CONCEPT PAPER FOR DEVELOPING NEPAL NATIONAL URBAN MOBILITY PROGRAM

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SOLUTIONSPlus - Integrating Urban Electric Mobility Solutions in the Context of the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda

About this report

This report outlines the reasons and necessity for the development of a National Urban Mobility Plan in Nepal with the aim to raise policymakers' awareness to its importance, prompting discussions towards its creation.

Title

Concept Paper for Developing Nepal National Urban Mobility Program

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Executive Summary

This concept paper underlines the urgency of developing a National Urban Mobility Plan (NUMP) in Nepal, given the current transport and mobility challenges in the country. Rapid urbanization has magnified existing urban transport dilemmas, such as traffic congestion, the inadequacy of public transport infrastructure and services, and road safety issues. In addition, the implementation of an integrated and sustainable urban mobility strategy in the country has been encumbered by governance and institutional challenges, such as the limited horizontal and vertical coordination between government departments and agencies and the untapped potential of Kathmandu Transport Authority. The worsening air pollution, particularly due to unmanaged vehicle emissions, compounded by the limited progress towards the adoption of sustainable transportation and low-carbon pathways has adversely affected public health and well-being in Nepalese cities.

Several policies have been introduced in Nepal to address these pressing transport and environment-related problems. For example, the National Transport Policy, published in 2001, aims to develop a reliable, cost-effective, safe, facility-oriented, and sustainable transportation system. It encourages the use of higher-tier public transport and non-motorized transport and endorses the prohibition of high-emitting vehicles, especially in urban areas. The National Environmental Policy (2019) emphasizes that clean air is a fundamental human right. Hence, the policy likewise promotes the use of low-carbon transport, such as electric vehicles (EVs), and cleaner energy fuels, such as gas, electricity, and solar, to prevent, manage, and reduce air pollution impacts from the transport sector. However, an integrated implementation of these policies remains challenging. This is an obstacle the proposed NUMP can help address.

The proposed NUMP will serve as a strategic framework for coordinating sustainable urban mobility development efforts nationwide. It will provide actionable recommendations to support and harmonize National Urban Mobility Policies and National Urban Mobility Investment Programs geared towards sustainable urban mobility. It will comprehensively cover transport sector's issues, including implementation gaps in national plans and policies and existing urban transport challenges (e.g., increased traffic jams and road accidents, worsening air pollution, inadequate parking and public transportation). The proposed NUMP will also endorse specific traffic safety and management strategies as well as financing mechanisms to support sustainable urban and transport planning. Ultimately, the proposed NUMP will help cities better plan, finance, and carry out projects and policies that sustainably and adequately meet residents' transportation and mobility needs.

This concept paper proposes four initial milestones for the eventual development a NUMP. When starting a NUMP, it is critical to form a technical working group comprised of key stakeholders who can provide useful information and suggestions. The immediate tasks of the technical working group are to develop a common vision, determine baseline data needs, and establish a development framework. However, in the interim, this concept paper recommends three action points to guide the way forward and prompt important conversations regarding the creation of a NUMP. First is to evaluate existing capacities of government bodies and other stakeholders, the availability of resources, and the present context in Nepal. Second is to engage with potential stakeholders, such as through roundtable discussions and public consultations. Third is to draft key priorities to guide discussions surrounding NUMP development in Nepal.

List of Acronyms

ADB	Asian Development Bank
AEPC	Alternative Energy Promotion Center
CBS	Central Bureau of Statics
DoTM	Department of Transport Management
EV	Electric vehicle
GDP	Gross domestic product
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
JICA	Japan International Cooperation Agency
KEVA	Kathmandu Electric Vehicle Alliance
KMC	Kathmandu Metropolitan City
KV	Kathmandu Valley
LCA	Logistics capacity assessment
LDV	Light-duty vehicles
LMC	Lalitpur Metropolitan City
MoPIT	Ministry of Physical Infrastructure and Transport
MoFE	Ministry of Forest and Environment
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MTP	Metropolitan Traffic Police
NDC	Nationally determined contribution
NEA	Nepal Electricity Authority
NMT	Non-motorized transportation
NPC	National Planning Commission
NRSAP	National Road Safety Action Plan
NRSC	National Road Safety Council
NUMPs	National Urban Mobility Plans
PM	Particulate matter
PUMP	Philippines Urban Mobility Programme
SoL+	Solution Plus
SUMP	Sustainable Urban Mobility Plan

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Introduction

1.1 Background

Nepal is a nation on the southern slopes of the Himalayan Mountain ranges. This landlocked nation is bounded to the east, south, and west by India and to the north by China's Tibet Autonomous Region. According to the country's 2015 Constitution, Nepal is a Federal Democratic Republic with seven provinces subdivided into 753 local governments (i.e., 276 urban municipalities, 460 rural municipalities, 11 sub-metropolitan cities, and six metropolitan cities). The bowl-shaped Kathmandu Valley is the capital of Nepal. It lies at an elevation of 1,400 meters in the Himalayan foothills, surrounded by mountains and forests. Kathmandu Valley has a total area of 721 square kilometers, covering three administrative districts: Kathmandu, Bhaktapur, and Lalitpur (Mesta et al., 2022). The Kathmandu district has the highest population density, with 5,169 inhabitants per square kilometer (National Statistics Office, 2023).

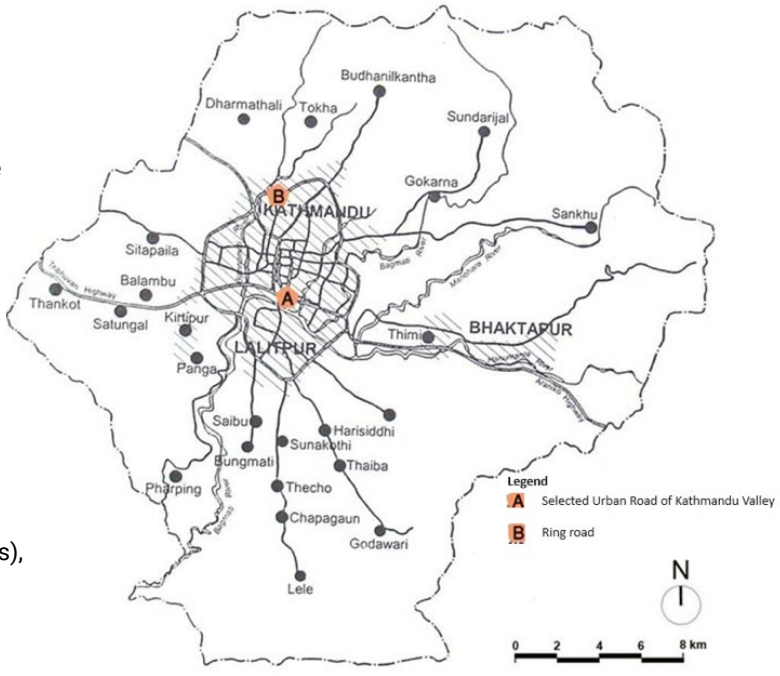
In terms of mobility, three different types of roads facilitate the movement of people and goods in Kathmandu Valley (see Figure 1): (1) the inside ring road, which covers the urban city regions; (2) the ring road, which encircles the entire valley and connects to the outside ring road; and (3) the outside ring road, which is connected to Nepal's highways. Multiple private and public transport modes ply these roads. Like in many developing countries, private individuals operate road public transportation in Nepal, which includes buses, microbuses, *tempos* (three-wheelers), and taxis (Bhattarai & Shahi, 2021; Mishra et al., 2020). The Department of Transport Management (DoTM) estimates that the average annual growth rate of vehicles in Kathmandu Valley is 14% (Aryal et al., 2022), although only 3% of registered vehicles in Kathmandu Valley are public transport (DoTM, 2020). Freight and passenger movement in Nepal is steadily increasing, given the country's socio-economic growth and rapid urbanization. However, the heavy reliance on private vehicles and the underrepresentation of relatively low-carbon modes, such as public and non-motorized transport, in Kathmandu Valley raises concerns about sustainable urban mobility.

Sustainable urban mobility plays a key role in delivering national objectives under the Paris Agreement, the Sustainable Development Goals, and the New Urban Agenda. The national government shapes sustainable urban mobility through planning, policymaking, and investment. For example,

Map of existing urban roads and ring road in Kathmandu Valley

Source: Modified from Chitrakar (2016)

FIGURE 1



they can transfer power to local government authorities to formulate and implement transport policies and plans appropriate to local contexts, incentivize low-carbon pathways, and appropriate national land transport funds for sustainable mobility programs. The complexity of sustainable urban mobility systems requires a strong policy framework, such as a National Urban Mobility Plan (NUMP), that supports integrated urban design, enables the shift to low-carbon mobility, and fosters take-up of innovative vehicle technologies and mobility services nationwide.

This concept paper aims to start discussions among key stakeholders about developing a NUMP in Nepal, emphasizing its urgency due to the current urban transport challenges in the country. Current urban transport dilemmas in Nepal are overviewed in Section 2. Subsequently, Section 3 proposes initial milestones for the eventual development of a NUMP, while Section 4 concludes this concept paper and recommends immediate action points to guide the way forward.

1.2 Objectives of the paper

The overall objectives of this paper are to highlight reasons that will support the development of National Urban Mobility Plan in Nepal and raise policymakers' awareness of its importance to prompt discussions towards its creation.

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Necessity for a National Urban Mobility Plan for Nepal

This section highlights the urgent need to develop a National Urban Mobility Plan in Nepal due to three main transport-related issues. First, rapid urbanization has intensified existing urban transport dilemmas. Second, governance and institutional challenges have impeded the implementation of an integrated urban mobility strategy. Third, existing urban transport dilemmas adversely affect public health and well-being.

2.1 Rapid urbanization intensifies existing urban transport challenges

Nepal is one of the fastest-urbanizing countries in South Asia, with an urban population of about 19.3 million (or 66.17% of the total population) and an annual population growth rate of 0.92% in 2021 (National Statistics Office, 2023). The most rapidly growing cities in Nepal include Kathmandu Valley, Butwal, Pokhara, Birgunj, Biratnagar, Dhangadi and Ithari. Kathmandu Valley is the largest urban economy in the nation, contributing 30% to the GDP and housing 50% of the total urban population (ADB, 2013). However, the fast-paced and unplanned urbanization in the country aggravates present urban transport issues, such as traffic congestion, inadequate public transport services and infrastructure, and road safety concerns.

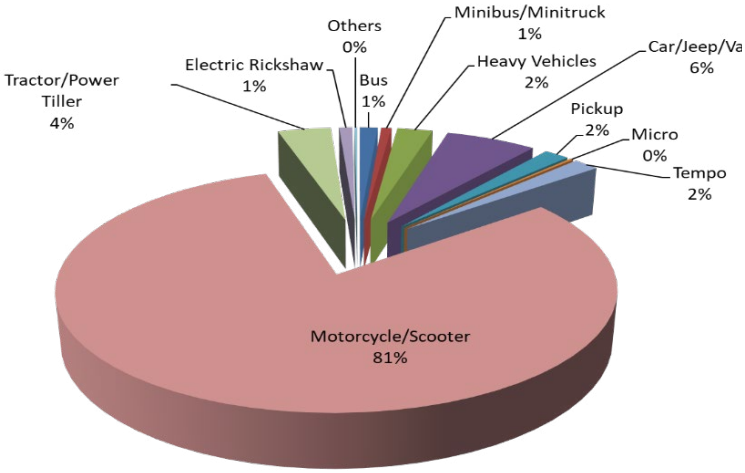
2.1.1 Traffic congestion

Nepal faces increasing traffic congestion, given the upward trend in vehicle ownership. Rapid urbanization and the surge in economic activities have magnified the demand for vehicles (Aryal et al., 2022). As of mid-March 2022, the total number of vehicles registered in Nepal has reached 4.882 million (see Figure 2), with over 36% registered in the Kathmandu Valley alone. Two wheelers (Motorbikes and scooters) constitute over 81% of the total, while the remaining 19% are three- and four-wheelers (from a presentation by Mr. Poudel of MoPIT, 2022). The number of motorbikes increased 80 times, while the number of three- and four-wheelers increased 18 times compared to 1989. In Kathmandu Valley, an overwhelming majority of registered vehicles are private vehicles. As mentioned in the introduction, only 3% of registered vehicles in Kathmandu Valley are public transport (DoTM, 2020).

Share of vehicles in Nepal

Source: (DoTM, 2023)

FIGURE 2



Total Number of Vehicles (4.882 Million) (As of Mid March 2022)

FIGURE 3

Traffic congestion in Nepal

Source: (Republica, 2021)

Besides the increasing vehicle ownership and reliance on private transport, roadside obstructions exacerbate traffic congestion in Kathmandu Valley (Sigdel, 2023; Thapa et al., 2008). For example, street vending, goods stalls, construction materials and equipment encroaching the road impede traffic flow (Sigdel, 2023). Further, the limited availability of suitable parking spots (e.g., Pahari et al., 2020) urges some vehicle drivers to park in public spaces, temple courtyards, and kerbside (Khanal et al., 2017). Improperly parked vehicles along crowded roads and alleys block footpaths and cause traffic bottlenecks. The cost of traffic congestion in Kathmandu Valley was estimated to be at least 16.5 billion Nepalese Rupees in 2018, given the time drivers and passengers spend navigating Kathmandu Valley's roads (Bista & Paneru, 2021; Republica, 2019).

Several news articles report that municipal authorities of Kathmandu Valley have taken steps to ease traffic congestion. For example, the Kathmandu Municipal Corporation (KMC) recently prohibited parking on blacktop roads around the New Road, the busiest market area in Kathmandu (Republica, 2024a). Instead, they allocated 300 parking spaces for four-wheelers and 700 parking spaces for two-wheelers at an allocated area (named Kathmandu Tower) free of charge (Republica, 2024a). In June 2019, KMC introduced "Park KTM", a mobile application that allows motorists to check parking availability and book a parking space 15 minutes in advance (The Himalayan Times, 2019). This smart parking system aims to systematize parking around Kathmandu (The Himalayan Times, 2019). Traffic police officers are also deployed to help manage congested areas (Sigdel, 2023). However, despite these interventions, Kathmandu Valley continues to experience heavy traffic. Motorists sometimes ignore traffic police officers' directives (Sigdel, 2023), and parking spaces in high-density areas remain insufficient (The Himalayan Times, 2019).

Nepal's cities require more proactive urban transportation planning and administration to handle the increased demand for vehicles caused by rapid urbanization. There have been some initiatives to address this issue, such as the ADB's Kathmandu Sustainable Urban Transport Project[1] and the SASEC Road connectivity project[2]. The former aims to improve transportation management in Kathmandu, while the latter focuses on improving road network connectivity. However, these projects remain the concept development phase. A proper and detailed implementation design has not yet been formed.

1. https://www.adb.org/projects/44058-013/main
2. https://www.adb.org/publications/nepal-sa-sec-road-connectivity

2.1.2 Inadequate public transport infrastructure and services

Another pressing transport issue in Nepal is the inadequate public transport infrastructure and services. The Global Green Growth Institute (GGGI, 2018) indicates that road transportation facilitates more than 90% of the domestic movement of goods and passengers in Nepal. However, the United Nations Centre for Regional Development (UNCRD, 2015) estimates that the share of public transportation (particularly buses) in the country's total vehicle fleet declined from 11% in 1990 to only 3% in 2015 (GGGI, 2018). This decline can be attributed to several factors, such as limited infrastructure development and poor public transportation service quality.

In The Global Competitiveness Report (2019), Nepal's transport infrastructure was ranked 91st out of 141 countries. The report considered the country's road, airport, and liner shipping connectivity, road infrastructure quality, railroad density, and train, air transport, and seaport services efficiency. According to Investment Board Nepal (IBN, 2024), the total length of national highways in the country is 14,666.11 kilometers, of which 65% are blacktop roads, 25% are earthen roads, and 10% are gravel roads. The IBN further indicated that there are plans to increase the length of national highways by 2,987.88 kilometers, and 514.51 kilometers are already under construction. In June 2023, the government of Nepal and the World Bank launched Accelerating Nepal's Regional Transport and Trade Connectivity (ACCESS) Project, a $275 million (or NRs 34.96 billion) undertaking that aims to enhance trade and connectivity in Nepal through resilient infrastructure development (World Bank, 2023). One of the project's activities is expanding a 69-kilometer section of the Butwal-Gorusinghe-Chanauta road along the East-West Highway from two to four lanes, reducing the travel time by 30% (World Bank, 2023). Nepal has made important strides toward infrastructure development; however, the country's progress falls behind middle-income economies in Asia (IMF, 2020). There are many opportunities for improvement, such as enhancing road quality and providing disabled-friendly footpaths, dedicated bus lanes, and cycling and charging infrastructures. There is also room for public-private partnerships (or PPP) since private investment in road infrastructure is limited (IMF, 2020).

Additionally, public transportation services in Nepal have poor connectivity and reliability. Vehicles are poorly maintained and cramped, especially during peak hours. For example, Clean Air Network Nepal (CANN) conducted a public transport quality survey in Kathmandu Valley in 2012. Among the 420 public transport users they surveyed, 30.5% spent more than 10 minutes waiting for a ride during morning peak hours, while 57.7% were dissatisfied with their in-vehicle travel time (Udas, 2012). Further, a significant portion of the microbus, minibus, and tempo users frequently find passengers already standing inside the vehicle (Udas, 2012). About one-third of the respondents indicated that public transport services are infrequent in the evening, while 10.8% have no access to night public transportation services at all (Udas, 2012). Regarding comfort and safety, 61.7% of the women surveyed find the seating space uncomfortable due to overcrowding, while almost 70% of the respondents concurred that the drivers practice reckless driving (Udas, 2012). Most respondents find the vehicles unhygienic and poorly maintained (Udas, 2012). Given these issues, reducing travel times, improving the overall comfort, safety, and inclusivity of public transportation services, and introducing a mass rapid transit (MRT) system to accommodate larger passenger volumes can greatly enhance passenger experience and encourage a shift to public transport services (Aryal et al., 2022). There is also an opportunity to strengthen the implementation of existing regulations and policies, such as the Vehicles and Transport Act of 1993, Section 107, which requires reserved seats for people with disabilities, women, and the elderly. Nepal's National Sustainable Transport Strategy 2015 also urges the development of a sustainable transport system that is efficient, accessible, people-centric, affordable, reliable, safe,

FIGURE 4

Passengers struggling to board a public transport vehicle in Nepal

Source: (OnlineKhabar, 2023)

inclusive, environmentally friendly, and climate and disaster-resilient (UNCRD, 2015).

2.1.3 Road safety

Road safety is another major concern in Nepal as reported road accidents increase every fiscal year (FY). According to Kathmandu's Metropolitan Traffic Police, there were 1.5 times more road traffic crashes in FY 2018-2019 than in FY 2015-2016, as the number of accidents rose from 5,668 to 8,511 (Kuikel et al., 2022). Although the amount of traffic crashes decreased to 7,500 at the onset of the COVID-19 pandemic the following fiscal year, it reached unprecedented levels in FY 2021-2022, as 10,165 road accidents were reported, including 2,883 deaths (Kathmandu Post, 2023). There were 9,683 road accidents in FY 2022-2023 (Republica, 2023), while 5,865 road accidents have already been recorded in the first six months of FY 2023-2024 (Samiti, 2024). Considering these figures, there have been calls to recognize the rising road accidents in the country as a national crisis (Republica, 2024b).

Road safety issues affect pedestrians and motorists. The Nepal Demographic and Health Survey 2022 conducted by the Ministry of Health and Population (2023) indicated that there are more deaths among men (11 per 100,000 men) than women (3 per 100,000 women). The report also showed that most (or 68%) of road accidents in the last 12 months before the survey involved motorcycles. Meanwhile, 12% are bicycle-related, 5% involved pedestrians, and the remaining 15% were associated with three and four-wheelers (e.g., *tempos*, cars, buses, and trucks). The number of road accident fatalities is also higher in urban areas (1,236 per 100,000 individuals) than in rural areas (833 per 100,000 individuals). Individuals aged between 15 and 24 years old are more prone to fatal road accidents, as 1,659 per 100,000 individuals died or were fatally injured within this age range. However, people younger than 15 years old were more prone to bicycle accidents, while three-fourths of 15 to 44-year-olds suffered motorcycle accidents. Most (or 79%) of those who were severely injured from road traffic accidents had chronic pain. Other continuing health problems include loss of limb function, brain damage, hearing loss, disfigurement, paralysis, and emotional trauma.

Traffic accidents in Kathmandu are mainly attributed to dangerous road conditions and driver and pedestrian behaviour. For example, Sapkota, Bista, and Adhikari (2016) surveyed 100 motorbike accident victims in Kathmandu, and most of them (or 41%) ascribed their accidents to bad road conditions. On the other hand, 21% cited rider and pedestrian carelessness, 20% mentioned traffic rule violations, 10% specified overspeeding and overtaking, and

8% noted poor vehicle conditions. A recent study by Manandhar (2022) had similar findings. According to the interviewed two- and four-wheeled vehicle drivers in Kathmandu Valley, poor driving conditions (e.g., bad weather, traveling along narrow roads and roads with potholes and blind curves), alcohol use before and while driving, driving over the speed limit, and mechanical flaws in vehicles cause traffic accidents.

FIGURE 5

Crossing pedestrians

Source: (The Kathmandu Post, 2020)

In line with Sustainable Development Goal (SDG) Target 3.6 on road safety, Nepal aims to reduce road traffic accident fatalities by 50% by 2030 (Ministry of Health and Population [Nepal] et al., 2023). The Ministry of Physical Infrastructure and Transport (MoPIT, 2021) recently published a revised Nepal Road Safety Action Plan (NRSAP 2021-2030) to renew national and international commitments to improving road safety in Nepal. The NRASP has five pillars, including road safety management, safer roads and mobility, safer vehicles, safer road users, and post-crash response. The United Nations Road Safety Fund (RSF, n.d.) allotted $300,000 to facilitate the implementation of NRASP. The funding will be used to enhance the capacity of the National Road Safety Council (NRSC), the lead agency on road safety. This project's duration is from April 2023 to October 2025. However, besides the limited capacity of the NRSC, other implementation challenges include infrastructural barriers (e.g., the inadequate provision of traffic signs and signals, sidewalks, and safe crossings), encouraging the use of proper safety equipment (e.g., helmets and seatbelts), and discouraging reckless driving (Kuikel et al., 2022).

2.2 Governance and institutional challenges in implementing an integrated urban mobility strategy

2.2.1 Limited progress towards sustainable transportation and low-carbon pathways

Nepal has several national policies that underscore the need for low-carbon and sustainable mobility. For instance, the National Transport Policy, published in 2001, aims to develop a reliable, cost-effective, safe, facility-oriented, and sustainable transport system. Subsection 6.2 of the policy specifically advocates the prohibition of air-polluting vehicles, particularly in metropolitan areas. Alternatively, it encourages the use of gas, electricity, and solar energy, as well as higher-tier buses, trams, and other forms of public transportation.

Similarly, the National Environmental Policy (2019) emphasizes that clean air is a fundamental human right, with Objective 1 focusing on preventing, controlling, and reducing air pollution. The policy highlights the promotion of clean fuel vehicles in Subsection 8.1, Strategy No. 14. Further,

Subsection 8.5, Point No. 2 anticipates proper management for successful electric vehicle (EV) promotion, while Point No. 4 focuses on pollution-reduction support for the renewable energy sector. The policy stresses the need to establish provincial bases and rules for the transportation industry to prevent pollution. Unfortunately, most of these measures have not been effectively implemented except for some extent of EV promotion.

In addition, the Climate Change Policy 2019 emphasizes the importance of a reliable transportation sector in achieving climate-resilient economic development. The government of Nepal prepared an Air Quality Management Action Plan, highlighting the need to control air pollution from transportation, industries, construction, and waste management (ICIMOD, 2021). Hence, the government banned old ICE 3-wheelers, introduced *safa tempos* (converted diesel three-wheeler to electric), and reduced taxes on EVs compared to ICEs to encourage EV uptake (Lefevre et al., 2016). However, Kathmandu remains one of the most polluted cities globally (The Himalayan, 2023), contributing significantly by transport sector. Air quality data shows that in 2019, the average $PM_{2.5}$ reading in Kathmandu was 48µg/cum, while the highest was 102.7 µg/cum (IQAir, n.d.). In 2021, the average $PM_{2.5}$ reading was 47.43 µg/cum, while the highest was 1475 µg/cum (Lamichhane et al., 2022), indicating worsening air quality.

2.2.2 Inadequate coordination between government tiers

Inadequate coordination between government tiers hinders the implementation of an integrated urban mobility strategy. Under the new constitution of Nepal (2015), each province has the authority to manage transport within its jurisdiction. Hence, various stakeholders work independently, set their own transport sector targets, and plan and implement their own policies. For instance, the Bagmati Province committed to removing all petroleum-powered vehicles from four urban centers, including Kathmandu Valley, Chitwan, Hetauda, and Kavre, by 2028, according to the Ministry of Forests and Environment (MoFE, 2021). However, except for Bagmati Province, the structure and functionality of other provinces' transport management departments remain underdeveloped, considering their limited capacity, experience, and skills to manage the transport sector. In addition, strong coordination between the central ministry (Ministry of Physical Infrastructure and Transport) and the provincial ministry (Ministry of Physical Infrastructure Development) is lacking. For example, Bagmati province filed a case against the federal government for seemingly encroaching on the authority of the provincial government to manage transport (Kamat, 2023). Bagmati province argued that the federal government's Urban Area Public Transport (Management) Authority Act of 2022 infringed the province's constitutional power (Kamat, 2023). The limited capacity of government bodies compounded by the inadequate coordination between them impedes the development of sustainable transportation in Nepal.

2.2.3 Untapped potential of local transport authority

In the case of Kathmandu Valley, the Kathmandu Transport Authority was planned to be formed in 2020 to integrate transportation planning and services, transforming Kathmandu's transportation landscape (Everest Times, 2020). It will act as an executive agency overseeing transportation project development. While the Kathmandu Transport Authority embodies immense potential, it is yet to be formed. As mentioned in the preceding section, the government of Nepal also endorsed the Urban Area Public Transport (Management) Authority Act of 2022[3]. The act aims to establish a dedicated Public Transport Authority in urban areas to enhance public transportation services, specifically by improving their efficiency, reliability, accessibility, affordability, user-friendliness, and safety. The authority will be responsible for planning routes, managing fares, developing vehicle standards, and

3. https://lawcommission.gov.np/np/wp-content/uploads/2022/12/[illegible].pdf

enhancing the overall service quality of public transport vehicles. However, an implementing body for the Urban Area Public Transport (Management) Authority Act has not been identified (Pahari, 2023).

2.3 Existing urban transport challenges adversely affect public health and well-being

2.3.1 Health problems from air pollution

Air pollution is another urgent concern in Nepal, given its adverse impacts on urban air quality, climate change, and public health and well-being (Das et al., 2018). Air pollution is a mixture of airborne particulate matter (PM) and gaseous pollutants, such as ozone (O_3), nitrogen oxides (NO_x), carbon oxides (CO_x), sulfur oxides (SO_x), and volatile organic compounds (Kishor Shrestha et al., 2017; Saud & Paudel, 2018). Continuous exposure to deteriorated air raises the risk of contracting noncommunicable diseases, such as cancer and lung and heart diseases (Saud & Paudel, 2018).

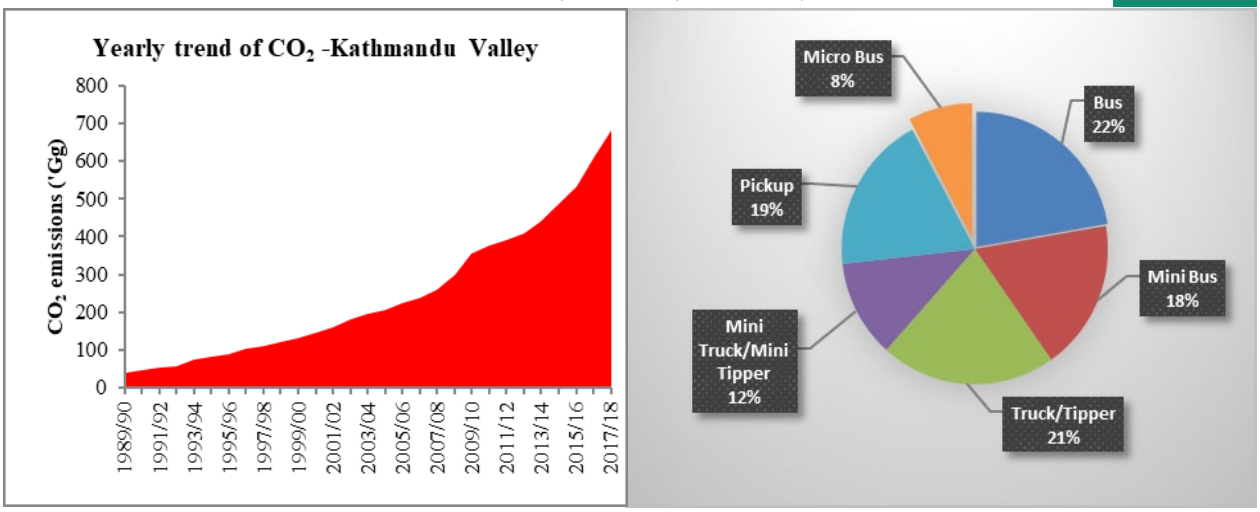
The transportation sector is a major contributor to air pollution in Nepal due to the growing reliance on private transport and concomitant fossil fuel consumption, poor fuel quality, and inefficient engines, especially in old vehicles (Bhattarai & Shahi, 2021). High traffic congestion, narrow and graded roads, improper vehicle maintenance, lower-grade vehicles, rush driving patterns, and high emission factors (EFs) also increase transportation-related emissions (Das et al., 2018, 2022).

In 2013, more than two-thirds of the petroleum products in Nepal were used in the transport sector alone (Malla, 2014). The average annual growth rate of petroleum consumption in the sector is 9% (Bhattarai & Shahi, 2021). Considering the recent study, CO_2 emissions from diesel vehicles were estimated to be between 2,214 to 2,781 gigagrams (Gg) for Nepal and between 638 to 680 Gg for Kathmandu Valley in the year 2017-2018 (Das et al., 2022). At present, CO_2 emissions increase by > 16 folds for both Kathmandu Valley and Nepal compared to the year 1989 (see Fig. 2.2).

Kathmandu Valley Transport CO_2 emissions by diesel vehicles,1989-2018

Source: (Das et al., 2022)

FIGURE 2.2



The freight industry is another significant contributor to air pollution. In idling and moving conditions, trucks, such as tippers, release greater CO_2, CO, and $PM_{2.5}$ emissions than buses, pickup trucks, minibuses, and microbuses in Nepal (Das et al., 2022). A variety of truck models with capacities ranging from 4 MT to 33 MT are utilized in the country for cargo transportation (LCA, 2024). The majority of Nepal's freight vehicles have rigid chassis up to 11 MT in weight, making up the majority of the country's fleet. Transport vehicles commonly used in mountainous regions are 4-wheel drive 4 MT trucks and tractor-trailer combinations (LCA, 2024). The Nepalese government determines standard transport tariffs for truck routes throughout the nation. In collaboration with the District Administration Office and District

Technical Office, the Federation of Truck Transport Entrepreneurs, Nepal (FTTEN) actively determines transportation charges, particularly for routes in isolated locations with primarily gravel roads. Tractors and small 4MT trucks are the primary means of transportation for goods in places inaccessible to vehicles, such as rural unpaved roads. Since effective logistics and freight impact economic development and sustainability, the central government (Ministry of Physical Infrastructure and Transport) and the newly formed transport authority of Kathmandu Valley aim to assist the freight industry in overcoming its present difficulties, including fragmentation, an aging vehicle fleet, ineffective operations, and a lack of coordination (LCA, 2024).

Nepal has taken important steps towards decarbonization to improve residents' quality of life and make Nepalese cities more livable. For instance, The Environmental Protection Act (2019b) and the National Climate Change Policy (2019a) are two broad policies targeting the reduction of greenhouse gas emissions in Nepal. The Environmental Protection Act (2019b) empowers the government of Nepal to formulate necessary standards to mitigate the impacts of pollution from motor vehicles and other equipment, goods, or places (e.g., hotels, restaurants, and other industries). On the other hand, one of the objectives of the National Climate Change Policy (2019a) is promoting a green economy through low-carbon emission development. One way of achieving this is "by developing reliable, sustainable and low-carbon technology industry, transport and physical infrastructure" (Government of Nepal, 2019a, p. 12). Some proposed strategies include mobilizing the private sector to reduce emissions through corporate social responsibility, gradually phasing out old, high-polluting vehicles, and promoting electric vehicles and other energy-efficient technologies (Government of Nepal, 2019a). However, enacting these strategies is challenging, considering policy and governance barriers (e.g., insufficient political support), infrastructure and market barriers (e.g., inadequate charging infrastructure), and limited financing, resources, data, and research (GGGI, 2018). Nonetheless, determining and implementing mitigation measures are essential to control adverse environmental impacts of the transport sector.

2.3.2 Loss of beneficial physical activity from active, non-motorized transportation

Active, non-motorized forms of transportation (NMT), such as walking and cycling, improve public health and fitness through physical activity (Rabl & de Nazelle, 2012). Sufficient physical exercise helps avert cardiovascular diseases, bone and joint injuries, and diabetes (Litman, 2010). In addition, NMT use delivers economic, social, and environmental benefits. For example, walking and cycling reduce costs from vehicle maintenance, fuel use, parking, and traffic congestion (Rahul & Verma, 2013). They also increase retail income in pedestrianized areas (Rahul & Verma, 2013). Proper NMT infrastructure also enhances user enjoyment, convenience, comfort, and community cohesion through positive interactions with people (Litman, 2010). NMT use also assists in reducing air pollution and in facilitating energy conservation (Litman, 2010; Rahul & Verma, 2013). Given these advantages, developing adequate pedestrian and cycling facilities and infrastructure is vital.

Although walking and cycling are preferred means of transportation in Kathmandu Valley, NMT development is not always prioritized in urban transportation planning (UNEP, n.d.). For example, according to a study by MoPIT and JICA, 90% of walking and cycling trips are completed in under 30 minutes. However, walking trips have substantially decreased over the years, i.e., from 53.1% in 1991 to 40.7% in 2012 (JICA, 2012), substituted by motor vehicles and also due to limited pedestrian and cycling infrastructures (e.g., separate lanes, priority areas, and bicycle parking). The first bicycle path in Kathmandu is 1.8 kilometers long, connecting Tilganga and Sinamagal. Originally envisioned in 2001, another 2.7 km cycling path from Tinkune

to Maitighar is under construction. Some locations, including Ashan and Thamel, are also considered cycling and walking zones. However, only 2% of the Kathmandu Valley is designated as open space (KDVA, 2016). The underdeveloped pedestrian and cycling infrastructure in Nepal led to pedestrians treading narrow and badly maintained sidewalks and to cyclists competing with motorists for road space (UNEP, n.d.).

2.3.3 Missed opportunities to enhance public health through decarbonization

Electric vehicles (EVs) are sustainable means of transportation that can facilitate decarbonization and likewise improve public health and well-being in the long run. However, the frequently changing policy landscape on EVs impede the adoption of low-carbon pathways. For instance, a decade ago, the government of Nepal promoted EVs by removing customs duties and sales taxes. The government also built hundreds of charging stations nationwide and waived import duties on EVs in its 2021–2022 budget to support the country's EV transition. The Nepal Electricity Authority (NEA) intends to develop a charging station infrastructure throughout the nation. However, the tax rate on entry-level electric vehicles has recently increased in 2023, potentially discouraging EV purchase (Nepalitimes, 2023; Onlinekhabar, 2023). The government raised customs duty from 10% to 15% for entry-level EVs, jeeps, and vans, which are popular in Nepal (Nepalitimes, 2023; Onlinekhabar, 2023). However, customs and excise taxes for 100–200 kW EVs declined from 30% to 20%. While customs duty for 200–300 kW EVs decreased from 45% to 40%, their excise duty remained constant at 45%. EVs with a power output of more than 300 kW are subject to a 60-80% customs rate, although it was previously fixed at 60%. This range also has an excise duty of 60% (Nepalitimes, 2023; Onlinekhabar, 2023). Currently, the government of Nepal is again considering lowering the excise duty, particularly for smaller-capacity EVs, although subsidies and tax incentives do not usually apply to luxurious electric vehicles.

Additionally, there is no strong push for the scrappage of high-emitting vehicles. The Department of Transport Management (DoTM) stated that the documents of public transport vehicles over 20 years old will not be renewed, and their route permits will be revoked. However, even though DoTM estimates that there were more than 5,000 public vehicles older than 20 years in 2018, only about 395 have been de-registered (Shrestha, 2018). Notwithstanding, the Nepal Government has amended the Vehicle and Transport Act to temporarily allow the modification of vehicles to become more energy-efficient and environmentally friendly for three years (Dhakal & Shakya, 2022). This means internal combustion engines of fuel-based vehicles can now be retrofitted with electric powertrains, converting them to EVs. This move aligns with global trends in retrofitting vehicles to reduce carbon emissions. Converted vehicles will also receive a three-year tax exemption.

2.4 Role of a national urban mobility plan

Developing a NUMP for Nepal can help address the country's major transport issues (summarized in Table 1). The NUMP will serve as guiding document that harmonizes policies and programs geared towards sustainability. It will assist small to larger cities in the planning, development and execution of low-carbon urban mobility.

Summary of major transport issues in Nepal

TABLE 1

Major transport issues in Nepal	Specific manifestations	Role of the NUMP
Rapid urbanization has intensified existing urban transport dilemmas.	1. Worsening traffic congestion 2. Inadequate public transport infrastructure and services 3. Increasing road accidents and fatalities	The NUMP can propose an integrated plan that sustainably addresses the balance between transport supply, demand, and land use. It can also provide a long-term strategic vision for traffic management and public transport infrastructure and services development, and strengthen the implementation of the National Road Safety Action Plan.
Governance and institutional challenges have impeded the implementation of an integrated urban mobility strategy.	1. Limited progress towards sustainable transportation and low-carbon pathways 2. Inadequate coordination between government tiers 3. Untapped potential of local transport authority	The NUMP can foster intersectoral collaborations and guarantee coherence between climate commitments, national transport policies, and investment plans.
Existing urban transport dilemmas adversely affect public health and well-being.	1. Health problems from air pollution 2. Loss of beneficial physical activity from active, non-motorized transportation 3. Missed opportunities to enhance public health through decarbonization	The NUMP can propose a roadmap for low-carbon transport intervention scenarios (i.e., short-term, medium-term, and long-term), including a monitoring and evaluation plan. The interventions can focus on promoting more sustainable transport modes, such as non-motorized transport, public transport, and electric vehicles.

03

Initial Milestones for Developing Nepal NUMP

This section proposes four initial milestones for developing a national urban mobility plan in Nepal. From the outset, it is important to determine governance and institutional arrangements, baseline data needs with preliminary analysis, a united vision, and a development framework that will guide the NUMP development process.

3.1 Determine governance and institutional arrangements

It is crucial to first identify key agencies and stakeholders who could bring in their expertise and provide valuable insights into developing a NUMP. It is recommended that representatives from key institutions form a technical working group to foster inter-agency collaborations and create opportunities for addressing potential problems, such as jurisdiction and governance issues. For instance, Table 2 below proposes the role of key government and nongovernmental organizations in developing Nepal NUMP based on their institutional mandates and objectives.

Proposed roles of key government agencies and stakeholders in NUMP development

TABLE 2

Name of government agency or affiliation	Institutional mandate and objectives	Proposed role in NUMP development
National Planning Commission	The commission assesses resource needs, identifies funding sources, and allocates a budget for socio-economic development. It serves as a central agency for monitoring and evaluating development policies, plans, and programs.	The commission can assist in formulating a united vision and a development framework for the NUMP that aligns with national priorities. It can also facilitate inter-agency coordination and collaboration.
Ministry of Physical Infrastructure and Transport (MoPIT)	The objective of MoPIT is to create a safe, efficient, and sustainable infrastructure and transport system that supports economic growth and improves the overall quality of life in Nepal. It oversees and coordinates the development and maintenance of physical infrastructure, including transportation systems.	The MoPIT can assist in drafting regulations and standards for implementing the NUMP's goals, ensuring that they align with the ministry's existing plans and policies.

Department of Transport Management (DoTM)	The DoTM is responsible for formulating and implementing policies, plans, and programs related to the transport sector in Nepal. It plays a crucial role in regulating and overseeing transportation services, including road safety, vehicle registration, and licensing.	The DoTM and the various Provincial Ministries of Transportation can help prepare an evidence-based NUMP by providing relevant and up-to-date transport-related data, trends, and forecasting. The provincial ministries can also share their knowledge of the local contexts and highlight specific transport issues that must be considered and addressed.
Provincial Ministry of Transportation (which has different names in different province) and transport infrastructure directorate	These ministries and directorates focus on local infrastructure development, the adaptation of national policies at the provincial level, local data collection and planning, vehicle registration, licensing, and stakeholder engagement.	
Representatives from Universities and Academia	The Universities and Academia can develop a skilled workforce for urban planning and transport infrastructure designs, disseminate knowledge, and conduct data collection and research.	Academics and researchers can provide theoretical insights and evidence-based contributions, as well as propose implementation actions in the NUMP process.
Stakeholders to be consulted		
Ministry of Finance (MoF)	The MoF can provide financial insights and aid in harmonizing the budget allocation for the different ministries and organizations involved in the implementation of the NUMP's goals.	
Ministry of Forest and Environment (MoFE)	The MoFE can help ensure that sustainable and eco-friendly practices are integrated into the NUMP to minimize adverse environmental impacts.	
Department of Road	These departments can provide insights into planning, developing, and maintaining efficient transport networks that adequately support urban mobility.	
Department of Railway		
Development organizations	Development organizations (e.g., ADB, GIZ, and JICA) can assist with feasibility studies and implementation of actions outlined in the proposed strategies of the NUMP.	
Professional organizations	Professional organizations, such as the Nepal Engineers' Association (NEA) and the Society of Transport Engineers of Nepal (SOTEN), can help in disseminating information and conducting outreach activities.	

3.2 Identify baseline data needs with preliminary analysis

Baseline data and analysis are crucial in the formulation of the NUMP. They provide policymakers with a comprehensive understanding of the current state of urban mobility within the country, including present challenges and areas for improvement (Lah et al., 2020). The baseline data and analysis can also form the basis for setting realistic visions and targets and for determining priorities in terms of investment and resource allocation. Policymakers can also use the baseline data to evaluate the effectiveness of the initiatives and justify necessary adjustments to achieve long-term improvements.

According to the NUMP development guidelines (Lah et al., 2020), the status quo assessment report provides a comprehensive overview of the various aspects essential to urban mobility planning. This includes the current state of urbanization, traffic behavior, congestion levels, available transportation modes, accessibility of public transportation, road safety conditions, environmental impacts, gender aspects, and mobility trends, among others. The report also contains an in-depth stakeholder analysis and mapping, an assessment of financial resources and capacities of both local and national government levels, a stock take of existing policies and programs, and an evaluation of financial structures and pertinent business models. Ultimately, status quo assessment report identifies potential barriers to sustainable urban mobility, considering political, regulatory, institutional, financial, social, technical, and technological aspects.

As an example, both the Philippine Urban Mobility Programme (PUMP) (GIZ, 2019) and Sustainable Urban Mobility Plan for Medan Metropolitan Area (SUMP Medibangro) (Egis Rail, 2022) provided a thorough discussion of the current state of urban mobility in the Philippines and Medibangro, respectively. These urban mobility plans linked the increasing motorization rate in their respective contexts to population growth and urbanization trends, highlighting the transport sector's contribution to GHG emissions and worsening air quality. While both plans examined the modal share within their jurisdiction, SUMP Medibangro provided a more in-depth analysis of the accessibility and affordability of the different transportation modes available within the region. Both plans also identified barriers related to each thematic area.

A comprehensive understanding of the existing urban mobility landscape enables the formulation of a cohesive plan that builds upon existing activities and aligns with sectoral plans. In the case of Nepal, the objective is to adapt the planning process to local and national contexts to ensure alignment between the NUMP and the legally mandated planning methodologies like the guidelines developed by MoFAGA for MTMP or the methodology and documents referred by the Provincial Transport Master Plan of Bagmati Province. It is important to establish how the NUMP development process can be integrated with other planning documents and policies effectively (ASEAN Secretariat, 2022).

Typically, NUMP development spans approximately two years. The initiation phase and status quo analysis take between 6-8 months, depending on the desired level of detail. For instance, the inventory and status quo analysis in the Philippines was conducted in November 2017, and the status quo report was submitted to the DOTR in June 2018[4]. The process of compiling and submitting the status quo report along with the Vision paper may have contributed to the extended timeline.

In Nepal, however, access to data and its collection remain a significant challenge which underscores the need for this concern to be addressed at the onset. Currently, the data availability and access to the data is an obstacle with multiple entities working on the transport sector, like department of transport registers the vehicles, department of roads is responsible for planning and construction of roads, local government is responsible for urban roads and transport

4. Case study example: Development of Philippine National Urban Mobility Programme [Video presentation]

plannings. As of now, there is no platform for the different stakeholders to come together. Society of Transport Engineers of Nepal (SOTEN) is working on creating a platform to bring the professionals in the field of transportation, however the outreach is limited. There have been few initiatives for sustainable transportation. MoPIT has developed the National Environmentally Sustainable Transport Strategy, Environment friendly vehicle and transport policy. NDC is determined to reduce the emission from the transport sector. Kathmandu valley public transport authority has been formed and local government can form such authorities as per the urban area public transport (management) authority act, 2022. National planning commission has prepared 16th five-year plan of Nepal with integrated transportation system being one of the major transformational program and strategy for Nepal.

3.3 Define vision and targets

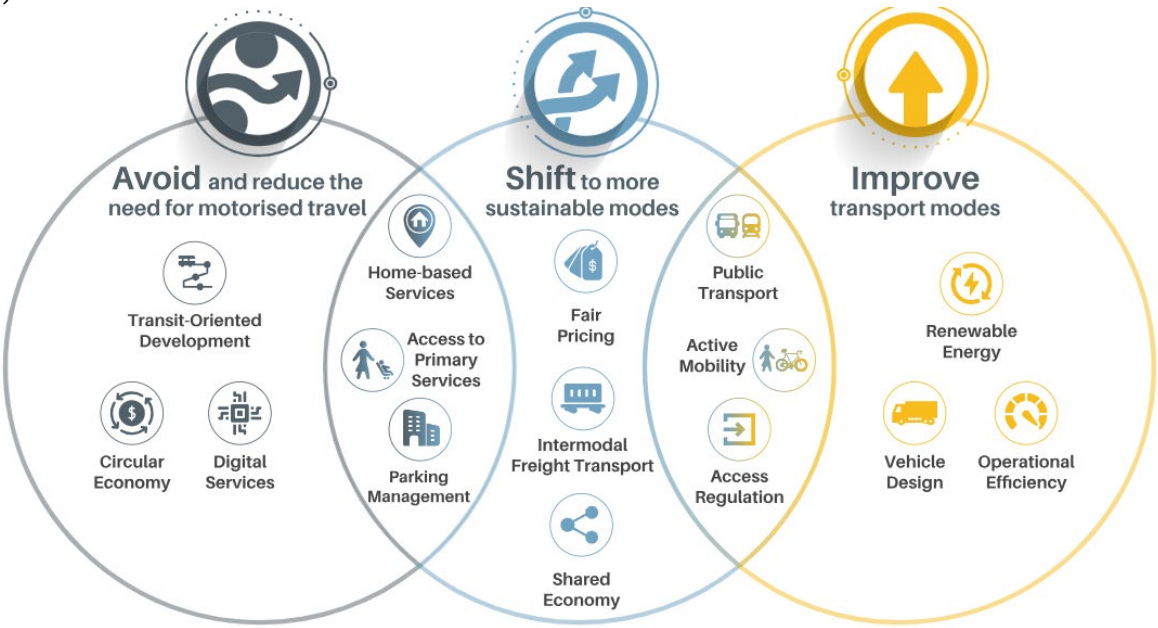
As early as the initiation phase, policymakers can already develop an initial vision for sustainable urban mobility based on initial assessment and stakeholder engagements. In this phase, the most important milestone is ensuring commitment to the implementation of this common vision. In the later phases of the NUMP development, policymakers formulate detailed scenarios and visions, set urban mobility targets, and prioritize measures.

There are various approaches to developing a vision and identifying specific targets or objectives for sustainable urban mobility. For instance, a holistic approach simultaneously considers social, environmental, health, and economic objectives. On the other hand, a thematic approach organizes measures according to themes, such as key sectors or target areas (e.g., public transport, non-motorized transport, and travel demand management). The Avoid-Shift-Improve (ASI) framework is another useful approach for formulating steps towards sustainable urban transport (see Figure 6). The ASI framework evaluates transport measures based on their potential to encourage avoidance of motorized and unnecessary travel, prompt shift towards more sustainable modes, and facilitate improvements of transport modes in terms of environmental performance (United Nations, 2016). It is vital to align the vision and specific objectives of the NUMP with the country's Nationally Determined Contributions (NDCs) and Sustainable Development Goals (SDGs).

FIGURE 6

Diagram of the Avoid-Shift-Improve framework.

Source: (SLOCAT, n.d.)



It is possible to adopt one approach at a time or combine them. For example, SUMP Medibangro (Egis Rail, 2022) in Indonesia was structured around six thematic areas, including public transport development, urban planning and NMT, road network and private vehicles, governance, environment and climate, and digitalization. The SUMP Medibangro established a comprehensive framework with 20 indicators (15 impact indicators and 5 investment indicators) that align with the city's priorities and needs. These indicators enabled the government of Medibangro to monitor the region's environmental, social, financial, planning, and technical development.

In comparison, the PUMP (GIZ, 2019) adopted holistic and thematic approaches. The PUMP's vision was developed based on social, environmental, and economic objectives, while activities and actions were grouped according to five thematic areas (i.e., NMT, public transport, urban freight, transport demand management or TDM, and transit-oriented development or TOD). The PUMP identified challenges, proposed immediate and long-term actions, developed financing mechanisms, and determined indicators for each thematic area. An overarching aim of the activities under the five thematic areas is to reduce GHG emissions, such as by encouraging a shift to more sustainable transport modes, lowering vehicle kilometers traveled (VKT), and improving fuel efficiency to reduce fuel consumption. Nine government agencies collaborated to define PUMP's vision to ensure comprehensiveness. The joint vision was subsequently presented to the inter-agency technical committee on transport planning.

Table 3 below summarizes the indicators identified by the PUMP and SUMP Medibangro. The two urban mobility plans have similar targets and indicators (highlighted in orange in Table 3), given their shared aim of mitigating GHG emissions and air pollution through sustainable urban mobility initiatives. Both urban mobility plans seek to reduce traffic congestion (which engenders substantial economic losses), enhance public transport accessibility and affordability, and minimize road accidents and fatalities.

Side-by-side comparison of indicators in the PUMP and SUMP Medibangro

Note: colored rows indicate similarities for both urban mobility plans

TABLE 3

Philippine Urban Mobility Programme (PUMP)	Sustainable Urban Mobility Plan for Medibangro (SUMP Medibangro)
Number of trips per person	Transportation Projects in Official Plans
Trips/ mode	Accessibility to Public Transport
Average trip length	Road Safety
Emission Factors	Affordability of Public Transport
Number of Jeepneys modernized	Modal Split of PT and NMT
Number of Jeepneys consolidated	Multimodal Integration of PT at Hubs
Number of Jeepney routes rationalized	Comfort and Bliss of Mobility
Number of freight vehicles per type	Security of Collective Mobility
Kilometer/vehicle type	Commuting Travel Time
Efficiency (L/km)	Road Congestion and Delays
Decrease GHG emissions per passenger km	Energy Efficiency of Overall Mobility
Reduce local air pollution	Reduction of GHG emissions from mobility
Increase Mass transit accessibility for vulnerable users	Reduction of Air Pollution from mobility
Increase in modal share of public transport	Quality and Livability of Public Space
Road fatalities	Mobility Facilities Space Usage
Increase km of protected bike lane	Mass Transit Studied

Reduce national fuel expenditure	Off-street Parking Hubs
Decrease average congestion	Bicycle Lanes
Decrease % of income spent on transport	Sidewalks and Pedestrian Facilities
	Financing for Mobility

In sum, choosing the appropriate approach for Nepal NUMP requires careful deliberation since it will influence the determination of objectives, priority areas, activities, actions, methodologies, and monitoring indicators. These aspects are deeply interdependent. For example, adjusting urban mobility targets necessitates a realignment of the overall vision and priority measures. Hence, an iterative approach is usually adopted to identify the most suitable and viable measures for achieving the NUMP's vision and targets. It is essential to consider financial implications of proposed measures versus their effectiveness in the delivering the NUMP's goals.

3.4 Establish a NUMP development framework

The MYC (Mobilise Your City) provides guidelines for countries and cities seeking to develop their NUMP. These guidelines provide a structured development cycle comprised of four main phases, including initiation, status quo analysis, vision and goal setting, and detailed preparation (Lah et al., 2020). This concept paper aims to provide focused guidance to policymakers in Nepal on initiating the development of their NUMP. The initiation phase is essential since it serves as the foundation for plans and future programs (Lah et al., 2020).

The initiation phase requires the government of Nepal to identify key stakeholders to establish a core team and steering committee, collate baseline data, determine a common vision through stakeholder dialogues, and establish a roadmap for NUMP development. Policymakers can begin stakeholder dialogue after completing the preliminary assessment of urban mobility. It is important to involve participants within and outside the transport community. A multi-stakeholder perspective is necessary to ensure comprehensiveness. The MYC has developed a tool called "MobiliseDays", to help their partners in initiating stakeholder dialogue.

The dialogue aims to validate findings regarding the challenges, opportunities, and priorities identified in the assessment. Stakeholders are encouraged to share their actual experiences in urban mobility and planning, identify main actors in NUMP development along with their perspectives and interests, and articulate needs and focus areas. Three expected outcomes from the dialogue are the identification of entry points and opportunities for NUMP development, the determination of proposed solutions to address institutional barriers related to division of responsibilities, and a draft vision and work program integrating sustainable urban mobility initiatives into sector policies. It is essential to collaborate with different actors to establish a comprehensive road map for the NUMP development process.

Most importantly, there is a need to secure high level political commitment. It is crucial to gain the commitment of key stakeholders to the NUMP development and implementation process. This commitment shall be formalized through resolutions or policies to ensure active participation in realizing the vision. Given potential changes in government, it is essential to ensure continuity by defining reporting periods over various terms. In addition, establishing an operational core team as facilitators maintains effort continuity, facilitates stakeholder coordination, ensures timely submissions, and maintains the quality of deliverables. Besides a core team, a steering committee must also be established to supervise the NUMP development, secure commitment from relevant authorities, ensure consistency in approach between actors, and serve as a focal point for development partners. The steering committee will lead the drafting of a common vision for sustainable urban mobility and prepares high-level inter-ministerial resolutions.

04

Conclusions and Ways Forward

This paper aims to prompt important conversations regarding the creation of a national urban mobility plan (NUMP) in Nepal. Hence, policymakers can use this concept paper as a starting point to initiate dialogue with the stakeholders. There is an urgent need to develop a NUMP, given the country's transport-related challenges, discussed in Section 2. Firstly, rapid urbanization has magnified urban transport dilemmas, such as traffic congestion, inadequate public transport infrastructure and services, and road safety issues. Secondly, governance and institutional challenges impede the implementation of an integrated urban mobility strategy, given the inadequate coordination between government tiers and the untapped potential of local transport authorities like the Kathmandu Transport Authority. Thirdly, current urban transport dilemmas adversely impact public health and well-being, considering the health ramifications of air pollution, the loss of physical activity from active, non-motorized transportation, and the missed opportunities to enhance public health and well-being through decarbonization.

Developing a NUMP can help mitigate these existing transport-related problems by prioritizing integrated and strategic transport management plans, encouraging collaborations between government and nongovernmental institutions, and focusing on sustainable urban mobility to enhance public health and quality of life. In creating a NUMP, it is critical to first form a technical working group comprised of key stakeholders who can provide useful information and suggestions, develop a common vision, determine baseline data needs, and establish a development framework. Section 3 provided specific suggestions for each of these four initial milestones.

As a way forward, below are three key recommendations that can be made in the interim to prepare for developing a National Urban Mobility Plan (NUMP) for Nepal.

4.1 Evaluate existing capacities, resources, and context

The capacities of relevant government bodies and stakeholders identified in Table 2 (e.g., the NPC, MoPIT, DoTM, DoR, and provincial ministries and directorates) can be assessed at this stage to determine their readiness for formulating a NUMP. Assessing their capacities means understanding current members and staff's management and technical skills, their knowledge of sustainable urban mobility planning, and their ability to train members and staff if necessary.

Further, it is vital to estimate the availability of resources that can support the development of a NUMP, including qualified staff and experts, existing policies, up-to-date research and data, facilities, tools (e.g., software packages), and funding. The potential need for external or international support should also be evaluated.

It is also crucial to understand the present context in Nepal through a systematic review of critical transport-related dilemmas, policies, and regulations. A comprehensive understanding of transport and mobility issues (e.g., urban traffic congestion, road and pedestrian safety, and quality public transportation infrastructure and services) in Nepal can inform short and long-term

targets and priorities. On the other hand, mapping and examining relevant policies and regulations can reveal policy and regulatory gaps that can be addressed by developing a NUMP.

4.2 Engage with potential stakeholders

Consultations can be conducted with relevant government authorities, private and nongovernmental organizations, academics, experts, community groups, and international bodies to gauge interest and draw attention to creating a Nepal NUMP. This can be led by the NPC or MoPIT. For example, they can initiate roundtable discussions and public consultations. These activities will allow stakeholders to express their views and suggestions openly and have important conversations about enhancing public health and making Nepalese cities more liveable through sustainable urban mobility planning. This can also assist in preparing a framework for the development of NUMP.

A participatory approach is crucial in NUMP development because its ultimate goal is to enhance the quality of life in Nepal. Urban mobility interventions and decisions have direct and indirect impacts on them. It is also important to increase and ensure the transparency of the decision-making making process through active stakeholder participation. As such, policymakers are advised to consult stakeholders throughout NUMP development and implementation.

4.3 Identify initial priorities

Main priorities can be drafted as early as now to guide discussions surrounding NUMP development in Nepal. For example, conversations can revolve around the following points:

1. Initiating participatory development of transport planning guidelines. This involves drafting a methodology for preparing a transportation masterplan for federal, provincial and local levels based on their authority through open and inclusive dialogues and consensus.
2. Prioritizing pedestrian safety by promoting NMTs, providing suitable footpaths, and increasing driver and pedestrian awareness of road safety.
3. Centralizing transport-related data management to ease data access and facilitate data-based planning and updating of plans.
4. Discouraging private vehicle use through penalties (e.g., higher parking costs, road taxes or congestion pricing) to reduce road congestion and pollution. This will go hand in hand with non-motorized and public transport infrastructure and service improvements.

05

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