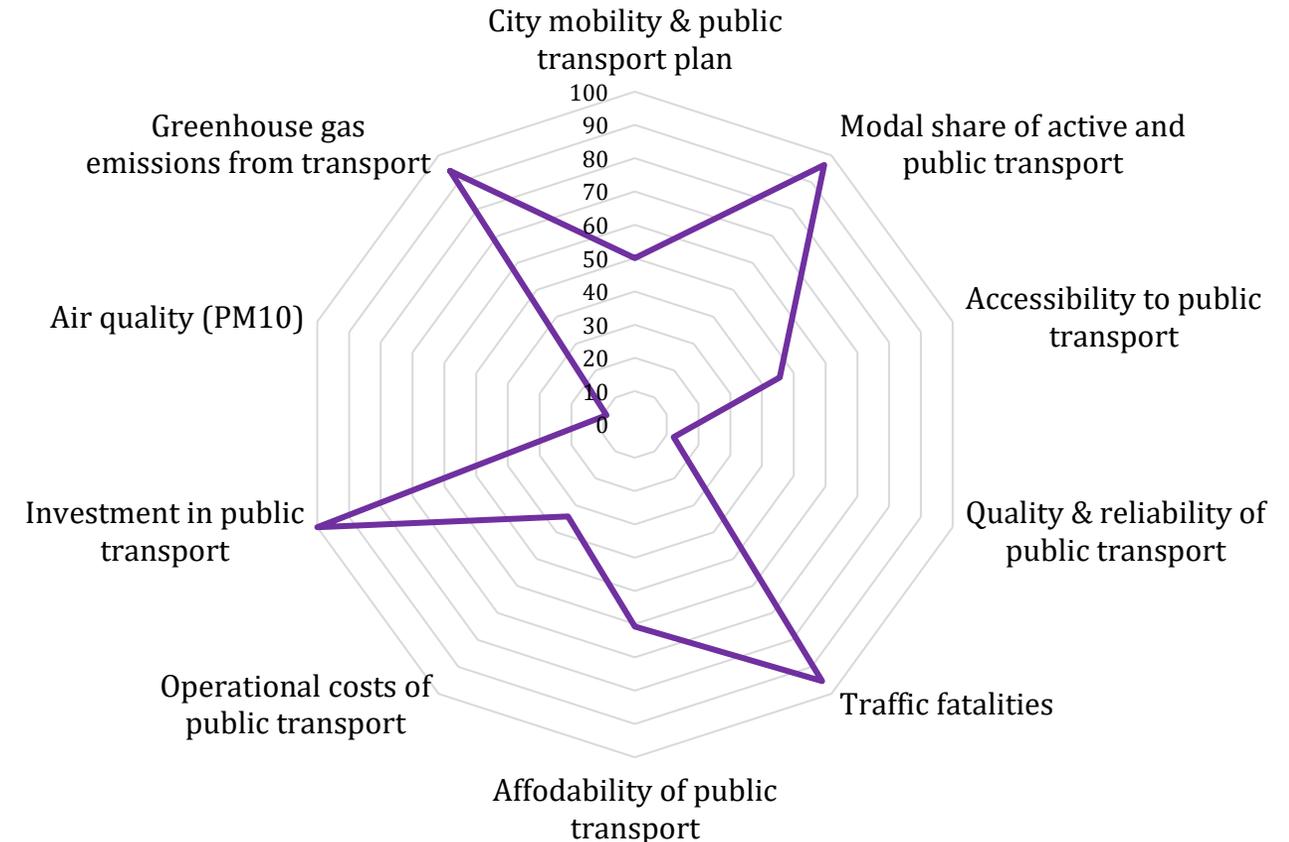
Source: ESCAP 2022

3. Urban Public Transport System of Dhaka

3.5 SUTI Score of Dhaka's Transport System

- The overall **SUTI score of Dhaka city is 46.27**, indicates the poor urban public transport system (Figure 6).
- **Weaknesses:**
 - Extremely low score indicates very **poor service quality of public transport**.
 - **High emissions** from vehicles, poor enforcement of emission standards, and **reliance on old, polluting vehicles**.
 - **Operational inefficiencies** and **inadequate planning** limit the system's effectiveness.
 - Score of investment in public transport: 100 indicates strong financial commitment, but effectiveness is low.

Figure 6. SUTI Score of Dhaka City



SUTI score is a globally recognized phenomena, where the score of Bangladesh in terms of better urban transport is so poor. Within this poor urban system, LEVs taking the role of mainstream transport system, creates congestion. FLM Transport support is requirement but under the present urban transport system, implementation will face challenges.

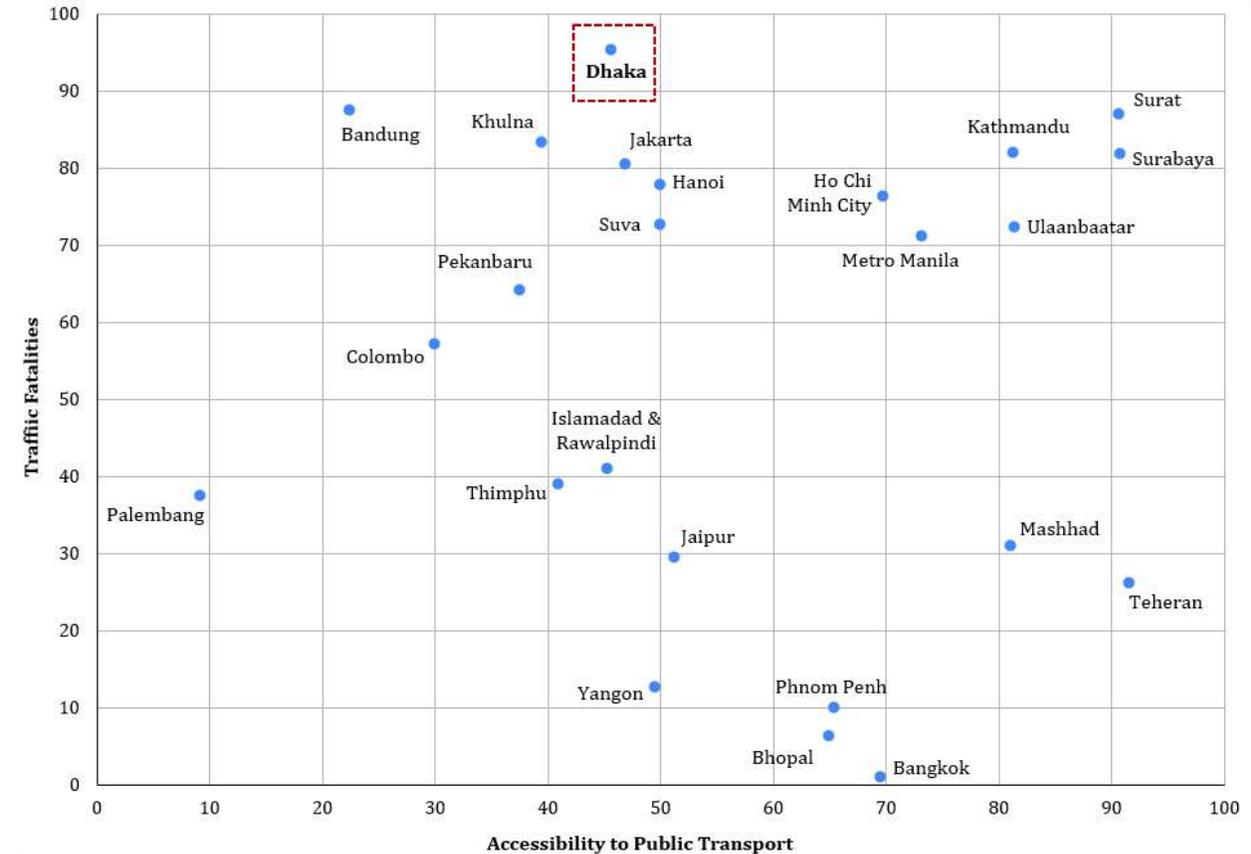
Source: ESCAP (2022)

3. Urban Public Transport System of Dhaka

3.6 Access of Public Transport and Traffic Fatalities across the Asian Cities

- Sustainable Development Goal (SDG) 11, target 2, urges United Nations member states:
 - “To provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, including women, children, persons with disabilities, and older persons.”
 - Progress toward this target is assessed by the proportion of the population with convenient access to public transport (Indicator 11.2.1) (ESCAP 2022).
- In this measure, public transport is considered convenient if the **nearest stop is within 500 meters** for low-capacity systems and **1,000 meters** of high-capacity systems (ESCAP 2022).
 - Under this measurement, Dhaka’s public transport scores **45.6 which ranks 17th** among the mentioned cities. Whereas **Khulna ranks 20** and the score was **39.48** (Figure 7).
- However, in terms of **traffic fatalities**
 - Dhaka ranks 1st among all of these countries which means the lower traffic fatalities
 - Khulna ranked 3rd by scoring 83.34 which also shows the lower traffic fatality (Figure 7).

Figure 7. Access of Public Transport and Traffic Fatalities across the Asian Cities



Source: ESCAP 2022

3. Urban Public Transport System of Dhaka

3.7 E3Ws in Major Cities in Bangladesh

Table 3. Scenario of E3Ws in Different Cities in Bangladesh

Location	Total E3Ws	Registration	Charging Stations	Sources
Dhaka	<ul style="list-style-type: none"> Around 2 Million inside Dhaka. 	<ul style="list-style-type: none"> Registered: 5% Unregistered: 95% 	Mostly informal home-based charging and small garage networks	The Business Standard, May 2025, Prothom Alo English, September 2025
Rangpur	<ul style="list-style-type: none"> City: 40k, 8 Upz: 100k Panchagarh: 6.5k 	<ul style="list-style-type: none"> Kurigram: 40k, Thakurgaon: 10k <ul style="list-style-type: none"> Registered: 6% Unregistered: 94% 	Majority Unregistered	Dhaka Post, September 2025, Dhaka Post, September 2025
Khulna	<ul style="list-style-type: none"> City: 30k Bagerhat: 7k Magura: 10k Meherpur: 12k 100k 	<ul style="list-style-type: none"> Jhineidah: 3.5k Jashore: 38k Kushtia: 17k Chuadanga: <ul style="list-style-type: none"> Registered: 7.9% Unregistered: 92.1% 	469 (Listed) Majority Unregistered	Dhaka Post, September 2025
Sylhet	<ul style="list-style-type: none"> City: 40k Sunamganj: 15k 	<ul style="list-style-type: none"> Registered: 18.2% Unregistered: 81.8% 	Mostly household/garage charging	Dhaka Post, September 2025
Rajshahi	<ul style="list-style-type: none"> City: 30k 9 Upz: 65k Joypurhat: 6.5k Shirajganj: 7k 106k 	<ul style="list-style-type: none"> Pabna: 64.5k Chapainawabganj: 6k Natore: 5k Naogaon: <ul style="list-style-type: none"> Registered: 8.8% Unregistered: 91.2% 	403 (Listed)	Dhaka Post, September 2025
Mymensingh	<ul style="list-style-type: none"> City: 40k 13 Upz: 30k Jamalput: 15k 	<ul style="list-style-type: none"> Netrokona: 15k Sherpur: 56k <ul style="list-style-type: none"> Registered: 23% Unregistered: 77% 	Mostly household/garage charging	Dhaka Post, September 2025
Chattogram	<ul style="list-style-type: none"> Above 300k inside City. 	<ul style="list-style-type: none"> Registered: 73.5k (24.5%) 	Mostly household/garage charging	The Business Standard, February 2023

Total E3Ws in Bangladesh is in around 6M whereas in Dhaka it is around 2M. Most of the major cities have the same scenario. Among these E3Ws, majority are unregistered and charging infrastructure are also illegal in most of the cases.

Source: Author's Compilation based on Secondary Data

E3Ws Legal Institutional and Operational Issues

4. E3Ws Legal Institutional and Operational Issues

4.1 Policy and Law Evaluation related to E3Ws

- There are **no comprehensive policy** which describes all the aspects of **E3Ws in Bangladesh**.
- However, several policy, guidelines are **partially discussed** about E3Ws.
- Those policies or guidelines has been evaluated by considering some key indicator related to E3Ws (Table 4).
- All the indicators are absent in Bangladesh Road Transport Act 2018 and EV Registration and Operation Policy 2023 (*Table 4*).

Table 4. Evaluation of Policy, Law, Ordinance and Guideline with respect to E3Ws

Metrics in Aspect of EW3s	Bangladesh Road Transport Act 2018	Electric Vehicle Charging Guidelines	Ordinance on Battery Rickshaw Operation 2025	EV Registration and Operation Policy 2023	EV Industry Development Policy 2025
Legal Recognition and Classification	Absent	Partially Present	Present	Absent	Not Recognized
Operational Rules & Urban Transport Integration (FLM)	Absent	N/A	Weak	Absent	Absent
Safety & Technical Standards	Absent	Present	N/A	Absent	Partially Present
Registration & Licensing	Absent	Present	Present	Absent	Present (EV)
Charging, Batteries & Infrastructure	Absent	Present	Absent	Absent	Present (EV)
Environmental & Sustainability Alignment (Disposal)	Absent	Partially Present	Absent	Absent	Present
Economic & Financial Provisions	Absent	N/A	Absent	Absent	Present

Source: Author's Analysis.

Absence of E3Ws and FLM support content in all the policy and guidelines which are the core challenges in integrating E3Ws in Urban Transport Network.

4. E3Ws Legal Institutional and Operational Issues

4.1 Policy and Law Evaluation related to E3Ws

- There are partial presence of regulating E3Ws in other documents, such as Electric Vehicle Charging Guidelines, Battery Rickshaw Operation 2025.
- The key observations are **no formal recognition of LEVs**, and the **absence of policy documents for organizing FLM transport system in Bangladesh**(Table 5).
- Absence of proper distribution** or road network creation **for implementing E3Ws**.
- However, there are countries like Thailand, Philippines have the policies and strategic plan to integrate Electric Tuk-Tuk and E-Jeepneys into their urban public transport system as Low Electric Vehicles (LEV).

Table 5. Gaps of Policy, Law, Ordinance and Guidelines for Integrating E3Ws Urban Transportation

Names	Key Gaps Identified for Integrating E3Ws in Urban Transport System
Bangladesh Road Transport Act 2018	<ul style="list-style-type: none"> No formal definition or classification of electric rickshaws. No EV or battery-related provisions (charging, safety, disposal, swapping). No FLM integration measures within urban transport planning. No incentives or financial support mechanisms for E3W operators.
Electric Vehicle Charging Guidelines	<ul style="list-style-type: none"> No regulatory guidance for home-based or informal e-rickshaw charging setups. No framework for battery-swapping stations widely used by E3Ws. No provisions linking charging infrastructure with E3W-dominant FLM routes or hubs.
Ordinance on Battery Rickshaw Operation 2025	<ul style="list-style-type: none"> No concrete route/ road network plan for operation of E3Ws. Absence of proper distribution of E3Ws in different routes. Lack of analysis on integrating E3Ws in transport system.
EV Registration and Operation Policy 2023	<ul style="list-style-type: none"> No recognition of E3Ws under EV. Absence of classification of LSEV and HSEV.
EV Industry Development Policy 2025	<ul style="list-style-type: none"> No recognition of E3Ws as Low Speed Electric Vehicle. Absence of FLM transport and its importance. Mainly discusses about E4Ws.

Source: Author's Analysis.

4. E3Ws Legal Institutional and Operational Issues

4.2 Regulatory Institutions and Responsibilities to Launch New Easy Bike

- Dhaka City Corporation (North and South) are taking the **main responsibility** to regulate the newly developed easy bike by BUET Team (Figure 8).
 - BRTA is not involved, as these low-speed vehicles are ineligible for highway permits.
 - DCC is responsible for vehicle registration, driver licensing, training programs, manufacturer standards, and law/policy enforcement.
 - BUET's Heat Engine Lab authorized for type testing of new vehicles.
 - DNCC and DSCC launched driver training in 10 zones (five per city). DNCC pilot training locations: Mohakhali Zone 3 (2 points), Mohammadpur Zone 5 (1 point), Mirpur Zone 4 (2 points).
 - Each training point can train 300–400 drivers daily; as of 4 Nov 2025, 8,000 drivers have been certified.

Figure 8. Regulatory Institutions and Responsibilities

DNCC and DSCC Dhaka North & South City Corporation

- The main body to control this vehicles inside Dhaka.
- Local Municipalities will take the control outside Dhaka similarly.
- Provide new license to the driver.

BRTA Bangladesh Road Transport Authority

- No direct involvement.
- Few officials from BRTA are in the team along with City Corporation to support and assist in implementation.

BSTI Bangladesh Standards and Testing Institution

- Approval for motors, controller, batteries and chargers.

BIDA Bangladesh Investment Development Authority

- Provide approval to manufacturer and assembler

BITAC Bangladesh Industrial Technical Assistance Center

- Evaluates prototypes and approves companies for manufacturing standardized electric rickshaws that meet government specifications.

BUET Bangladesh University of Engineering and Technology

- New vehicles need undergo with the testing phases of BUET Heat Engine Lab.
- Approves the type of the vehicle.

Source: Author's Illustration based KII

4. E3Ws Legal Institutional and Operational Issues

4.3 Flaws in New Vehicle Implementation Approach

- Several **shortcomings** have been identified in the **current approach** to introducing new vehicles into the transport system.
 - KIIs with E3W stakeholders revealed **no comprehensive plan for integrating E3Ws** into the current transport network, especially regarding the phase-out of older models (Table 6).
 - **Road network creation** and **phase out** of existing E3Ws are **not transparent**.
 - The major concern of **lead contamination** and its negative effects are still **unaddressed** by the officials related to this.
 - A sustainable plan on integrating new E3Ws and regulated charging system are still missing in the present plan.

Table 6. Evaluation of Present Approach of Implementing E3Ws

Metrics	Observations
Zone or Network Creation for E3Ws	Weak.
Zone-wise Distribution Plan	Absent
Phase-out Plan for Existing E3Ws	Unclear
Incentive Approach to Adopting New Vehicles	Absent
Phase out of Lead Batteries	Absent
Concern of Lead Battery Health and Environmental Effect	Absent
Battery Recycling and Disposal Guideline	Absent

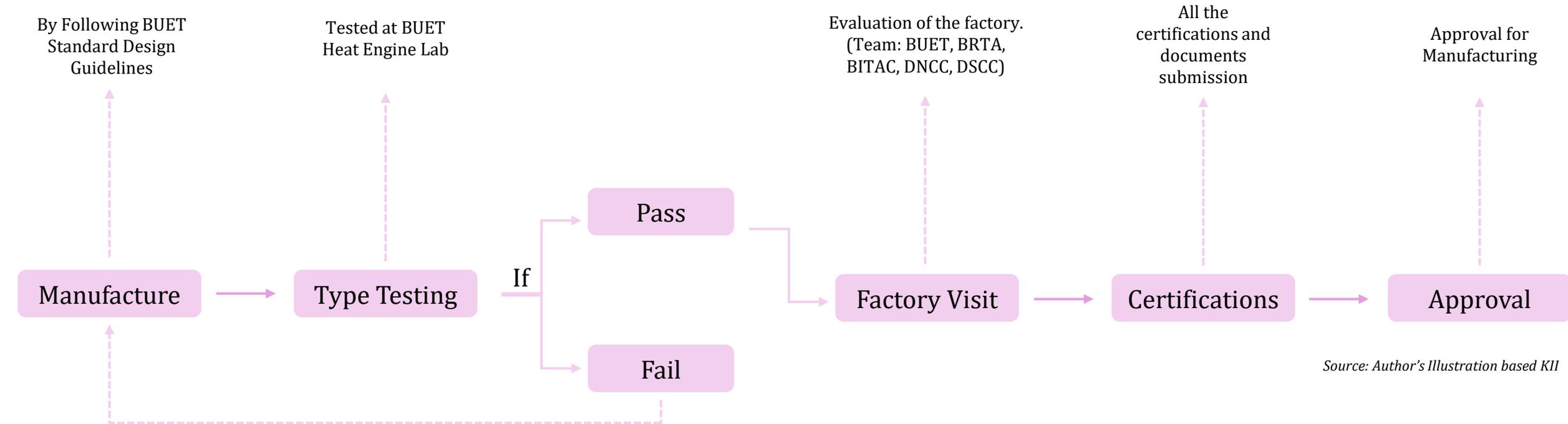
Source: Author's Observation.

Source: Author's Illustration based KII

4. E3Ws Legal Institutional and Operational Issues

4.4 Type Approval

Figure 9. Type Approval Chain of New E3W



Procedures:

- Type testing of the new vehicles are being conducted at Heat Engine Lab, BUET (Figure 9).
- All the manufacturer has to follow the **manufacturing guidelines** and should pass the testing phases of BUET.
- After passing the tests at BUET, the type of the vehicle will be approved.
- Then, city corporation team will do legal procedures such as factory visit and assessment, capacity assessment.
- After all the processes, a manufacturer got the license for manufacturing the new E3Ws.

Technical Evaluation of E3Ws

5. Technical Evaluation of E3Ws

5.1 Types of E3Ws in Bangladesh

Figure 10. Main Types of E3W in Bangladesh



(a)

(b)

(c)



(d)



(e)

Source: Author's Capture and Finding

(a) Electric Rickshaws, (b) Electric Converted Pedal Rickshaw, (c) Electric Van, (d) Electric Mishuk, (e) Electric Easy Bikes

These are the core designs of E3Ws in Bangladesh. However, apart from this there are lots designs are present in Bangladesh. This creates questions on the quality of the vehicles.

5. Technical Evaluation of E3Ws

5.1 Types of E3Ws in Bangladesh

Common Specifications:

- Power consumption range of are in between **800 – 1500 W** (Table 7).
- The battery capacity range are in between **20 – 120 Ah**.

▪ The **chassis or body** of the E3Ws are totally **manufactured in Bangladesh**.

Braking System:

- Mostly uses rim brake or caliper brake, and mechanical brake at easy bikes.
- Easy bike has better braking system than Electric rickshaw, but it also needs to incorporate with advanced system.

Table 7. Detail specifications of different type of E3Ws

Metrics	Type 1: Electric Rickshaw	Type 2: Pedal Rickshaw (Electrical Converted)	Type 3: Electric Van	Type 4: Electric Mishuk	Type 5: Electric Easy Bike
Power Consumption	800-1200W	800W	800-1000W	800-1200W	1000-1500W
Battery Capacity	48/60V, 58-120Ah	48V 50-100Ah	48V	48V, 120Ah	60V, 120Ah
Body Size (Approx.)	2370* 990*1680 mm	2200* 850*1550 mm	2600*1100*1850 mm	2370* 990*1680 mm	2980*1180*1190 mm
Tire Size (W-D)	2-26	1.95-26	1.95-26	2.75-14	3.25-16
Payload Capacity	200-300 kg	120-150 kg	~450 kg	<300kg	420 kg
Brake System	Caliper Brake	Rim Brake	Rim Brake	Disc or Drum Brake	Drum or Disc Brake
Gradient	Less than 15 degree	Less than 12 degree	Less than 15 degree	17 -19 degree	17 -19 degree
Passenger Capacity	2	2	6-8	3	Large: 6-8 Small: 3-4

Source: Author's Compilation Based on Available Data

5. Technical Evaluation of E3Ws

5.2 Evaluation of Existing Vehicles (Manufacturing and Testing)

Table 8. Evaluation of Existing E3Ws in Aspect of Manufacturing and Testing

Indicators	Observed Performance	Remarks
Manufacturing Quality	Mostly produced by local workshops, no standard process of production followed.	Poor
Chassis/Body Structure	Entire body made locally, designs vary a lot from one to another workshop.	Poor
Design Standards Compliance	No adherence to standard design specifications.	Absent
Vehicle Weight-Speed Balance	Weight distribution poorly matched with operational speed.	Average
Converted Rickshaws	Pedal rickshaws are frequently converted to electric by installing motors, controllers, and battery.	Very Poor
Braking System	Mostly, caliper brakes were originally designed for low-speed pedal rickshaws. Easy bikes use disc or drum break without hydraulic feature.	Average
Headlights	Headlight positioned behind front mirror; no high/low beam control.	Average
Indicators	Most vehicles lack turn signals.	Absent
Weather Protection	Insufficient rain protection.	Average
Overall Safety	Instability and inadequate safety features.	Average
Standard Testing	Don't undergo any standard testing phases.	Poor

Source: Author's Compliance based on KIIs

*Evaluation Sequence (Low to High): Very Poor – Poor – Average – Acceptable – Good.

5. Technical Evaluation of E3Ws

5.3 Manufacturing and Testing Guidelines by BUET

- Bangladesh University of Engineering and Technology (BUET) has been working on standardizing the design of existing easy bikes, funded by the Bangladesh Energy and Power Research Council (BEPRC).
- Vehicle production under these guidelines requires major components, like BLDC motors, controllers, and differentials, to meet international standards, most of which are imported.
- The **recommended motor capacity ranges from 1000 to 1200 W**. The subsequent table outlines the detailed design specifications (Table 9).
- The key **mechanical features** incorporated in this design are as follows:
 - Hydraulic Brake System, Parking Brake
 - Half Door System, Front Cover
 - Changes in Driver Seat Size, Passenger Safety Net
 - Vehicle Identification Number, Rear View Mirror
 - Windshield Wiper, Any Weather Protection Cover
 - Sharp Corner, Ban of Rear Mirror

Table 9. Manufacturing Guidelines by BUET for New Easy Bikes

Parameters	Specifications
Width	Maximum 1.1m
Length	Maximum 2.5m
Height	Maximum 1.9m
Length/Width Ratio	Maximum 2.27
Ground Clearance	Minimum 140mm
Flore Height	Minimum 240mm
Carb Weight	325 – 425 kg (Including Battery)
Pay Load Capacity	Maximum 250kg
Rear Axle Length	37-39 inch (Hub Faceplate Out- Out), Differential and Parallel Motor Drive
Tire: Solid Rim Size	12-16 inches
Tire: Outer Diameter	20-23 inches
Tire: Width	Minimum 3 inch
Brake	Hydraulic Disk/Drum (All Three Wheel), Parking Brake
Spare Wheel	Rear Side or Under the Seat

Source: Author's Compliance based on KIIIs

5. Technical Evaluation of E3Ws

- The **electric features** incorporated in the design are as follows:
 - Position of Headlight
 - Tail Lamp
 - Power Cut-off Switch during Brake
 - Roof Light
- **Key Differences** between **BUET developed E3W** and **existing E3W** are as follows:
 - Better braking system.
 - Chassis build in consideration of motor and controller specifications.
 - Passenger safety during rain.
 - Headlight kept outside of vehicle
 - Regenerative braking system
 - Speed limit within 30 km/hr

Table 10. Testing Parameters for Type Approval of a New Vehicle

Parameters	Compliance Range
Maximum Speed Limit	27-30 km/hour
Acceleration Time (During High Speed)	Maximum 20 second
Maximum Distance during Braking	10m
Turning Radius	Maximum 3m
Gradient (With Payload)	Minimum 7 degrees (12%)
Water Resistance Capability	IP 67 Motor

Source: Author's Compliance based on KII's

Figure 11. BUET developed Easy Bike



Source: Author's Capture

Socio-economic Aspects Related with E3Ws

6. Socio-economic Aspects Related with E3Ws

6.1 Employment and Income (Drivers)

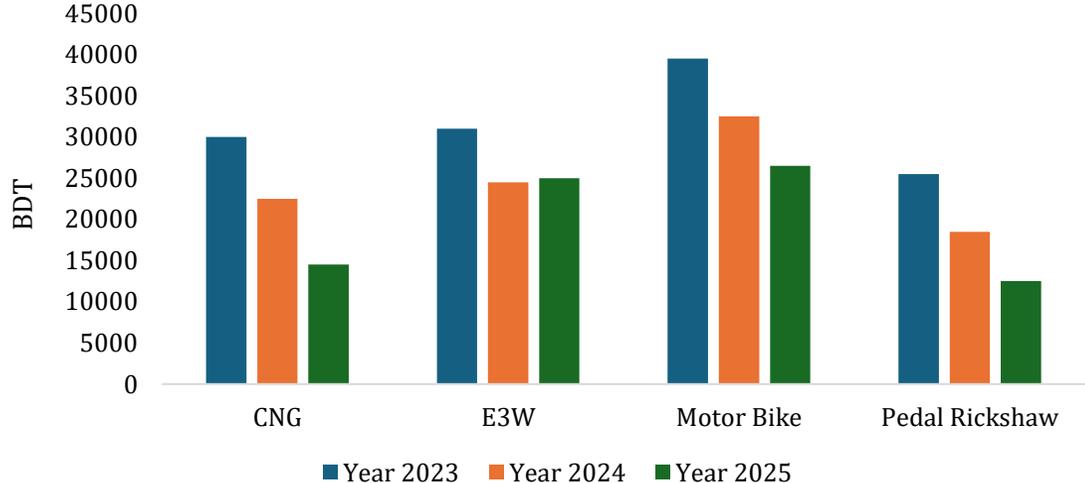
- Some key interview has been conducted to understand the income trends of different type of vehicle drivers in Dhanmoni-27 area, Dhaka.
- It reveals that:
 - The rapid expansion of E3Ws and riding long trips reduces the income of CNG and Pedal Rickshaw Drivers (Table 11).
 - **CNG income drops** from 30k to 22.5k 2023 to 2024, and it become worsen from 2024 to 2025, reduces from 22.5k to 14.5k according to survey conducted related areas at Dhanmondi 27 (Figure 12).
 - A similar **income drop occurs for pedal rickshaw**, from 26.5k to 18.5k in the year from 2023-24, and 18.5k to 12.5k in the year from 2024-25, respectively.
 - **Daily Deposit** for vehicle rent:
 - 550 BDT for easy bikes
 - 400 BDT for battery rickshaws
 - 500 BDT for Mishuks

Table 11. Average Monthly Income of Different Type of Vehicles in Dhaka City.

Vehicles	Avg. Monthly Income Year: 2023 (BDT)	Avg. Monthly Income Year: 2024(BDT)	Avg. Monthly Income Year: 2025(BDT)
CNG	28 – 32k	20 – 25k	13 – 15k
E3W	30 – 32k	23 – 25k	24 – 27k
Motor Bike	37 – 42k	32 – 33k	25 – 28k
Pedal Rickshaw	24 – 27k	17 – 20k	11 – 14k

Source: Author's Finding.

Figure 12. Income Decrease Trends of Different Vehicles



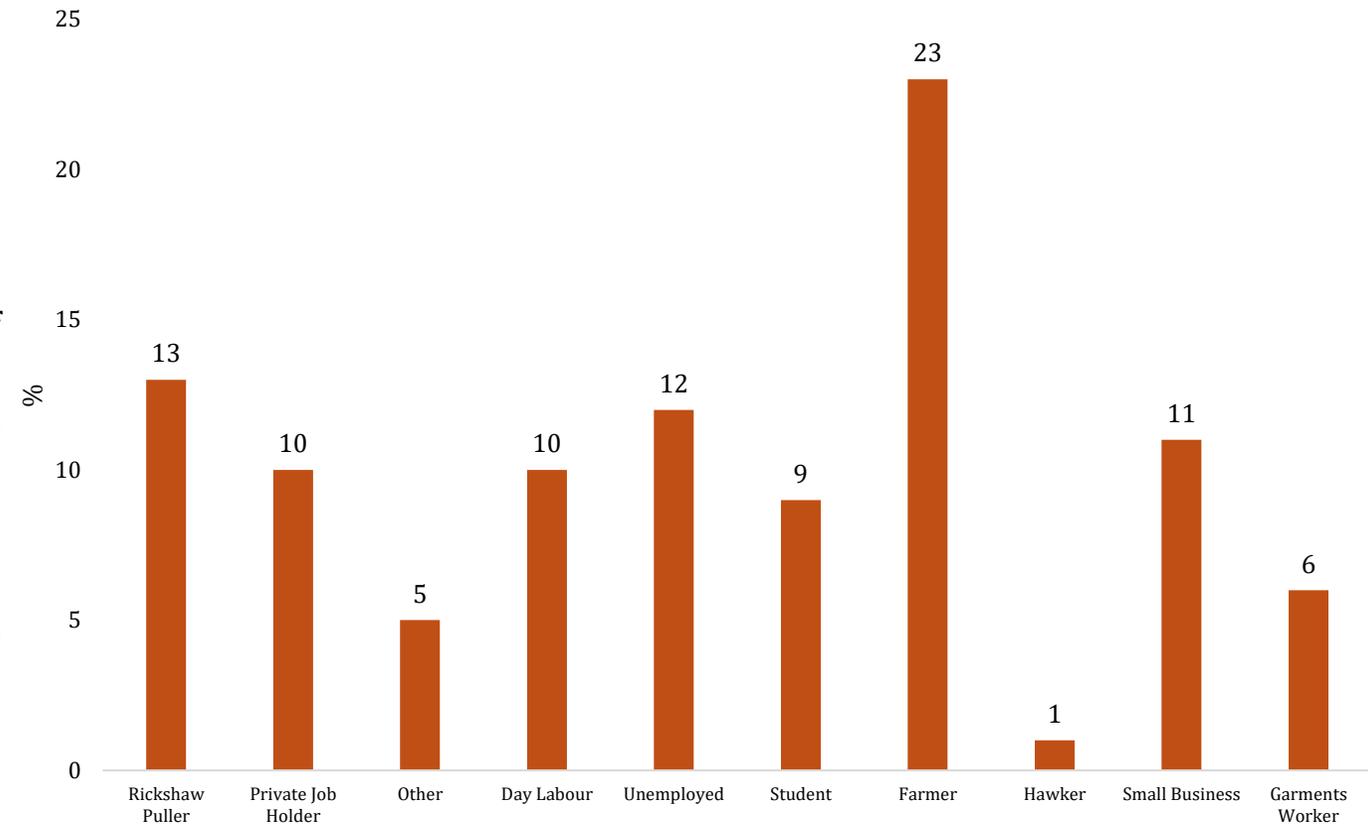
Source: Author's Finding

6. Socio-economic Aspects Related with E3Ws

6.1 Employment and Income (Previous Occupation)

- Most of the E3Ws driver have previous occupation history (Farmers, Day Laborers, Garments Workers) where the income was unstable and relatively poor than riding E3Ws (Figure 13).
- A survey conducted (**400 samples**) by (Pramanik et al., 2024) at **Rangpur City**, shows that:
 - Majority of farmers came to this job **during off season** of cultivating crops.
 - Garment worker and lay laborer whose **unstable income** insisted to drive E3Ws.
- The **low entry cost and flexible earnings** make E3Ws a crucial livelihood source in rural and peri-urban areas with limited formal employment opportunities.
- **Low Entry Cost:** Most E3Ws drivers live in garage with food and bath facilities where they need to pay 500 – 600 including the vehicle rent.

Figure 13. Previous Occupation of E3W Driver at Rangpur City



Source: Pramanik et al., (2024)

Source: Author's Finding

6. Socio-economic Aspects Related with E3Ws

6.1 Employment and Income (Garage Owners)

- Garage and workshop owners serving battery-run three-wheelers and earn from multiple sources:
 - Daily charging and recharging fees
 - Parking or rental fees
 - Routine servicing
 - Spare-parts sales (especially batteries),
 - Occasional vehicle sales.
 - Living facility for drivers (foods, baths, beds)

- Larger operators managing dozens of vehicles earn substantially more through per-vehicle rental fees and margins on charging services.
 - A **Kamrangirchar garage owner**, for example, **reported gross daily income of about BDT 4,000** against electricity costs of nearly BDT 2,000.
 - Many garages charge **fixed monthly parking** or rental fees of around **BDT 3,000 per vehicle**, creating reliable cash flow when hosting large fleets (The Business Standard, May 2024).
 - Garage owners typically host 40–60 battery-run rickshaws or easy bikes, benefiting from scale-based income generation (The Business Standard, May 2024).

Garage owner can be able to earn a lot of money as they charge 400 – 500 BDT per vehicle per day. Excluding all daily costs, gross income is around 4000 for a rickshaw garage owner having 40 rickshaws. The lower price of vehicle insisted people to come this sector.

6. Socio-economic Aspects Related with E3Ws

6.2 Cost Efficiency of E3Ws

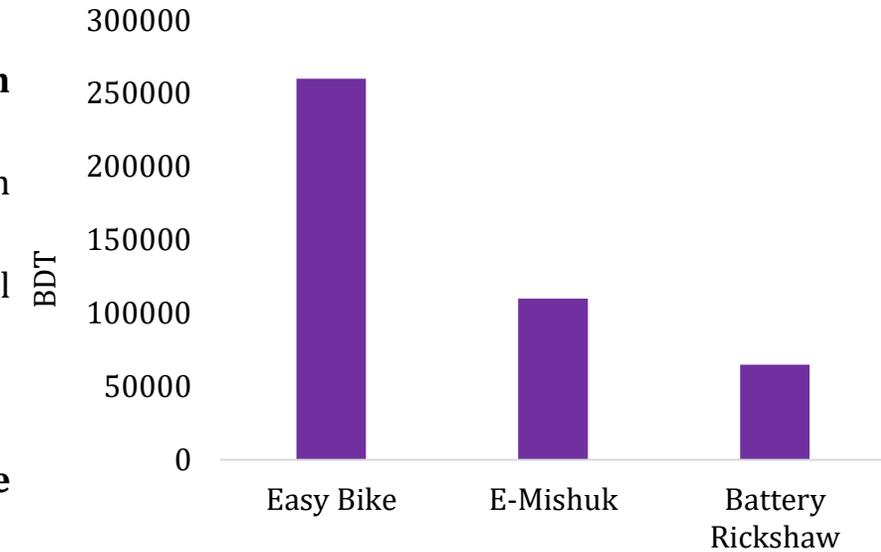
▪ Vehicle Prices:

- The **Easy Bike**, capable of carrying up to eight passengers, **costs between 2.5–2.65 lakh BDT** and offers a **mileage of 70–90 km** per charge (Figure 14).
- Battery Rickshaws are priced between **70,000–110,000 BDT**, with mileage ranging from **40–70 km per charge**.
- While the **Mishuk model** priced at **1.18–1.6 lakh BDT** provides **up to 80 km** of travel per full charge.

▪ Battery Price:

- **Lead Acid batteries** costing around **26–30k BDT**, with an **average lifespan of one year**, requires a regular maintenance(*KIIs*).

Figure 14. Price of Different Type E3Ws



Source: Dhakapost, September 2025

6.3 Protest Trends of E3Ws in Recent Times

- **May 2024** Mirpur clashes: 44–48 drivers arrested; hundreds of cases filed and in November 2024 Dhaka (Jurain) demonstrations: additional small-scale arrests and detentions (Figure 15).
- **April 2025** Chattogram confrontations: at least 33 arrests initially, rising to 51 after follow-up police actions.
- Smaller protests, sit-ins, and road blockades also resulted in sporadic arrests and vehicle seizures.

▪ Reason: Imposing ban on E3Ws

Figure 15. Recent Arrest Case History of E3W Drivers



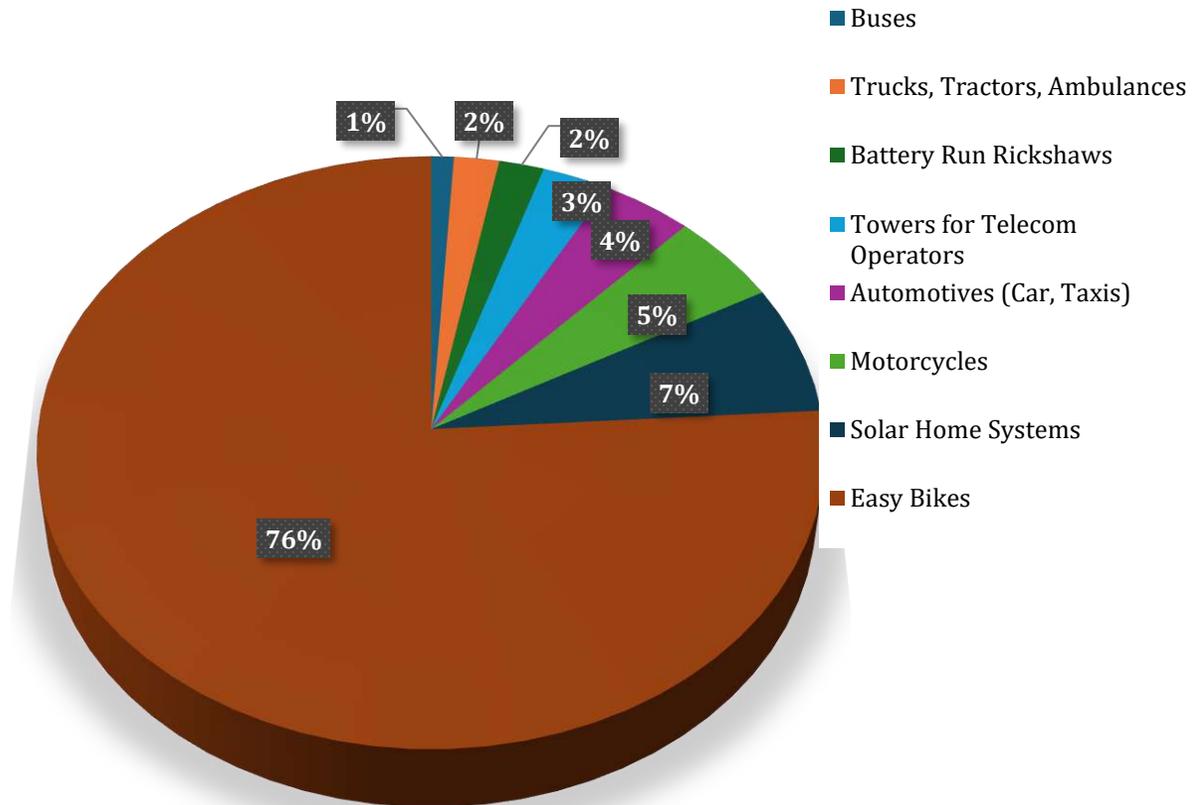
Health and Environmental Aspects of E3Ws

7. Health and Environmental Aspects of E3Ws

7.1 Lead Poisoning Effects

- The rapid growth of Bangladesh's electric three-wheeler (E3W) sector has intensified the use of lead-acid batteries, which contain **metallic lead (Pb) plates**, lead oxide, and sulfuric acid electrolyte with lead being the most toxic component.
- Globally, **lead-acid battery production** accounts for nearly **90% of total lead consumption**, making it a major source of environmental contamination.
- In Bangladesh, the **E-rickshaw and easy-bike segment consumes 78% of the total lead-acid battery market**, driving a parallel surge in informal and unsafe recycling of used lead-acid batteries (ULABs) (Figure 16).
- Lead has no safe level of exposure, and even small amounts can harm children's developing brains.
- Globally, lead exposure was responsible for over **1.5 million deaths** in 2021, primarily due to cardiovascular impacts, and contributed to 33 million years lost to disability (WHO, September 2024).

Figure 16. Lead Acid Battery Share in Transport Sector



Source: Pure Earth (2020)

7. Health and Environmental Aspects of E3Ws

7.1 Lead Poisoning Effects

- Studies and UNEP and Pure Earth assessments have identified hundreds to **over 1,100 informal ULAB recycling sites** (Figure 17) across the country, though many more operate unrecorded (Pure Earth, 2020).
- In Bangladesh, the crisis is severe, UNICEF, IEDCR, and icddr,b studies detected lead in the blood of **all 980 children tested in Khulna, Tangail, Patuakhali, and Sylhet, and among 500 children in Dhaka** (UNICEF Bangladesh, November 2024).
 - Shockingly, **40% of children in those four districts and 80% in Dhaka had blood lead levels (BLLs) exceeding the WHO's intervention threshold of 5 µg/dL** (UNICEF Bangladesh, November 2024).
- **Over 35 million children in the country have dangerously high lead levels** in their blood (UNICEF Bangladesh, November 2024).
 - The national **average BLL is 6.8 µg/dL**, and approximately **60% of Bangladeshi children suffer from lead poisoning** (Pure Earth, 2023).
- Health consequences are profound children experience in:
 - brain damage
 - loss of learning ability
 - behavioral disorders
 - while adults face heightened cardiovascular risks
 - women report increased rates of pregnancy complications.

Figure 17. Used Lead Acid Battery Informal Recycling Factory



Source: Pure Earth (2020)

7. Health and Environmental Aspects of E3Ws

7.1 Lead Poisoning Effects

- Bangladesh ranks as the **4th most lead-polluted nation in the world** (*UNICEF, 2024*).
 - **30,000 annual deaths** from lead-related diseases
 - **138,000 cardiovascular deaths** among adults over the age of 25 due to the lead exposure in Bangladesh.
- Only **20% of ULAB recycling occurs through formal, regulated channels**, with the remainder handled informally (*SMEP, April 2024*).
 - Resulting in a significant annual tax losses.
 - In November 2025, around **30 cows had died** due to severe lead contamination at Jamalpur (*Jamuna News, 2025*).
 - An outbreak of lead contamination occurs at a village of Magura, where **50 animal had died** through lead contamination.
- The **soil contaminated in Mirzapur, Bangladesh** in such a way that the color of the soil changes and local people claiming most of soils close to factory lost its fertility (*Figure 17*).

Figure 18. Soil Contamination due to Lead Poisoning at Mirzapur, Bangladesh



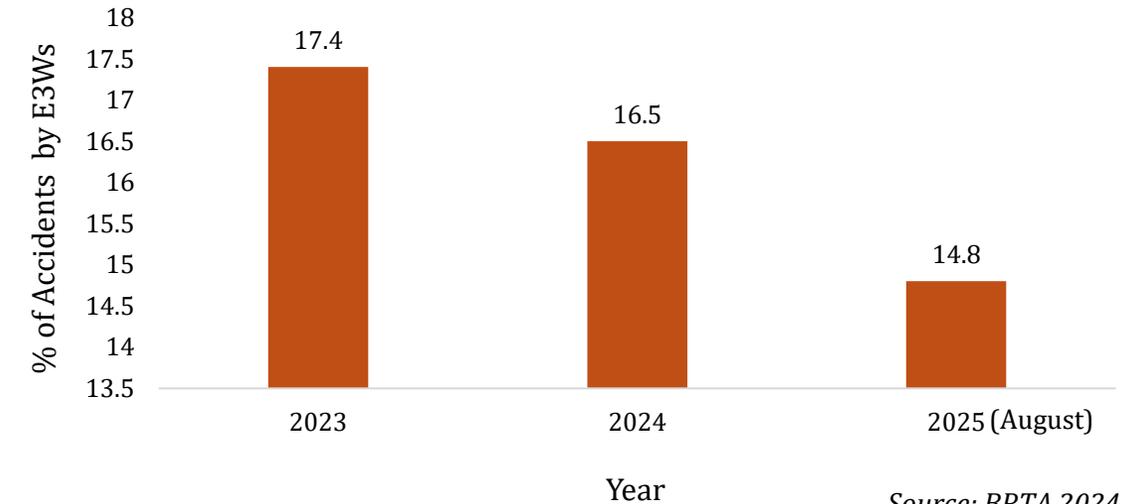
Source: France 24 (April 2024)

7. Health and Environmental Aspects of E3Ws

7.2 Accidents Trends By E3Ws

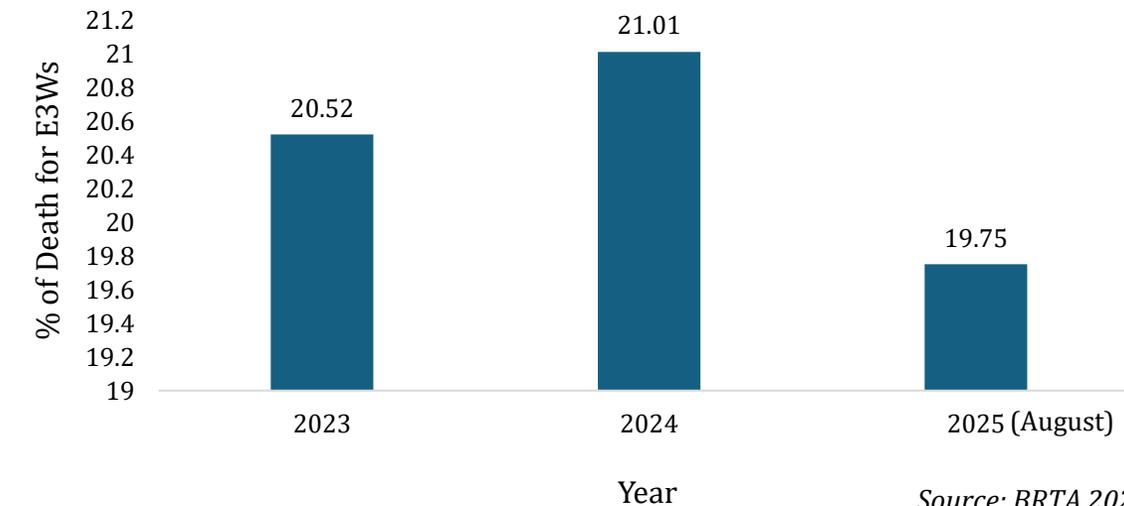
- The rapid and unregulated expansion of E3Ws has intensified traffic congestion and contributed to a high frequency of road accidents.
 - The **total number of accidents** through E3Ws from the year of **2023 to 2025 (August)** are respectively **1111, 1279, and 901** (BRTA, 2024).
 - Year-wise accident share by E3Ws are **17.4% in 2023, 16.5% in 2024 and 14.8% in 2025** (August) (Figure 19).
- However, the **death tolls** in these accidents are quite higher.
 - Around **797 peoples have been died in 2023**, and this numbers were increased in 2024.
 - The deaths caused by accidents through E3Ws in **2024 and 2025** (Till August) are respectively **980 and 739** (BRTA, 2024).
 - Year-wise **death share in accident by E3Ws** are **20.52% in 2023, 21.01% in 2024 and 19.75% in 2025** (August) (Figure 20).
- The persistently high share, hovering around **one-fifth of all road fatalities**, highlights the significant safety challenges associated with the rapid and largely unregulated expansion of E3Ws in the country.

Figure 19. Year-wise Accidents Shared by E3Ws



Source: BRTA 2024.

Figure 20. Year-wise Death Share in Accidents by E3Ws



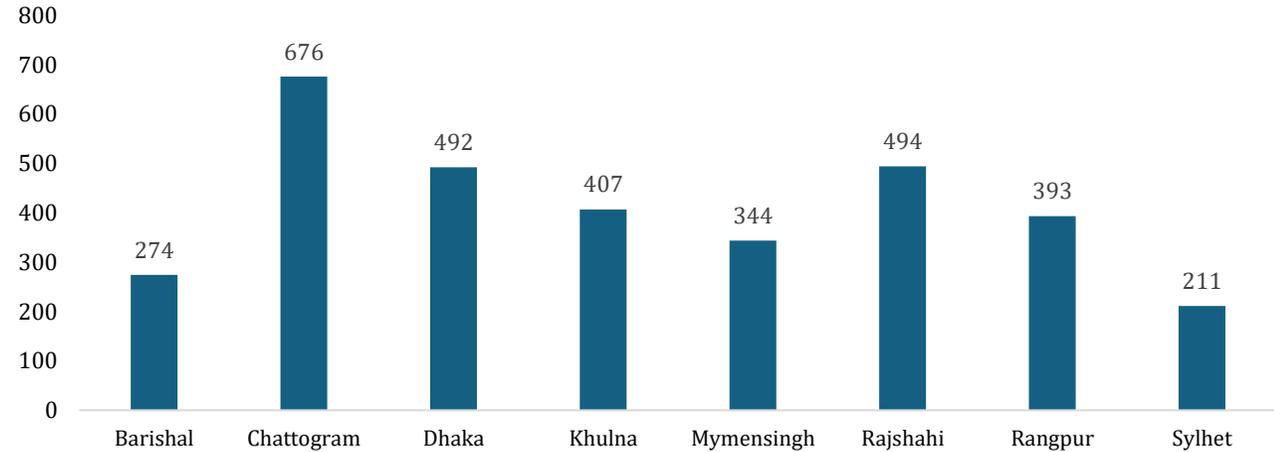
Source: BRTA 2024

7. Health and Environmental Aspects of E3Ws

7.2 Accident Trends By E3Ws

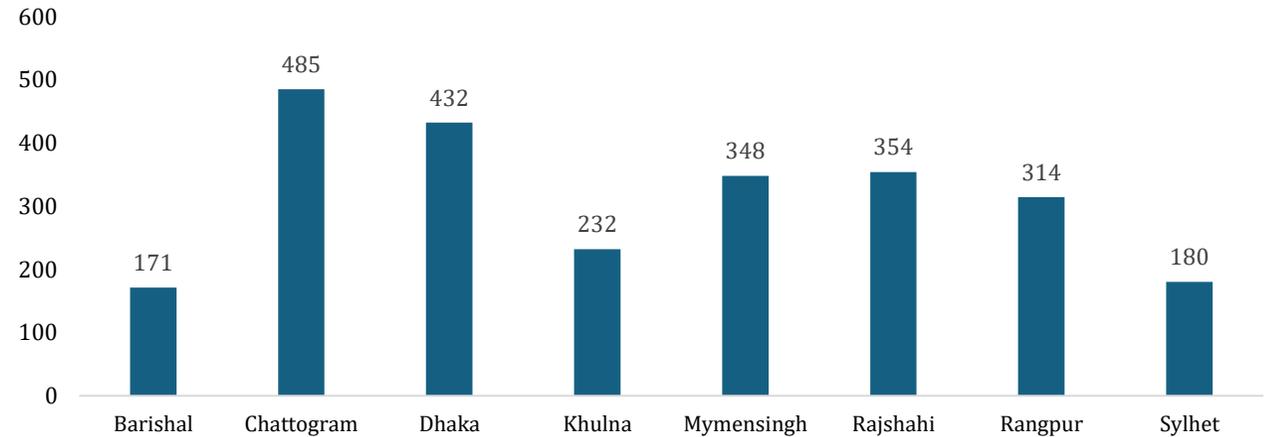
- The location-wise data from 2023 to August 2025 reveal significant geographic disparities in E3W-related accidents and deaths across Bangladesh.
 - **Chattogram reports the highest number of accidents (676) and deaths (485)**, indicating severe safety challenges in the region (Figure 21), (Figure 22).
 - **Dhaka recorded 492 accidents and 432 deaths**, while **Rajshahi shows 494 accidents and 354 deaths**.
 - In contrast, **Sylhet and Barishal consistently exhibit the lowest figures**, with **Sylhet reporting 211 accidents and 180 deaths**, and **Barishal recording 274 accidents and 171 deaths**.
- Mid-range regions like Khulna, Mymensingh, and Rangpur report notable E3W accidents and fatalities, highlighting widespread safety concerns.
- Overall, the spatial distribution highlights the need for region-specific regulatory measures, targeted enforcement, and localized safety interventions to effectively address E3W-related risks across the country.

Figure 21. Location-wise Accidents Year: 2023-2025 (Aug)



Source: BRTA 2024

Figure 22. Location-wise Deaths Year: 2023-2025 (Aug)



Source: BRTA 2024

E3Ws in Public Transport System: Lessons from ASEAN Countries

8. E3Ws in Public Transport System: Lessons from ASEAN Countries

8.1 ASEAN Guidelines for LEV

Table 12. ASEAN Standard Guidelines for LEV

Standard Categories	International Standard	Standard Details
Battery Performances	IEC 62660	Performance, reliability, and safety testing requirements for lithium-ion rechargeable cells used in electric vehicles.
Battery Swapping Requirements	IEC 62840	Electric vehicle battery swap system
Battery Testing	a. IEC 62660 b. ISO 18243	a. Performance, reliability, and safety testing requirements for lithium-ion rechargeable cells used in electric vehicles. b. Test methods and safety requirements for lithium-ion traction battery packs are used in electric road vehicles.
Charging Requirements	IEC 61851	Specifies requirements and safety guidelines for electric vehicle conductive charging systems
LEV Classifications	ISO 13062	Electric mopeds and motorcycles – Terminology and classification
Vehicle Approval	a. UNR 100 b. UNR 136 c. EU 168	a. Uniform provisions concerning the approval of vehicles concerning specific requirements for the electric power train b. Uniform provisions concerning the approval of vehicles of category L with regard to specific requirements for the electric power train c. Approval and market surveillance of two- or three-wheel vehicles and quadricycles
Vehicle Safety	a. ISO 13063 b. ISO 18243 c. ISO 18246 d. ISO 26262	a. Electrically propelled mopeds and motorcycles: Safety Specifications b. Electrically propelled mopeds and motorcycles: Test specifications and safety requirements for lithium-ion battery systems c. Electrically propelled mopeds and motorcycles — Safety requirements for conductive connection to an external electric power supply d. Road vehicles — Functional safety — Part 12: Adaptation of ISO 26262 for motorcycles
Vehicle Testing	a. ISO 13063 b. ISO 13064	a. Electrically propelled mopeds and motorcycles: Safety Specifications b. Battery-electric mopeds and motorcycles: Performance

Source: ASEAN Guidelines on Light Electric Vehicles (2024)

ASEAN countries like Thailand, Philippines, Indonesia, etc. are currently following this guidelines (Table 12). The guidelines contains most of the technical recommendations and international standard for low-speed vehicles manufacturing. This kind of standards ensures the vehicles quality and passengers safety.

8. E3Ws in Public Transport System: Lessons from ASEAN Countries

8.2 Integration Strategy of Electric Tuktuk in Thailand's Urban Transport

- The strategies of integrating E-tuktuks in Thailand's urban transport system are as follows:
 - **App-based micro transit and pooling (Digital Integration)**
 - ✓ Platforms (MuvMi, Grab) use apps for trip matching, dynamic routes and payments, enabling e-tuks to act as formalized FLM feeders to rail or bus nodes (*Figure 24*).
 - **Conversion Programs & Policy Support:**
 - ✓ Thailand Government was introduced fully subsidized programs to convert existing internal combustion tuk-tuks to electric powertrains, acknowledging operators' limited capacity to buy new vehicles.
 - ✓ These initiatives cut emissions, strengthen local conversion industries, and allow traditional drivers to adopt electric mobility without displacement (*Clean Technica, 2025*).
 - **Targeted charging infrastructure and fleet logistics**
 - ✓ Rather than widespread fast-charging for cars, many e-tuk pilots rely on depot charging and swappable batteries or opportunistic slow charging at terminals and markets.
 - **Regulatory & registration workarounds**
 - ✓ Formal integration requires legal vehicle classification, safety and insurance frameworks and driver licensing.
 - **Public-private partnerships and funding**
 - ✓ Development finance (ADB, UN, domestic industry) and private OEM support pilots, batteries, or charging pilots.

8. E3Ws in Public Transport System: Lessons from ASEAN Countries

- **MuvMi is leading Thailand's shift to electric tuk-tuks** with a centrally managed:
 - App-based fleet of more than 600 vehicles operating across 12 Bangkok neighborhoods.
- **Its six-seat electric tuk-tuks eliminate noise and exhaust emissions.**
 - Significantly cutting PM2.5 pollution while offering efficient first- and last-mile links to BTS and MRT transit lines (Clean Technica, 2025).
- **In January 2024, the Asian Development Bank and BANPU approved a 2.4-billion-baht loan.**
 - To deploy 1,500 six-seater electric tuk-tuks and build the charging networks required for micro-transit services across Bangkok (ADB Reports).
- **This scale of funding signals confidence in electric tuk-tuks as practical urban mobility solutions**, particularly in dense areas where larger vehicles struggle.

Figure 23. App-based Electric Tuk-Tuk in Bangkok.



Source: MuvMi (2024)

8. E3Ws in Public Transport System: Lessons from ASEAN Countries

8.3 Lessons From ASEAN Countries

▪ Thailand's Iconic Tuk-Tuks Evolve: From Smoker To Zero Emission

- Previously, Thailand has two stroke engine base Tuktuk which pollutes the air, creates noise and has some other negative impacts.
- The revolution towards green solution is came through Electric Tuktutk.
- The pioneer of E-TukTuk is MuvMi, an app-based transport service.
- MuvMi operates a centrally managed fleet that passengers can summon through a smartphone application.

▪ Prioritize First and Last Mile Connectivity

- ASEAN countries show that LSVs work best when they fill short-distance mobility gaps.
- Integrating them with mass-transit stations, BRT corridors, ferry terminals, or regional bus hubs creates a seamless door-to-door system.
- Thailand's e-tuktuk services and the Philippines' e-trikes demonstrate that LSVs thrive when strategically placed **to support existing public transport networks rather than compete with them.**

8. E3Ws in Public Transport System: Lessons from ASEAN Countries

- **Formalization and Regulation Improve Safety and Reliability**
 - Countries like Thailand and the Philippines have shown that clear regulations on speed limits, passenger capacity, designated routes, and vehicle standards significantly improve public acceptance.
- **Infrastructure Must Expand in Parallel**
 - LSVs depend on strategic charging infrastructure along high-demand corridors. Countries that paired vehicle rollout with infrastructure development experienced smoother adoption compared to places where charging lags behind vehicle deployment.
 - Having a good infrastructure for High-Speed vehicles allows to adopt E-tuktuks so smoothly.
- **Local Manufacturing and Conversion Programs Reduce Costs**
 - ASEAN countries learned that local assembly or retrofitting drastically reduces costs:
 - ✓ Thailand converts old ICE tuk-tuks to electric.
 - ✓ Vietnam encourages local micro-EV production.
 - ✓ The Philippines supports localized e-trike assembly.

Recommendations

9. Recommendations

- Despite having the potential of E3Ws, it increased challenges to the health and environment, creates concerns on road safety, and for maintaining urban transport system effectively.
- Poor Urban Public Transport System is not responsible for unregulated expansion of E3Ws – there are multiple reasons behind this.
- To mitigate these issues related to health and environment, technical, social and economical and urban public transport system , the recommendations are as follows:
 - **9.1 Recommendations: (Urban Public Transport System Management of E3Ws)**
 - **Strengthening institutional capacity for regulating and managing low-speed vehicles (LSVs) in Bangladesh**
 - Institutional weaknesses have been a primary driver of the rapid and unregulated expansion of E3Ws in Bangladesh.
 - Dedicated and well-resourced units should be established within city corporations, with clear mandates to implement, monitor, and enforce E3W-related policies and regulations.
 - Respective Authorities to implement: DTCA, City Corporation (DNCC & DSCC)
 - **Preparing a Dedicated Road Network for E3Ws**
 - The absence of a designated road network for E3Ws allows unrestricted movement across the city, contributing to severe congestion on both main and local roads.
 - Dedicated routes should be developed to ensure E3Ws can operate efficiently without accessing highways or main roads.
 - Respective authorities to implement: Roads and Highway Department (DTCA).

9. Recommendations

- **Restrict E3Ws from Operating on Highways and Major Arterial Roads in Bangladesh**
 - Revise BRTA and city corporation regulations to formally classify E3Ws as low-speed urban vehicles, making them ineligible for highway and arterial road permits.
 - Implement enforcement through traffic police and city authorities using designated routes, clear road signage, and routine monitoring in high-traffic corridors.
 - Respective authorities to implement: Dhaka Metropolitan Police (Traffic Division)
- **Determining an Optimal Balance between High-Speed Vehicles (HSVs) and Low-Speed Vehicles (LSVs) in Dhaka**
 - A comprehensive urban transport study specific to Dhaka should be conducted to determine the optimal ratio of high-speed vehicles and E3Ws, based on road capacity, travel demand, and network performance.
 - Based on rigorous surveys and technical assessments by urban transport experts, a capped number of operating licenses for both vehicle categories should be introduced within the city.
 - Anyone from anywhere are launching vehicles on the roads. This must be stopped, otherwise traffic congestion will increase day by day more.
 - Respective authorities to determine: DTCA, BRTA, City Corporations
- **Proper Distribution of E3W Licenses in Major Bangladeshi Cities**
 - Restrict the number of E3W licenses in major cities based on study findings.
 - Allocate licenses according to road capacity and accident data to reduce congestion and improve pedestrian safety.
 - Implement zone-based operations with color-coded vehicles to ensure compliance with designated routes.
 - Respective authorities for distribution: City Corporations

9. Recommendations

9.3 Recommendations: Policy Improvements

▪ **Develop Comprehensive Guidelines for LSVs (FLM Transport Support)**

- Prepare a unified guideline to establish a sustainable ecosystem for LSVs.
- Key areas to include:
 - ✓ Manufacturing standards aligned with international norms.
 - ✓ Rigorous vehicle compatibility and testing procedures.
 - ✓ Licensing procedures for vehicles and drivers.
 - ✓ Operating rules, regulations, and institutional responsibilities.
 - ✓ Guidelines for used battery recycling facilities.
 - ✓ Charging station standards and tariff frameworks.
- **Respective authorities to implement:** Ministry of Road Transport and Bridges (MoRTB), BRTA and City Corporation

▪ **Increase taxes on imported components.**

- Major components like BLDC motors, controllers, and differentials are heavily imported from China.
- Higher import taxes can help regulate growth and discourage excessive entry into the sector.
- Respective authorities to implement tax on components: National Board of Revenue (NBR)

▪ **Ban Lead-Acid Batteries in E3Ws**

- Many countries are phasing out lead-acid batteries due to environmental and health risks.
- Ministry of Environment (MoE) should develop a comprehensive policy to prohibit their use and promote safer alternatives.
- Ban implementation: District level wing of MoE, District level police.

9. Recommendations

9.4 Recommendations: Technical

▪ **Transition to LiFePO₄ Batteries in E3Ws**

- LiFePO₄ batteries are less prone to overheating, leakage, or explosion compared to lead-acid batteries, enhancing overall vehicle safety.
- LiFePO₄ batteries offer significantly higher cycle life and energy efficiency, reducing replacement frequency and long-term operational costs.
- Without **LiFePO₄ battery**, the license should not be given.
- Respective authorities for this transition: City corporations.

▪ **Standardize E3W Charging Stations and Adjust Tariff Rates**

- **Regulation and Authorization:** Most E3W charging stations are unregistered or unauthorized, causing losses for public sector utilities (PSUs). Identifying and regulating these stations ensures proper billing and fair revenue collection.
- **Tariff Adjustment:** Increasing tariff rates can help discourage excessive use and uncontrolled entry into the E3W sector.
- **Power Quality Considerations:** Low-quality or unregulated charging systems can introduce harmonics and Total Harmonic Distortion (THD) into the grid, affecting power quality and potentially damaging both the electrical network and connected devices.
- **Respective authorities for standardization:** BPDB, BREB.

9. Recommendations

▪ **Infrastructure Development and Route Segmentation for FLM Transport in Dhaka**

- To achieve an efficient and sustainable first- and last-mile (FLM) transport system, segregate routes for low-speed vehicles (E3Ws) and high-speed vehicles (HSVs), while upgrading high-speed vehicle infrastructure to support safe and integrated operations.
- Without improving the infrastructure for high-speed vehicles, the problem of FLM can not be resolved.
- Respected authorities to develop infrastructure: Roads and Highway Department (MoRTB), DTCA (MoRTB) along with BRTA.

▪ **Increase Passenger Capacity of Newly Designed Vehicles**

- Introduce a mixed fleet combining low-capacity 2-seater E3Ws and medium-capacity 8–10-seater vehicles to efficiently meet first- and last-mile (FLM) demand.
- Replace some low-capacity vehicles with medium-capacity alternatives to reduce the total number of vehicles and alleviate congestion on urban roads.
- Respective authorities to implement: DNCC & DSCC along with BUET team.

9.5 Recommendations: Socio-economic, Health and Environmental

▪ **Establish a Regulatory and Monitoring Framework for Battery Recycling and ULAB Management**

- Develop a national system to register and monitor all battery recycling facilities, ensuring they operate legally and safely.
- Identify and shut down informal or illegal used lead-acid battery (ULAB) recycling operations to prevent environmental contamination and health hazards.
- Introduce guidelines and standards for safe ULAB handling, storage, and disposal to formalize the recycling sector.
- Respective authorities to establish: Ministry of Environment.

9. Recommendations

■ **Implement Licensing and Regulatory Management for E3W Garage Owners**

- Establish a formal licensing system for all E3W garage owners to regulate operations and prevent illegal charging or unauthorized practices.
- Identify informal garage operators and integrate them into the formal framework, ensuring compliance with safety, service, and environmental standards.
- Create a unified structure that includes both garage owners and E3W drivers, safeguarding driver rights and preventing excessive vehicle rent or exploitative practices.
- Respective authorities to implement: City corporations (DNCC & DSCC)

■ **Conduct a Nationwide Survey on Lead Exposure in Vulnerable Populations**

- Initiate a comprehensive nationwide survey to assess lead levels in the blood of children and women, who are most vulnerable to lead exposure.
- Based on survey findings, implement targeted medical interventions, awareness programs, and preventive measures to reduce lead exposure.
- Use the survey results to inform national policies on battery recycling, E3W operations, and environmental health management.
- Respective institutions to conduct the survey: IEDCR, icddr,B, MoE.

9. Recommendations

■ **Identify and Remediate Lead-Contaminated Lands**

- Conduct systematic identification of lands affected by lead contamination, particularly in areas surrounding informal or formal ULAB recycling sites.
- Assess the severity of soil contamination and its impact on agricultural productivity and local livelihoods.
- Implement remediation measures, such as soil decontamination and restoration techniques, to remove lead and restore soil fertility.
- Respective authorities to identify: Ministry of Environment.

■ **Enforce Minimum Age Requirement for E3W Drivers and Continuous Training Programs.**

- Establish and strictly enforce a minimum age requirement for obtaining an E3W driving license to prevent underage operation.
- Implement mandatory verification procedures during license issuance to ensure compliance with the age requirement.
- Respective authorities for enforcement: DNCC, DSCC, DTCA

Thank You...!!