

THE 100 QUESTIONS

URBAN MOBILITY AND TRANSPORTATION DOMAIN



INTRODUCTION

Transportation and mobility are key factors in sustainable urban development, equal access to economic opportunities, and the quality of life in urban centers. As urban growth across the world continues, ensuring safe, accessible, inclusive, and sustainable mobility in cities is crucial.

To parse the most valuable and data-actionable questions on urban mobility through a collaborative manner, CAF—The Development Bank of Latin America, the Transformative Urban Mobility Initiative (TUMI), and the New Urban Mobility Alliance (NUMO) partnered with The Governance Lab (The GovLab) to set up the Urban Mobility and Transportation domain of the 100 Questions Initiative. The work was commissioned by the Transforming Urban Mobility Initiative (TUMI), implemented by the Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ).

The 100 Questions Initiative seeks to collaboratively map the world's 100 most pressing, high-impact questions using a unique participatory methodology. The initiative starts from the premise that solving problems begins with formulating the questions that define the problem rather than focusing on the already available data, resources, and hypotheses. This process stimulates, identifies, and establishes a transformative agenda with partners on a wide range of societal challenges.

The initiative has six stages: Topic Mapping; Identification and Engagement with 'Bilinguals'; Question Sourcing and Clustering; Question Prioritization; Public Voting; and Purpose-Driven Data Collaboration.

This document provides an overview of the process undertaken by the Urban Mobility and Transportation domain of the 100 Questions Initiative. First, it details the 100 Questions Initiative's six-step methodology; second, it presents the outputs of the initiative, including a topic map, the top ten research questions developed from these topics, and engagement activities undertaken for the public voting phase. It also provides an appendix of the full question sourcing and clustering processes, as well as detailed information about the 'bilinguals' (subject matter and data experts) involved in the project. A next step following this report is to build data collaboratives and leverage informed and responsible data use in mobility and transportation.

INCEPTION OF THE 100 QUESTIONS INITIATIVE AND URBAN MOBILITY AND TRANSPORTATION DOMAIN

The 100 Questions Initiative

Launched in 2019, the 100 Questions Initiative seeks to identify pressing policy issues through a data-driven decision-making framework. The GovLab uses questions as a device for both inquiry and data responsibility. Through this new science of questioning, The GovLab approaches data-driven projects from a demand-side rather than a pre-existing information supply-side to identify the most vexing unresolved issues across sectors and communities and prioritize interventions to make the most of scarce public resources.

In April 2022, The GovLab, CAF, TUMI, and NUMO launched the Urban Mobility domain of the 100 Questions Initiative. This work was essential because cities need to steer the use of data more purposefully to better inform and shape policy decisions on urban development, clean transportation, equal access to economic opportunities, and quality of life in urban centers. As urban growth across the world continues, ensuring safe, accessible, inclusive, and sustainable mobility in cities is crucial.

The 100 Questions' approach to identifying priority questions and useful data to answer them stands at the nexus of data use and data responsibility. Through the questioning process, The GovLab advances three main data principles:

- **Data Minimization and Proportionality:** Questions are a device to frame problems more effectively. High-quality questions reduce data collection for the sake of it and highlight specific parameters on what information exists and is needed to justify data collection and reuse. This practice advances the popular wave of data privacy and protection regulations worldwide.
- **Participation (Democratization):** Opening up government and data processes to encourage wider participation allows for stronger communication and trust across stakeholders on data use and reuse. Questions are an accessible medium to engage an array of stakeholders—experts, academics, data holders, and the lay public—in an

inclusive and participatory manner by bringing those who are most affected by policy decisions into the decision-making process.

- **Accountability:** Consulting with a wider community helps policymakers identify who has been impacted by a data project. This process allows for iteration of policy interventions and anticipation of impact and risk from these decisions, creating a flexible and responsible system of data (re)use.

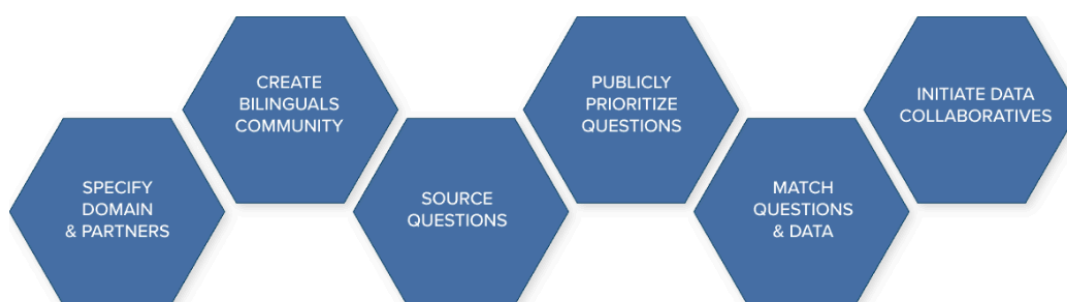


Figure 1.1. Visual representation of the 100 Questions process.

Thinking about Urban Mobility

In May 2022, The GovLab partnered with CAF to apply the 100 Questions methodology to define, curate, and prioritize ten actionable questions to make transportation and mobility policies more data-driven. These questions would subsequently be used to inform priority areas for the data hub that CAF is creating in collaboration with TUMI to build data collaboratives, a new form of collaboration, beyond the public-private partnership model, in which participants from different sectors—in particular, private companies—exchange their data to create public value for sustainability in transportation and mobility.

CAF is a development financial institution committed to improving the quality of life of all Latin Americans. CAF's actions promote the sustainable development and integration of the region through loans, non-reimbursable technical assistance resources, and support in the technical and financial structuring of programs and projects in the public and private sectors in Latin America. CAF works in 18 Latin American and Caribbean countries, as well as in Spain and Portugal through 13 offices, to serve the region.

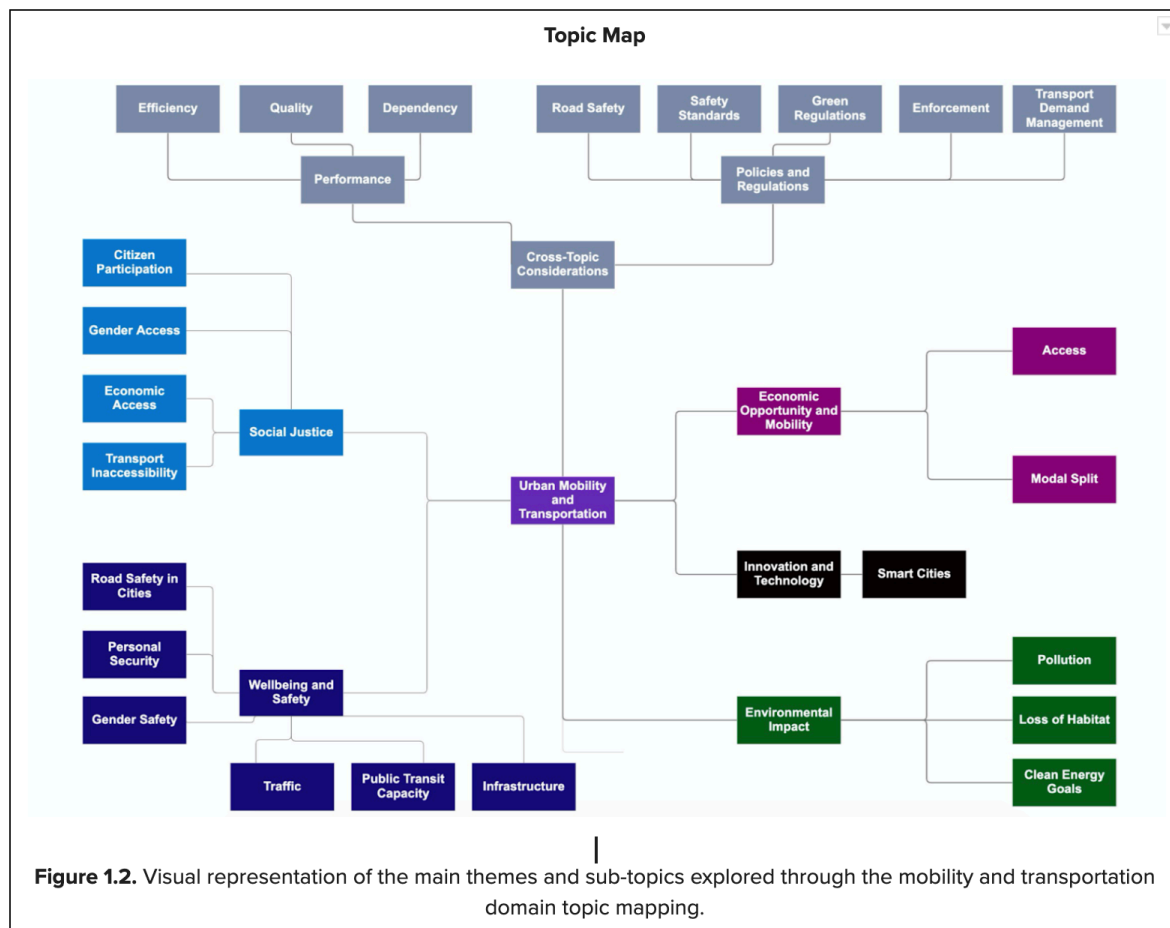
TUMI is the leading global implementation initiative on sustainable mobility, formed through the union of 11 prestigious partners. Facilitated by the German Development Agency (GIZ) and funded by the German Federal Ministry of Economics and Development (BMZ), TUMI's

envisioning the creation of thriving cities with enhanced economic, social, and environmental performances in line with the New Urban Agenda, the Agenda 2030 and the Paris Agreement. TUMI's vision is based on three pillars: innovation, knowledge, and investment.

NUMO is a global organization that channels tech-based disruptions in urban transport to create joyful cities where sustainable and just mobility is the new normal. Founded in 2019 as an outgrowth of the Shared Mobility Principles for Livable Cities, NUMO convenes diverse allies and leverages the momentum of significant revolutions in mobility to target urban issues—including equity, sustainability, accessibility, and labor—impacted by the shifting transportation landscape. NUMO is hosted by WRI Ross Center for Sustainable Cities.

TOPIC MAPPING

To scope the field of literature around a large topic such as Urban Mobility and Transportation, The GovLab built a gestalt or large-scale overview, that provided a primer on major themes in the literature. The topic map was presented to bilinguals and updated with feedback from bilinguals following the First Check-In Meeting to create a more substantive knowledge base on the topic at hand.



This review used The GovLab's R-Search Methodology to create a scan of the issues and central research questions around urban mobility and transportation. Rapid reviews are, by nature, more limited than other types of research synthesis and can therefore lack the detail that traditional systematic reviews provide. At the same time, rapid reviews and systematic reviews generally result in similar topic mappings.

In the case of urban transportation and mobility, we examined a range of social, environmental, economic, and regional factors that impact policies and the performance of urban mobility. Since the domain is interdisciplinary, the topic mapping included vital elements such as inequality, accessibility, safety, and sustainability in the global context. The objective was to develop an initial understanding of the elements that make up the urban mobility sphere, and how they affect mobility behavior of different demographics.

Based on a literature review on urban transportation and mobility, we identified six central topics:

- I. Cross-topic considerations of performance, policies, and regulations
- II. Economic opportunity and mobility
- III. Social justice
- IV. Wellbeing and safety
- V. Environmental impact
- VI. Innovation and technology

For each topic, we identified several important and interconnected sub-topics along with key observations on how each point affects the state of urban mobility and people's habits, behaviors, and mobility choices. To showcase the interconnectedness of the elements of urban mobility and transportation, we developed a tagging system based on current literature.

Topic tags include:

- *Social and equity considerations*: issues of accessibility, safety, inclusivity, and barriers to mobility and participation;
- *Environmental considerations*: factors relating to addressing climate change risks and promoting more sustainable modes of mobility;
- *Economic considerations*: overarching trends that impact urban development and mobility policies; and
- *Cultural considerations*: issues of perception, including status, comfort, and reliability, which contribute to the desirability for certain modes of mobility over others.

I) Cross-Topic Considerations

Performance

1. **Quality**: Travelers take into consideration a wide range of factors when choosing how to travel or commute. Overall, the quality of a mode of transportation determines levels of participation, rider satisfaction, and future use. The main elements of quality that pertain to all modes of transportation and mobility are:

- A. **Reliability:** The level of certainty that travelers have about the level of service they will receive during travel.¹ This includes travel time reliability, which has a significant impact on the attractiveness of transit to current and prospective riders.²

Tags: Economic considerations, Cultural considerations

- B. **Comfort:** Can refer to actual comfort levels, such as quality of seating, amount of space per passenger, and high-quality infrastructure for active mobility. It can also refer to perceived comfort, which is an important element that can determine the popularity of a certain method of transportation.

Tags: Environmental considerations, Cultural considerations

- C. **Transit coverage:** Proper coverage for transport networks is crucial to ensure accessibility and maximum participation. Sufficient coverage also reduces the dependence of low-served areas on informal transit.³

Tags: Social and equity considerations, Economic considerations

- D. **Affordability:** The ability to make or purchase necessary journeys for work, school, healthcare, and other social services, as well as make or purchase non-essential journeys.⁴

Tags: Social and equity considerations, Economic considerations

2. **Efficiency:** In addition to quality, efficiency is a determinant of what transportation method users will choose. The most popular methods of transportation are likely to be the fastest or the most direct.

- A. **Travel time:** The most significant and traditional variable that determines route choice and method of transportation is travel time. Users almost always look for the fastest way to get to their destination.⁵

Tags: Economic considerations

- B. **Transfers:** The number of transfers and the time spent transferring during a transit journey affects the overall travel time and perceived efficiency of the trip. Travelers may tend to prefer routes that seem more direct and perceive transfers as increasing travel time.⁶

Tags: Social and equity considerations, Economic considerations

¹ <https://link.springer.com/article/10.1007/s11116-021-10188-2>

² <https://www.nctr.usf.edu/pdf/77607.pdf>

³ <https://www.transformative-mobility.org/publications/sustainable-urban-transport-in-latin-america>

⁴ <https://openknowledge.worldbank.org/handle/10986/17408>

⁵ <https://doi.org/10.1016/j.tra.2014.05.010>

⁶ <https://doi.org/10.1016/j.tra.2014.05.010>

- C. **Congestion:** This affects travel time for most modes of transportation. The more congested the roadway, the longer the travel time is for public transit users and road users.

Tags: Environmental considerations, Economic considerations

- D. **Vehicle occupancy:** The average number of passengers per private vehicle. Shifting the traffic mode away from single occupancy vehicles to ride-sharing or uses of higher occupancy transportation methods has the potential to reduce traffic congestion in urban areas.⁷

Tags: Environmental considerations, Economic considerations

- E. **Farebox recovery:** Percentage of transit operational costs recovered with fares. Very few public transit systems in the world generate enough revenue through fares to cover the cost of operations. Even some of the most developed transit systems in Europe rely on government subsidies.⁸

Tags: Economic considerations

3. **Dependency:** The above factors of quality and efficiency assume that people have a choice of what method of mobility best suits their needs. However, this is not always the case since not everyone has the freedom to choose their mode of transportation.

- A. **Captive users:** Defined as users who have only one viable option for transportation they can use in the area where they live.⁹ Captive users may be tied to one mode of transportation due to income, gender, age, location, or disability.

Tags: Social and equity considerations, Economic considerations

- B. **Choice users:** In contrast to captive users, choice users have the opportunity to weigh the benefits of different modes of transportation based on quality and efficiency, to choose the mode of transportation that best suits their needs.¹⁰ These choices can potentially be shifted to increase usage of more sustainable modes of transportation through incentives and other green regulations.

Tags: Social and equity considerations, Cultural considerations, Environmental considerations

⁷ <https://ftp.iza.org/dp11812.pdf>

⁸ <https://transportgeography.org/contents/chapter8/urban-transport-challenges/world-farebox-ratio/>

⁹ <https://www.researchgate.net/publication/>

[37984537_Accessibility_Connectivity_and_Captivity_Impacts_on_Transit_Choice](#)

¹⁰ Ibid.

Policies and Regulations

1. **Safety standards:** A key factor of mobility safety for pedestrians and transit passengers alike is robust safety standards. This includes a wide range of factors, such as safety features for pedestrians, standards for vehicle and bus safety, dedicated infrastructure for different types of transportation, and proper enforcement of standards.

A. **Passenger protection:** This can range from standards on wearing helmets for cyclists and motorcycle riders, to standards for vehicles to tolerate a crash or collision with minimal injury. This can also include standards for safety belts.¹¹ Passenger protection standards disproportionately favor men in their design.¹² For example, in the United States, crash test dummies represent the average male and do not take into account that female bodies react differently in a crash.¹³ As a result, females are more at risk of injury.

Tags: Social and equity considerations

B. **Pedestrian protection:** Dedicated infrastructure is one method for ensuring pedestrians can travel safely. Safety features in vehicles are another way to improve safety for people of the vehicle.

Tags: Social and equity considerations

2. **Road safety:** Refers to measures taken to lower the risk of road traffic injuries and deaths. An estimated 90% of global road traffic deaths occur in low- and middle-income countries.¹⁴ Improving road safety could include lowering speed limits, enforcing the use of helmets for cyclists, and establishing dedicated infrastructure for pedestrians and cyclists.

A. **Infrastructure:** The quality and efficiency of transportation systems are closely related to the quality of infrastructure. This applies to all modes of transportation, including walking. Infrastructure indicators could include paved roads, dedicated bus lanes, dedicated lanes for cyclists, space for pedestrians, such as sidewalks, roundabouts instead of traffic lights, anti-speeding road elements, and adequate street lighting. In developing countries, basic pedestrian protection is often absent due to a lack of proper infrastructure, with the majority of roads having no pedestrian crossings or formal sidewalks.¹⁵

Tags: Social and equity considerations, Economic considerations

¹¹ UN Regulation No. 14 <https://unece.org/fileadmin/DAM/trans/main/wp29/wp29regs/2020/R014r6e.pdf>

¹² <https://www.forbes.com/sites/tanyamohn/2019/10/28/dummies-used-in-motor-vehicle-crash-tests-favor-men-and-put-women-at-risk-new-report-says/?sh=2435e3e547bc>

¹³ Ibid.

¹⁴ <https://www.paho.org/en/topics/road-safety>

¹⁵ <https://www.fiafoundation.org/blog/2018/june/latin-america-caribbean-child-deaths-need-urgent-action-says-new-report>

- B. **Speed management:** Speed is closely connected to the risk of being involved in a crash, as well as the probability and severity of the injury.¹⁶ Speed management is one of the key issues in road safety. Speed limits should be at such a level that if a crash were to occur, the impact on the human body is below serious injury levels.¹⁷

Tags: Social and equity considerations, Economic considerations

- C. **Drug and alcohol consumption:** Alcohol is a major element contributing to the frequency and severity of road crashes. Drinking and driving regulations are based on the level of blood alcohol concentration (BAC).¹⁸ It is widely accepted that a BAC of 0.5g/l should be the maximum legal limit while driving.¹⁹ Drinking also affects cycling safety, although there are fewer regulations around drinking and cycling, versus drinking and driving. Additionally, there is a growing concern in many countries about the effects of drug use on road safety.²⁰

Tags: Social and equity considerations

3. **Green regulations:** Globally, transit emissions make up an estimated 15-20 percent of total emissions. Vehicles are among the biggest contributors to these emission levels.²¹ In 2021, the UN Task Force issued a number of recommendations to improve green and healthy transit. These included allocating space for public transit, encouraging the adoption of electro-mobility (e-mobility), presence of innovation and technology, and supporting active mobility, such as walking and cycling.²²

- A. **Fuel quality:** National fuel-efficiency standards are essential tools in the process of reducing CO2 emissions.²³ In Latin America, several countries are working to improve fuel quality and there has been significant progress in recent years.²⁴

Tags: Environmental considerations, Economic considerations

- B. **Emissions-based regulations:** Transit emissions can include particulate matter, nitrogen oxides, carbon monoxide, and sulfur dioxide. These emissions result from the exhaust of cars, trucks, and buses. Regulations to lower these emissions can include targets for electric car and bus adoptions, improving standards for manufacturers, and developing

¹⁶ https://www.itf-oecd.org/sites/default/files/docs/benchmarking_road_safety_latam.pdf

¹⁷ https://www.itf-oecd.org/sites/default/files/docs/benchmarking_road_safety_latam.pdf

¹⁸ Ibid.

¹⁹ <https://www.who.int/initiatives/SAFER/drink-driving>

²⁰ <https://www.who.int/publications/i/item/drug-use-and-road-safety>

²¹ <https://www.nationalgeographic.org/media/transportation-and-climate-change>

²² <https://unece.org/environment/press/un-task-force-issues-recommendations-green-and-healthy-transport-support>

²³ <https://www.wri.org/outcomes/government-mexico-introduces-latin-americas-first-ever-fuel-efficiency-standard-light-duty>

²⁴ <https://stratasadvisors.com/Insights/2021/02242021-LATAM-Fuel-Quality>

incentive programs.²⁵

Tags: Environmental considerations, Economic considerations

- C. **Incentives:** One way to reduce GHG emissions from transportation is to incentivize zero-emission vehicles or other zero-emissions modes of transportation. This could include financial incentives, such as rebates and subsidies. Another method is to disincentivize the use of unsustainable modes of transportation, such as private vehicles.

Tags: Environmental considerations, Economic considerations, Cultural considerations

4. **Governance & Policies:** Changing stakeholders and goals of urban mobility programs require the use of both hard and “soft” policy tools that account for the diversity in local demographics, transportation aims, and sustainable energy use. Local government decentralization and differences in quality, providers, and aims of urban and rural transportation introduce a web of players in transportation governance.

- A. **Sustainable urban mobility plans (SUMP):** Traditional urban and transport planning prioritizes cars and automobiles over walking and cycling modes of transportation. SUMP requires a paradigm shift that emphasizes clean modes of transport like walking and cycling²⁶, allows for commute time flexibility while considering the quality of movement and peoples’ time, and encourages balance, safety, accessibility, and savings.²⁷ SUMP-style planning tends to be concentrated in large cities with ample budgets and administrative power to consult with numerous actors.

Tags: Social and equity considerations, Environmental considerations, Economic considerations

- B. **Mobility-as-a-service (MaaS) governance:** MaaS refers to the bundling of a variety of different types and modes of transportation providers through a streamlined interface (i.e. an app). Combining public transportation with private modes and shared mobility requires buy-in from local governments and transport authorities.²⁸ To coordinate between these modes of transportation, technical tools (e-tickets, transferable tickets, APIs, etc.) require data collection, sharing, and application policies for interoperability and collaborative use to inform MaaS.²⁹

Tags: Social and equity considerations, Environmental considerations, Economic considerations

²⁵ <https://www.ucsusa.org/resources/cars-trucks-buses-and-air-pollution>

²⁶ https://link.springer.com/chapter/10.1007/978-3-030-47135-4_17

²⁷ <https://www.mdpi.com/2071-1050/13/11/5950/pdf>

²⁸ https://www.sciencedirect.com/science/article/pii/S0967070X19307504?casa_token=9mhdJpvCOP4AAAAA:i_6GbFDmeqD7TFyItE8r8G6Ln5NFdyRy_YPZLapCxy3G1ympf0_0TGZhkSulbldP_exmDw-2zOA

²⁹ https://www.sciencedirect.com/science/article/pii/S096585641830973X?casa_token=l3y_3WsbqXgAAAAA:47HtYYVZZ8zyh75luOK7NPKNWpFr9Ng7s2KYncNW4UPoCp8qEAbt1Ear06yqlz7yAQU7gG5HKw

- C. **Allocating budget to transport:** For governments, an essential part of public infrastructure programs is deciding how to effectively allocate the budget, especially in times of financial difficulty.³⁰ Budget allocation can refer to new public transportation developments, maintenance of current infrastructure, or subsidizing public transportation to make it more accessible and affordable to users.

Tags: Social and equity considerations, Economic considerations

5. **Enforcement:** To help cities to improve mobility dynamics, safety standards, and green regulations require adequate levels of enforcement. Strategies such as police control points, radar-controlled areas, and other enforcement are needed, as well as communications strategies to communicate standards to the public.³¹

- A. **Traffic enforcement:** In addition to laws and regulations on speed limits, supervision of road users' compliance with traffic laws is required. Failure to adhere to these laws can result in penalties.

Tags: Social and equity considerations

- B. **Civic culture strategies:** Communication and education strategies can help inform users on safe road behaviors to improve road safety and decrease non-compliance with traffic laws.

Tags: Social and equity considerations

- C. **Safety enforcement mechanisms:** Mechanisms on public transit and along pedestrian and cycling routes, such as alarm buttons or emergency phones, are important for improving safety and safety perception.

Tags: Social and equity considerations

6. **Transport Demand Management (TDM):** This can increase transportation efficiency by providing incentives for individuals to change their mobility behaviors, including travel routes, modes of transportation, travel time, frequency, and cost.³² TDM focuses on increasing access to services and activities, instead of vehicle transportation.

- A. **Mobility options:** Increasing the number of mobility options available can discourage the usage of personal vehicles. This can include improvements to public transit systems, walking and cycling improvements, rideshare programs, bike-sharing, and carsharing services.³³

Tags: Environmental considerations, Economic considerations, Cultural considerations

³⁰ https://www.jstage.jst.go.jp/article/easts/7/0/7_0_415/_pdf

³¹ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

³² <http://transferproject.org/wp-content/uploads/2017/09/Transportation-Demand-Management.pdf>

³³ Ibid.

B. **Economic incentives:** Encouraging individuals to switch to more sustainable modes of transportation can involve both financial disincentives and incentives. These are called push and pull strategies.

- **Push strategies:** This approach involves discouraging certain types of transportation, particularly car use. Push strategies can include car-limited zones, car bans, road pricing, fuel tax increases, and parking regulations.

Tags: Economic considerations, Cultural considerations

- **Pull strategies:** This method encourages users to make more desirable transportation choices. Pull strategies include high service frequency, comfortable transit stops, and surroundings, and pedestrian and cycling networks.³⁴

Tags: Environmental considerations, Economic considerations, Cultural considerations

C. **Land use policies:** Focusing on transit-oriented development, car-free planning and traffic calming can contribute to lowering vehicle use and promoting more sustainable modes of transportation, such as walking, cycling, and taking public transit.³⁵

Tags: Environmental considerations, Economic considerations

II) Economic Opportunity and Mobility

1. **Access:** An overarching goal of modern mobility is ensuring equitable access to the city.³⁶ Transportation is the key to accessing economic opportunities, education, and healthcare.³⁷ Access to transit has a significant impact on the overall quality of life. The following elements depend on access to transit:

A. **Employment:** A spatial mismatch between where people live and where economic opportunities are can result in higher unemployment rates and/or the proliferation of informal jobs and underemployment.³⁸ Investments in proper transit infrastructure and systems allow more people to have access to employment opportunities. However, transportation planning is usually formed based on formal employment trends, and

³⁴ <http://transferproject.org/wp-content/uploads/2017/09/Transportation-Demand-Management.pdf>

³⁵ Ibid.

³⁶ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

³⁷ <https://www.urban.org/sites/default/files/publication/102992/access-to-opportunity-through-equitable-transportation>

³⁸ Ibid.

those that rely on informal employment get left out.

Tags: Social and equity considerations, Economic considerations

- B. **Healthcare:** Barriers to transportation are cited as a cause of barriers to healthcare access. Transportation barriers lead to missed appointments, delayed healthcare, and missed medication. This may lead to overall poorer healthcare outcomes.³⁹

Tags: Social and equity considerations

- C. **Education:** In many cities, transportation systems are built to transport adults to cities' economic centers.⁴⁰ As a result, these networks cannot always connect students to their education centers. When cities and schools do not offer transportation, parents (mostly women who perform care tasks) take on the burden of transporting their children to school.

Tags: Social and equity considerations

- D. **Political participation:** Low voter turnout, disparities in voter turnout and not being able to meet with like-minded people and advocate for policies, is a concern for democratic and political participation. A barrier to political participation is being able to get to the polls.⁴¹ If voters face impediments to accessing polls, such as a lack of transportation, they may be less likely to vote.

Tags: Social and equity considerations

- E. **Social participation:** Limited mobility is related to a lower level of participation in social activities. The more time a person spends on their commute to work, the less time they are likely to spend engaging in social or meaningful activities.⁴²

Tags: Social and equity considerations, Economic considerations

- F. **Public spaces:** Access to public spaces can have an impact on lifelong health.⁴³ For people who do not have access to transportation modes, accessing parks is not always possible. This makes walking, cycling, and public transportation an important factor in getting to parks and allowing all people to enjoy the outdoors.

Tags: Social and equity considerations, Environmental considerations

2. **Modal split:** A modal share is the percentage of travelers who use a certain type of transportation or the number of trips per type of transportation.⁴⁴ This split between

³⁹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4265215/>

⁴⁰ <https://files.eric.ed.gov/fulltext/ED574750.pdf>

⁴¹ <https://www.democracydocket.com/news/got-wheels-how-having-access-to-a-car-impacts-voting/>

⁴² <https://doi.org/10.1016/j.tra.2018.09.006>

⁴³ <https://www.eesi.org/articles/view/all-aboard-for-nature-improving-outdoor-access-through-public-transportation>

⁴⁴ https://doi.org/10.1007/978-1-349-02093-5_8

different modes of transportation, including active mobility and micro-mobility results from the following factors:

- A. **Reliability:** One of the factors that impact usage of public transit is reliability and perceived reliability. Some systems, such as Bus Rapid Transit (BRT) in Latin America suffer persistent perceptions of being a low-quality unreliable option that is slow and uncomfortable. This perception is shared by users and non-users alike.⁴⁵ In contrast, the popularity of cars and motorcycles grows.

Tags: Economic considerations, Cultural considerations

- B. **Flexibility:** Private transportation modes go right from your home to your destination at any time. In contrast, transit schedules and routes may be or may seem inflexible and inconvenient.⁴⁶ Being able to walk short distances or ride a bike to work, owning a car or a motorcycle can mean improved access to employment and services.

Tags: Economic considerations, Cultural considerations

- C. **Proximity:** Urban transportation systems are under pressure to cope with growing congestion in many urban areas. One approach is to increase transportation options and availability, another is to rethink urban mobility in terms of proximity to services. This is called the ASI approach: avoid, shift, improve (avoid the need to travel, shift to sustainable modes of transportation, improve performance of existing systems).⁴⁷

Tags: Social and equity considerations, Economic considerations, Cultural considerations

- D. **Cost:** In areas where the cost of personal vehicles is relatively low, and public transit is seen as unreliable and inflexible, the demand for cars and motorbikes goes up.⁴⁸ A greater reliance on cars and motorcycles leads to poorer road safety, more traffic and pollution, and greater inequality since not everyone can access or afford a personal vehicle.

Tags: Social and equity considerations, Economic considerations

- E. **Parking access:** Personal vehicle use in urban areas hinges on the availability of parking spaces.⁴⁹ Real-time parking space availability technology is crucial to help those with cars or bikes navigate city spaces; however, a mismatch between demand and supply leads to high parking prices and causes parking-related delays for

⁴⁵ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

⁴⁶ <https://cleantechnica.com/2021/10/13/cities-must-consider-flexible-transit-options-before-the-next-pandemic-heres-one-answer-from-ust/>

⁴⁷ <https://www.urbanet.info/proximity-city-improving-access-avoiding-transport/>

⁴⁸ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

⁴⁹ <https://doi.org/10.1007/s12544-012-0088-3>

individuals.⁵⁰ Parking controls aim to reduce danger, congestion, and pollution from cars, however, the needs of bicyclists and improvement of bus and train operations have to be taken into account to achieve more navigable roads.

Tags: Environmental considerations, Economic considerations, Social considerations

III) Social Justice

1. **Transport inaccessibility:** If one cannot walk a short and safe distance, ride a bike, access a public transit route, afford a taxi, ride-sharing service, or have another private transportation option, accessing the city and all of its services can be extremely difficult.⁵¹ Transport inaccessibility depends on socioeconomic factors and disproportionately affects low-income neighborhoods.⁵²

- A. **Informal settlements:** Cities can grow in part because they offer greater economic opportunities. As cities grow and become more expensive, informal settlements and poverty belts grow in city peripheries.⁵³ This is a result of unplanned urban growth and leads to high rates of poverty, more inequality, and less access to transportation.⁵⁴

Tags: Social and equity considerations, Economic considerations

- B. **Road infrastructure:** In city peripheries, there is limited transportation infrastructure. This includes roads, sidewalks, and infrastructure for cyclists. Throughout Latin America, despite being one of the most motorized regions in the world, there is low road density and a low percentage of paved roads.⁵⁵

Tags: Social and equity considerations, Economic considerations

- C. **Splintering urbanism:** Involves higher investments in the connectivity of the more attractive zones, such as city centers, to the detriment of less attractive areas, such as city peripheries.⁵⁶

Tags: Social and equity considerations, Economic considerations

⁵⁰ https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6728210&casa_token=dOp6gLwKwTMAAAAA:5NtyxJSmH6DGM-P_21VX7tiB5L3tvtt-xBjSb8kYJOVp7GuS6nYmDaUKoa28JoHEmUb-MFv&tag=1

⁵¹ <https://www.utoronto.ca/news/stranded-without-transit-u-t-researchers-say-one-million-canadians-suffer-transport-poverty>

⁵² Ibid.

⁵³ <https://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12>

⁵⁴ <https://latinaer.springeropen.com/articles/10.1007/s40503-015-0027-5>

⁵⁵ <https://doi.org/10.1007/s40503-015-0027-5>

⁵⁶ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

- D. **Intra- and inter-city mobility mechanisms:** An equitable network of transportation integrating both intra- and inter-city mobility is crucial for regional planning and promoting economic growth.⁵⁷ Developing a comprehensive transport infrastructure plan regionally requires long-term investment and in-depth examination of passenger demand forecasting and cost-benefit analysis.⁵⁸

Tags: Social and equity considerations, Economic considerations

- E. **Accessibility for people with disabilities:** Access to transportation for people with disabilities depends on proper planning and design with accessibility in mind, oftentimes these design features are neglected.⁵⁹ Accessible features can include ramps, room for wheelchair users, anti-slip spaces, and designated parking.

Tags: Social and equity considerations

2. **Gender access:** To be economically successful, women need access to transportation infrastructure that takes into account their circumstances and needs. One of these circumstances is that women disproportionately take care of home maintenance and childcare. Therefore, errands such as grocery shopping and taking children to school are often women's responsibilities.⁶⁰ If the transportation system available is inaccessible near locations where these errands are, this means women have less time, less mobility, and less access to opportunities.⁶¹

- A. **Reliance on transit:** Studies have shown that there has been a "masculinization of private car use" where men tend to opt for cars more frequently than women.⁶² Women tend to use public transit more frequently than men. Therefore, public transit needs to be a major consideration in designing spaces accessible to women.

Tags: Social and equity considerations, Environmental considerations

- B. **Distance to public transit:** In Latin America, women walk the farthest because they have to reach public transit to complete their errands.⁶³ In some areas, such as city peripheries, the urban poor has no access to public transportation.

Tags: Social and equity considerations

- C. **Time spent in transit:** As a result of a disproportionate burden of household work, women spend more time on public transit to complete their work. If the transportation

⁵⁷ <https://rpa.org/work/research-areas/transportation>

⁵⁸ <https://www.systematica.net/service/transport-infrastructure-planning/national-and-regional-transport-planning/>

⁵⁹ <http://dx.doi.org/10.26911/thejhpm.2016.01.01.01>

⁶⁰ <https://genderpolicyreport.umn.edu/addressing-gender-disparities-in-transportation/>

⁶¹ Ibid.

⁶² https://repositorio.cepal.org/bitstream/handle/11362/44903/1/S1900405_en.pdf

⁶³ Ibid.

system is unreliable, this results in more time spent traveling for women.

Tags: Social and equity considerations

- D. **Mobility of care:** Includes travel that results from caring responsibilities, such as accompanying children and elders, shopping for daily necessities, and visiting to care for ill or elderly relatives⁶⁴ These care trips, which fall disproportionately on women, are often not accounted for in datasets as these trips are hidden under other reasons for traveling, such as leisure or social activities.

Tags: Social and equity considerations, Cultural considerations

3. **Economic access:** Affordability of transit trips is another barrier to access. In some areas, the urban poor have to forego transit trips altogether because of barriers to access, which leads to very long travel times.⁶⁵ Efforts to improve affordability could involve transport subsidies to drive the cost of transit for users down.

- A. **Public transit subsidies:** Access to affordable and efficient transit systems is crucial. In order to attract and retain more users, improving the level of service and reducing costs for individuals can help. This can be done through subsidizing public transit and transit-oriented urban planning.

Tags: Social and equity considerations, Environmental considerations, Economic considerations

- B. **Economic burden of mobility:** In some households, particularly in low- to middle-income countries, expenditure on transportation can consume as much as 30% of household income.⁶⁶ The poorest households in large cities are the most affected by this since they pay the largest portion of their household income on transportation.

Tags: Social and equity considerations

- C. **Vicious cycle:** When transit systems are unreliable, uncomfortable, and/or unaffordable, there will be fewer users over time. This in turn leads to less profit for the transit provider and can lead to increased fares.⁶⁷

Tags: Social and equity considerations, Environmental considerations, Economic considerations, Cultural considerations

4. **Citizen participation:** To create efficient, accessible, and popular transportation methods, transport planning requires citizen engagement.⁶⁸ People's practical knowledge needs to supplement the planning of transport specialists in order to address users' needs. One of

⁶⁴ <https://unhabitat.org/mobility-of-care-ines-sanchez-de-madariaga>

⁶⁵ <https://doi.org/10.1186/s40503-019-0079-z>

⁶⁶ Ibid.

⁶⁷ <http://www.brt.cl/wp-content/uploads/2012/06/AAG-Public-Transport-in-Latin-America-a-view-from-the-World-Bank.pdf>

⁶⁸ <https://doi.org/10.1016/j.retrec.2015.10.016>

the challenges in Latin America is there has been little exploration of involving citizens in transport decision-making.⁶⁹

- A. **Low accessibility in low-income areas:** Lack of consultation and listening to users' needs has resulted in poor transportation planning, which has led to low accessibility to transport services in low-income areas.

Tags: Social and equity considerations

- B. **Advocacy for participation:** There has been a push from leading citizen organizations to have consultations regarding public transportation development, however, a lack of citizen participation in many areas persists.

Tags: Social and equity considerations

IV) Wellbeing and Safety

1. **Road safety in cities:** Road safety and traffic deaths are a major development concern, particularly in low- to middle-income countries. A contributing factor to low road safety in Latin America is road design, road maintenance, and car-centric urban planning.⁷⁰

- A. **Road injuries and deaths:** According to WHO, approximately 1.3 million people are killed on roads globally. This number is expected to keep rising. In Latin America, the rate of traffic-related deaths has grown significantly and is about twice as high as the rate in high-income countries.⁷¹ For one of Latin America's youngest populations, children ages five to fourteen years old, roads are the number one cause of death.⁷²

Tags: Social and equity considerations

- B. **Speed management infrastructure:** Speed bumps and other traffic calming infrastructure can be effective in reducing car speeds in urban areas where there are pedestrians and cyclists.⁷³

Tags: Social and equity considerations, Economic considerations

- C. **Use of motorcycles:** Roadways in developing countries are used by a large number of motorcycles, along with non-motorized transportation, such as cycling and walking. However, there is a lack of safety features, such as motorcycle lanes, to protect

⁶⁹ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

⁷⁰ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

⁷¹ <https://doi.org/10.1186/s40503-019-0078-0>

⁷² [STREETS FOR LIFE](#)

⁷³ <https://toolkit.irap.org/default.asp?page=treatment&id=33>

vulnerable travelers, such as pedestrians and cyclists.⁷⁴

Tags: Environmental considerations, Economic considerations, Cultural considerations

- D. **Age of vehicle fleet:** The age composition of vehicle fleets is important to understanding road safety and vehicle emission trends.⁷⁵ Newer cars have more safety features and are more reliable than older ones. There is also a global trend to export and upcycle vehicles from the global north that has both challenges and opportunities.

Tags: Environmental considerations, Economic considerations

2. **Personal security:** The perception of one's security and the fear of crime in urban centers has the potential to alter people's travel behavior.⁷⁶ Fear of crime can depend on transit factors such as lighting, crowding, surveillance, and travel companionship, as well as on gender and income levels.

- A. **Crime:** Preventing crime on public transit is vital for users' safety, however, studies have shown that lowering crime rates does not always equate to lowering fear of crime.⁷⁷ Abuse can take the form of verbal catcalling, non-verbal gestures or actions, or physical assault and robbery.⁷⁸ Crime and harassment are present throughout an individual's transit journey—occurring at and on the way to public transport stops and while on public transit.

Tags: Social and equity considerations

- B. **Safety perception:** Major determinants of safety perception include the previous victimization and witnessing other people's victimization.⁷⁹ The notion of being around strangers has been shown to increase fear, anxiety, and feelings of danger on public transit.⁸⁰

Tags: Social and equity considerations, Cultural considerations

- C. **Safety of minority populations:** Studies have found that women, the elderly, ethnic minority groups, disadvantaged urban youth, the LGBTQI community, and the economically disadvantaged report lower safety perceptions.⁸¹ Public transportation is an area where individuals of various genders, ethnicities, and backgrounds all congregate together. In a cross-racial environment, discrimination can be subtle (distancing) or overt (assault).⁸² Similarly, women experience more verbal and physical

⁷⁴ Ibid.

⁷⁵ https://unece.org/DAM/trans/doc/2019/wp6/SDG_fleet_age_paper_FINAL.pdf

⁷⁶ <https://doi.org/10.1016/j.tra.2021.11.001>

⁷⁷ Ibid.

⁷⁸ <https://doi.org/10.1080/08974454.2020.1733732>

⁷⁹ <https://doi.org/10.1177/1077801221992874>

⁸⁰ <https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1069&context=jpt>

⁸¹ Ibid.

⁸² <https://doi.org/10.1111/cico.12116>

sexual violence across the transit journey.⁸³ In micro-spaces, people with disabilities face rudeness and harassment due to ableist attitudes and non-inclusive public space designs.⁸⁴ Those without access to private modes of transportation are forced to endure unsafe situations.

Tags: Social and equity considerations, Cultural considerations

3. **Gender Safety:** Compared to men, women report the highest levels of fear of crime on public transportation and are more likely to fall victim to a range of crimes, including non-violent thefts, sexual harassment, and psychological violence.⁸⁵

- A. **Harassment against women:** Access to safe public transit is essential for women's access to economic opportunities, therefore, it is vital to reduce harassment and violence against women on transit.⁸⁶ This is especially important since women rely more on transit than men and are more at risk.

Tags: Social and equity considerations

- B. **Sexual aggression perception:** In addition to incidents of harassment, the fear of sexual aggression may prevent women's mobility and as a result, lower women's abilities to participate in work, school, and social life.⁸⁷

Tags: Social and equity considerations

- C. **Exclusion:** Gender-based crimes, such as sexual aggression and harassment, change the way women travel. High crime rates and high levels of fear may result in some women being excluded from mobility options.

Tags: Social and equity considerations

4. **Public transit capacity:** As pollution and congestion levels continue to rise, some cities are trying to influence modes of transportation to curb traffic during peak travel hours. ⁸⁸ This includes investment into public transit, dedicated lanes for high-capacity transit, and congestion pricing schemes.⁸⁹

- A. **Crowding:** Crowding at bus stops, stations, inside buses and trains has an impact on waiting time, travel time reliability, and route choice.⁹⁰ Along with cost, time reliability, and quality of service, crowding influences modal choice. Crowding may also lead to higher perceptions of unsafety, higher levels of anxiety, and overall discomfort during

⁸³ [DOI: 10.1080/08974454.2020.1733732](https://doi.org/10.1080/08974454.2020.1733732)

⁸⁴ [DOI: 10.1111/area.12455](https://doi.org/10.1111/area.12455)

⁸⁵ <https://doi.org/10.1016/j.tra.2021.11.001>

⁸⁶ <https://www.endvawnow.org/es/articles/1991-womens-access-to-safe-transport.html>

⁸⁷ <https://doi.org/10.1177/1077801221992874>

⁸⁸ <https://publications.iadb.org/publications/english/document/Urban-Transport-Systems-in-Latin-America-and-the-Caribbean-Challenges-and-Lessons-Learned.pdf>

⁸⁹ Ibid.

⁹⁰ <https://doi.org/10.1016/j.tra.2013.06.005>

the trip.⁹¹

Tags: Social and equity considerations, Cultural considerations

- B. **Road space:** While cars remain a more attractive mode of transportation with lots of users, less space there is on the road for other modes of transportation. Per traveler, especially in single-occupancy vehicles, cars take up the most space.⁹² While we consider how much transit costs in dollars, we also need to consider how much transit costs in space, which is a commodity in urban centers.

Tags: Environmental considerations, Economic considerations

- C. **Ride-share services:** The rise of ride-sharing services in cities leads to diminished public transit use. These services are a substitute—and therefore, competition—to public transportation systems because they offer more efficiency, convenience, and address ‘last-mile’ transportation problems.⁹³ They also can reduce the number of car emissions, traffic congestion, and increase the mobility of lower-income individuals.⁹⁴

Tags: Environmental considerations, Economic considerations

5. **Infrastructure:** Cars, buses, and trains are not the only modes of transportation available. Other options include active mobility, like cycling and walking or using micro-mobility modes, such as scooters. Active mobility and micro-mobility can be better for people’s health, and the environment, and take up less space. However, they require dedicated infrastructure to ensure safe travels.

- A. **Safety for pedestrians:** Infrastructure, like sidewalks for pedestrians, is essential for providing safe paths. However, in some urban centers, particularly ones that experienced unplanned growth, sidewalks do not always exist or are not maintained.⁹⁵ Non-motorized transportation, like walking, is rarely well-integrated with public transportation or infrastructure for cars. Walking is often considered a peripheral issue instead of a legitimate mode of transportation.⁹⁶

Tags: Social and equity considerations, Environmental considerations

- B. **All ages and abilities:** Even when infrastructure for pedestrians and cyclists does exist, it is not always accessible or suitable to people of all ages and abilities. Urban mobility planning should include considerations for safety and accessibility for children, the

⁹¹ Ibid.

⁹² <https://humantransit.org/2012/09/the-photo-that-explains-almost-everything.html>

⁹³ <https://digitalcommons.bowdoin.edu/econpapers/13>

⁹⁴ <https://ssrn.com/abstract=2843301>

⁹⁵ <https://openknowledge.worldbank.org/bitstream/handle/10986/26390/114110-REVISED-PUBLIC-RethinkingInfrastructureFull.pdf>

⁹⁶ Ibid.

elderly, and people with disabilities.⁹⁷

Tags: Social and equity considerations

- C. **Safety for cyclists:** There is a consensus that having more cyclists than car users in a city leads to fewer emissions, healthier people, and reduces the need for freeways.⁹⁸ However, in order to maximize the benefits of cycling as a form of commuting, there needs to be dedicated infrastructure, such as bicycle lanes and bicycle parking to incentivize this mode of transportation.

Tags: Social and equity considerations, Environmental considerations

6. **Traffic:** As a result of a history of car-centric urban planning, traffic and congestion have been growing, especially in mid-size and large cities.⁹⁹ Traffic congestion is costly in time and money. Data from Latin America has shown that cities such as Mexico City, Bogota, Lima, and Rio de Janeiro have the most traffic in the world.¹⁰⁰

- A. **Motorization increase:** One of the causes of increased traffic congestion is higher motorization rates and lower public transit use.¹⁰¹ As mentioned above, the popularity of cars is in part driven by the unreliability or perceived unreliability of public transit options. COVID-19 has also impacted the modal split with more people preferring to drive instead of taking public transit.

Tags: Environmental considerations, Cultural considerations

- B. **Public space occupation per transportation mode:** With the increased use of cars and more traffic, there is less space in the city for pedestrians and bicycles. Studies have shown that there is a relationship between traffic rates and road crashes, many of which involve pedestrians and cyclists.¹⁰²

Tags: Environmental considerations, Economic consideration

- C. **Level of service:** Another negative effect of traffic is the impact on travel time across all modes of transportation, which impacts the level of service. As congestion and delays grow, public transit is perceived to be slower and less attractive.¹⁰³

Tags: Economic considerations, Cultural considerations

⁹⁷ <https://www.880cities.org/>

⁹⁸ <https://www.smartcitiesdive.com/ex/sustainablecitiescollective/7-reasons-fund-bicycle-infrastructure/268971/>

⁹⁹ <https://publications.iadb.org/publications/english/document/Urban-Road-Congestion-in-Latin-America-and-the-Caribbean-Characteristics-Costs-and-Mitigation.pdf>

¹⁰⁰ Ibid.

¹⁰¹ Ibid.

¹⁰² Ibid.

¹⁰³ <http://www.brt.cl/wp-content/uploads/2012/06/AAG-Public-Transport-in-Latin-America-a-view-from-the-World-Bank.pdf>

7. **Wellbeing and joyfulness:** Research supports the idea that there is a relationship between the mode of transportation and/or travel conditions, and joyfulness.¹⁰⁴ Elements that contribute to the feeling of joy include, less stressful modes of transportation, a sense of mastery of skills, such as cycling, and perceptions of physical health.¹⁰⁵

A. **Stress:** Non-drivers, such as pedestrians, cyclists, and public transit users have reported lower levels of stress during their journeys than individuals who drive vehicles or buses.¹⁰⁶ An important aspect of these lower-stress modes of transportation is adequate conditions and infrastructure. The speed limit, road classification, and presence of dedicated pedestrian and cycling infrastructure can make a street less stressful for pedestrians and cyclists.¹⁰⁷

Tags: Social and equity considerations, Environmental considerations

B. **Skills:** Activities, such as cycling contribute to the feeling of accomplishment of mastering a skill. A 2019 study found that cycling is the happiest mode of transportation while using public transportation is the least happy and meaningful.¹⁰⁸

Tags: Social and equity considerations, Environmental considerations

C. **Health perception:** For active modes of transportation, levels of self-perceived health are higher than for driving or taking public transit.¹⁰⁹ This also contributes to overall feelings of joy.

Tags: Social and equity considerations, Environmental considerations

D. **Alignment with city culture:** Understanding local culture and needs is important when it comes to (re)imagining urban mobility, demonstrating that a 'one-size-fits-all' model is not effective when designing future mobility solutions.¹¹⁰ Urban mobility can serve both as a driver and a reflection of a city's culture. Biking and micro-mobility mechanisms have become integral to promoting wellbeing and catalyzing social and spatial transformation.¹¹¹

Tags: Social and equity considerations

¹⁰⁴ <https://medium.com/the-numo-blog/creating-joyful-transportation-carlos-pardo-numo-alliance-cfccb9c7bf2b>

¹⁰⁵ <https://doi.org/10.1016/j.trf.2011.12.010>

¹⁰⁶ Ibid.

¹⁰⁷ <https://storymaps.arcgis.com/stories/283d772a8c654ef4afd52536456ac090>

¹⁰⁸ <https://doi.org/10.1016/j.tra.2018.09.019>

¹⁰⁹ <https://doi.org/10.1016/j.envint.2018.08.002>

¹¹⁰ <https://kadence.com/en-us/cultural-understanding-is-key-to-harnessing-the-urban-mobility-opportunity/>

¹¹¹ <https://www.elgaronline.com/view/edcoll/9781789900460/9781789900460.00023.xml>

V) Environmental Impact

1. **Pollution:** Transport-related emissions account for almost a quarter of global CO₂ emissions.¹¹² Some areas have experienced more emissions growth. Transport-related greenhouse gas (GHG) emissions in Latin America have risen by 50% in the region between 2000 and 2016.¹¹³ Pollution from transportation can also include criteria pollutants, such as particulate matter, nitrogen oxides, and volatile organic compounds, which contribute to smog and poor air quality.

A. **Climate change:** As the transportation sector is responsible for carbon pollution that exacerbates climate change, institutions are enacting programs that aim to reduce carbon pollution.¹¹⁴ In some cities, smart mobility services have been experimentally deployed for climate mitigation and reduction of pollution.¹¹⁵

Tags: Environmental considerations, Economic considerations

B. **GHG emissions:** GHG are gasses that trap heat in the atmosphere.¹¹⁶ One way to measure emissions from transportation is by calculating users' kilometers traveled per day and through what mode of mobility. Since a large portion of the world's transportation is car-focused, road vehicles account for almost 75% of GHG emissions from transport.¹¹⁷

Tags: Environmental considerations, Economic considerations

C. **Fuel quality:** A key element of lowering emissions from cars and buses is fuel quality. Cleaner fuels and advanced emission control systems are required to lower emissions.¹¹⁸ In some regions, diesel use is still prevalent. Vehicles that use diesel are more polluting than petrol and emit more CO₂ emissions.¹¹⁹

Tags: Environmental considerations, Economic considerations

D. **Air quality:** As a result of growing emissions from transportation and continued diesel use, poor air quality is a public health concern in urban areas.¹²⁰ In Latin America, this

¹¹² <https://www.wri.org/insights/everything-you-need-know-about-fastest-growing-source-global-emissions-transport>

¹¹³ <https://slocat.net/publications/transport-and-climate-change-2018-global-status-report/>

¹¹⁴ <https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation>

¹¹⁵ <https://www.mdpi.com/2071-1050/13/8/4127>

¹¹⁶ <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

¹¹⁷ <https://www.iea.org/reports/tracking-transport-2019>

¹¹⁸ <https://unece.org/transport/press/uneces-new-recommendation-fuel-quality-will-help-countries-reduce-air-pollution>

¹¹⁹ <https://www.transportenvironment.org/discover/dirty-diesel-also-worse-climate-petrol-cars-study/>

¹²⁰ <https://www.despacio.org/wp-content/uploads/2020/02/SUTLac-05022020-web.pdf>

issue is exacerbated by low enforcement of emission and fuel quality standards.¹²¹

Tags: Social and equity considerations, Environmental considerations

- E. **Exposure to pollutants:** Exposure to pollutants from traffic-related emissions is associated with poorer health outcomes.¹²² These effects are more pronounced in urban areas with high-pollution vehicle fleets.

Tags: Social and equity considerations, Environmental considerations

- F. **Water pollution:** Run-off from mobility infrastructure can contaminate surface water and groundwater. In Northern countries, salt use in winter is a problem as it washes off the sidewalks and roads into rivers and lakes. This is harmful to the environment and wildlife, but can also contaminate drinking water.¹²³

Tags: Social and equity considerations, Environmental considerations

- G. **Noise pollution:** The transportation sector is the main cause of noise pollution, which is a harmful environmental stressor to humans and wildlife.¹²⁴ All forms of urban mobility produce noise pollution of varying levels.

Tags: Social and equity considerations, Environmental considerations

2. **Loss of habitat:** Roads, highways, and other mobility infrastructure have a significant impact on wildlife habitat that is much larger than simply the area of land that the mobility infrastructure occupies.¹²⁵ For example, in the United States, it is estimated that roadways cover just one percent of the region, but fifteen to twenty percent of the land is affected by roads and vehicles.¹²⁶

- A. **Land use for infrastructure:** Not all mobility infrastructure impacts the loss of habitat to the same extent. Highways, for example, are a much larger threat to wildlife than smaller roads or active mobility infrastructure.¹²⁷

Tags: Environmental considerations

- B. **Degradation of habitat:** Pollution from mobility infrastructure can negatively affect habitats that are hundreds of meters away.¹²⁸

Tags: Environmental considerations

¹²¹ Ibid.

¹²² <https://doi.org/10.1038/s41370-020-0242-2>

¹²³ <https://www.toronto.ca/services-payments/water-environment/live-green-toronto/reducing-the-use-of-road-salt/>

¹²⁴ <https://www.eea.europa.eu/highlights/road-traffic-remains-biggest-source>

¹²⁵ https://ag.umass.edu/sites/ag.umass.edu/files/pdf-doc-ppt/tws_overview_ms.pdf

¹²⁶ Ibid.

¹²⁷ Ibid.

¹²⁸ Ibid.

3. **Clean-energy goals:** The United Nations (UN) has set a goal of “decarbonizing all means of transport in order to get to net-zero emissions by 2050 globally.”¹²⁹ The UN is urging governments around the world to incentivize clean transport through regulations and taxation.

A. **Clean mobility:** can include electric cars, or active mobility such as cycling and walking.

- **Clean vehicles:** A clean vehicle produces less harmful impacts on the environment in comparison to vehicles that run on gasoline or diesel. Some governments, like in British Columbia, Canada, have created incentive programs using rebates to make electric cars more affordable.¹³⁰

Tags: Environmental considerations, Cultural considerations

- **Active mobility:** Lowering emissions can also be achieved by promoting active mobility, such as walking and cycling. This requires dedicated infrastructure and citizen engagement to be effective.

Tags: Social and equity considerations, Cultural considerations

B. **Emissions cap:** Putting a formal limit on the number of emissions a certain sector, like transportation, can produce may result in reduced pollution.¹³¹ In the United States, Northeast and North Atlantic states are working on a transition to low-carbon transportation. These states are considering putting a cap on emissions from mobile sources.¹³²

Tags: Environmental considerations, Economic considerations

C. **Energy storage:** A growing Electric Vehicle market introduces the opportunity to reduce the impact of renewable energy intermittency through “managed EV battery charging and discharging profile in conjunction with the national grid, known as the Vehicle-to-Grid system (V2G).”¹³³

Tags: Environmental considerations, Economic considerations

¹²⁹ <https://news.un.org/en/story/2021/10/1103062>

¹³⁰ <https://goelectricbc.gov.bc.ca/>

¹³¹ <https://www.transportationandclimate.org/fact-sheet-cap-and-invest-tool-reduce-pollution>

¹³² <https://www.transportationandclimate.org/fact-sheet-cap-and-invest-tool-reduce-pollution>

¹³³ <https://doi.org/10.3390/en15030803>

VI) Innovation and Technological Advancements

1. **Smart Cities:** Smart cities make use of data and digital technology to improve decision-making.¹³⁴ A smart city is made up of three layers; a technology base that includes a critical mass of smartphones and sensors, specific applications that translate the data collected into usable and accessible information, and users of this data at the individual, company, and city level.¹³⁵

- A. **Smart transportation:** Part of a smart city is smart transportation, whose goal is to optimize mobility through the use of the internet, applications, and electronic devices to make urban travel more efficient.¹³⁶

Tags: Social and equity considerations, Environmental considerations, Economic considerations

- **Mobility-as-a-Service (MaaS):** integrates trip planning, booking, electronic ticketing, and payment services on a digital platform.¹³⁷ A current example of MaaS is Uber and Lyft. However, some cities such as Helsinki have created applications that allow people to plan and pay for any mode of private or public transportation within the city.¹³⁸

Tags: Economic considerations

- **Intelligent transportation systems (ITS):** combination of information and communication technologies used for transportation and traffic management systems to improve the efficiency and sustainability of transportation networks.¹³⁹

Tags: Economic considerations

- B. **Micro-mobility:** Many cities around the world are grappling with the negative effects of car use.¹⁴⁰ Introducing and promoting micromobility modes of transportation such as e-scooters, e-bikes, and bike-sharing programs can accelerate the transition to a more sustainable urban transportation system.¹⁴¹

Tags: Environmental considerations, Economic considerations, Cultural considerations

¹³⁴ <https://www.mckinsey.com/business-functions/operations/our-insights/smart-cities-digital-solutions-for-a-more-livable-future>

¹³⁵ Ibid.

¹³⁶ <https://www.iotforall.com/what-makes-transportation-smart-defining-intelligent-transportation>

¹³⁷ <https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/consumer-business/deloitte-nl-cb-ths-rise-of-mobility-as-a-service.pdf>

¹³⁸ <https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/consumer-business/deloitte-nl-cb-ths-rise-of-mobility-as-a-service.pdf>

¹³⁹ <https://www.wsp.com/en-CA/services/intelligent-transportation-systems-its>

¹⁴⁰ <https://doi.org/10.1016/j.trd.2020.102628>

¹⁴¹ Ibid.

- C. **Citizen-friendly governance:** Part of a smart city is increased government transparency and accountability through the publishing and use of open data. Availability and accessibility of open information and data online can lead to a more informed public.¹⁴² If this is combined with options and space for citizen participation in government decision-making, cities can improve mobility. This approach depends on how ready are the citizens in terms of skills, to use technology and engage with open government strategies.

Tags: Cultural considerations

- D. **Mobility-based vs. accessibility-based urban planning:** Accessibility-based planning is defined as “the amount of services and jobs people can access within a certain amount of travel time, considering multimodal modes of transport such as walking, biking, driving and the use of public transport.”¹⁴³ The shift from mobility-based to accessibility-based planning implies “a shift in paradigm,” where planners focus on the needs of people and sustainable goals rather than the infrastructure system itself.¹⁴⁴

Tags: Environmental considerations, Economic considerations, Cultural considerations

¹⁴² <https://iopscience.iop.org/article/10.1088/1755-1315/126/1/012073>

¹⁴³ https://www.isocarp.net/Data/case_studies/2160.pdf

¹⁴⁴ *ibid.*

IDENTIFICATION AND ENGAGEMENT WITH BILINGUALS

With help from partners, The GovLab conducted desk research and tapped into its network of mobility and data science experts to identify ‘bilinguals,’ individuals with the appropriate subject matter and data and data science background to drive data-actionable questioning.

Over four weeks, we invited individuals to participate in the Urban Mobility and Transportation domain. Eighty-four bilinguals accepted the offer. The group was made up of 33 women and 47 men, from Africa (9), Asia (9), Europe (12), Latin America (22), and the USA and Canada (28).

Similarly, the different sectors of mobility and transportation were represented by 33 participants from academia, 18 from non-governmental organizations, 4 from social/philanthropic organizations, 10 from the public sector and 15 from the private sector. A full list of bilinguals can be found in Appendix B.

On April 26, 2022, and April 28, 2022, we held the First Check-In Meeting to accommodate bilinguals in different time zones. At this meeting, we introduced them to the partners and the domain, previewed the 100 Questions methodology, and presented the topic map. At the meeting, bilinguals noted the need to consider that data collection on mobility issues is not standardized and that topic intersects broadly with gender and digital literacy. They also highlighted that governance considerations were missing from the initial topic map, which was subsequently rectified in the expanded version. Further, some experts pointed to the paradigm shift urban planning and transportation has been undergoing, moving from mobility-based to accessibility-based planning recognizes the intertwining of land use, delivery services, accessibility for persons with disabilities, telecommunications access, and active travel needs in urbanizing cities. Using feedback from participants, we expanded the topic map—see Topic Map—to cover the host of pertinent issues in the field.

As well, we explained the types of questions sought from the bilinguals and invited them to submit research questions along with a short rationale about how the question’s line of inquiry about mobility and transportation could be answered with greater access to data and data science. All bilinguals submitted questions according to pre-developed criteria developed for the purposes of operationalizing these questions.

QUESTION SOURCING AND CLUSTERING

Question sourcing was open for three weeks, from April 26, 2022, to May 17, 2022, and was hosted on Typeform in English. Multiple question submissions were permitted. In total, we received 113 questions: 39 questions were received on policies and regulations, 16 on economic opportunity and accessibility, 18 on social justice, 15 on well-being and safety, 9 on environmental impact, 13 on innovation and technology, and 3 on land use.

Next came the clustering process. The GovLab grouped the questions together following the same thematic and insight-building criteria that the bilinguals previously used in the sourcing phase in collaboration with the partners. These questions were further regrouped, combined thematically, and revised by the partner organizations to ensure clarity, and applicability, and that they could be answered using data or data science capabilities. Ultimately, we created 48 clustered questions.

QUESTION PRIORITIZATION

To touch base with bilinguals and prepare them for the next step in the process, we held a Second Check-In Meeting on June 10, 2022. Bilinguals discussed the updated topic map, and concepts around the need for inter-city mobility considerations, historic/cultural disparities that influence spatial organization, informal transportation practices, and delivery of transportation services, which were subsequently added to the top map as well.

Next, we presented the clustered questions and outlined the parameters for prioritization. Specifically, we asked bilinguals to vote on the top ten questions they considered the most important based on four criteria in mind: potential impact, novelty, feasibility, and overall quality. The prioritization process was open for two weeks and was hosted on TypeForm in English. We tallied the ten questions receiving the most votes (see Top 10 Questions). These questions were then prepared for public voting to receive further input from the lay public to prioritize in later work involving data collaboratives.

PUBLIC VOTING

Recent uptick in using questions to better design research and policy projects has seen an increase in researchers turning not only to experts but also to the general public. Looking at crowdsourcing in the sciences, [Beck et al. \(2022\)](#) find that public involvement helps increase the practical impact of initiatives, and [Wahl, Füller, and Hutter \(2022\)](#) show that public consultation helps structure wicked problems. To this end, the public voting phase of the 100 Questions Initiative seeks input from non-experts to concentrate scarce public resources on the research avenues that matter to everyday people.

Conscious that CAF, NUMI, and TUMO worked extensively in the Latin America and Caribbean region and wanting to involve a diverse group of public voters, the top ten questions were published in English, Spanish, and Portuguese. Public voting was held online at the [domain site](#) and randomly shuffled the question order for more balanced voting.

We announced the start of public voting with a blog in [English](#) and [Spanish](#) that was circulated across partner networks. As well, we held a social media campaign encouraging public voting in English and Spanish on Twitter, Facebook, and LinkedIn. The bilingual community helped amplify calls for public voting.



CAF also presented the public voting on June 28, 2022, at the World Urban Forum on the session “Shaping the future of Mobility: Data Governance for Sustainable Development”, organized jointly with TUMI and GIZ. The event’s objectives was to provide an overview of the data ecosystem in Latin America; its stakeholders, processes, governance, values and expectations; contextualize the data-driven policy making process in sustainable transport for

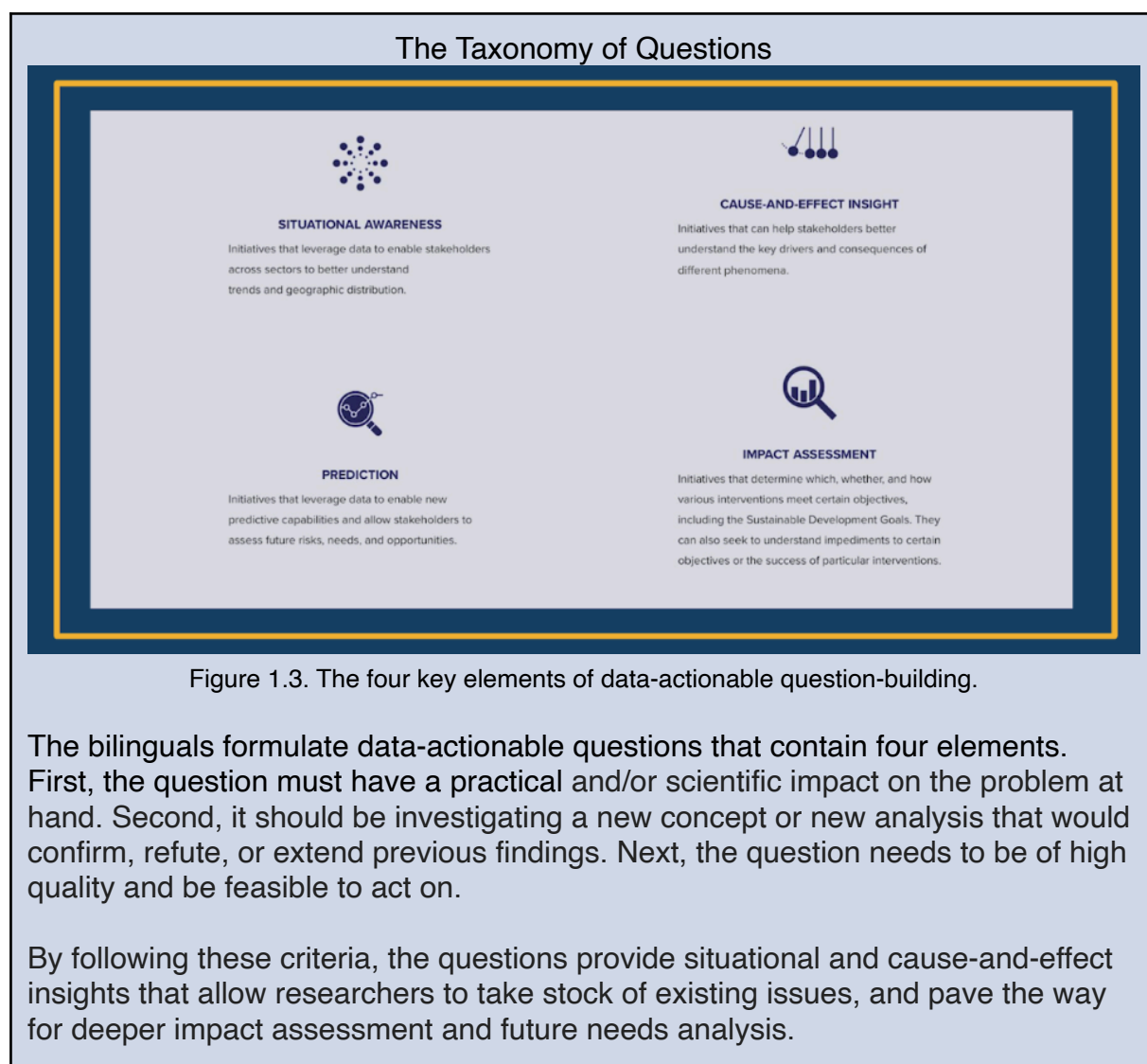
Latin American cities, including its challenges and opportunities; and present the TUMI Mobility Data Hub¹⁴⁵ and launch the public voting as a tool for the development of the Hub's conceptual framework.

Public voting ran from June 28, 2022, to July 28, 2022. We received 1,047 votes from across the world. With the top ten questions, we are now turning our attention to operationalizing these questions via data collaboratives.

¹⁴⁵ Project financed by TUMI-GIZ and developed by CAF to promote the digital transformation of urban mobility in an environmentally friendly way and make cities more inclusive, sustainable and habitable. This project had three goals: (1) to build an open source digital platform with applications that organize, analyze, visualize and share data of interest in mobility and transport, improving decision and policy-making; (2) to develop pilots in Latin America and the Caribbean cities applying data analysis to answer specific policy questions; and (3) to enhance future innovation and technology agenda through academic research in the region.

TOP 10 QUESTIONS

Following the sourcing, clustering, and prioritization processes, below are the top ten urban mobility and transportation data-actionable questions selected by bilinguals. Included with each question are the rationales for the questions originally provided by the bilinguals and edited by The GovLab for clarity. For a full list of sourced questions, see Appendix A.



1. **How can transport/mobility data collected using innovative data collection methods, such as smartphone data, be shared and made easily available for researchers, urban planners, and policymakers?**

Rationale: The use of smart devices is growing rapidly. Currently, there are entities that already collect data on where we go and how we travel. If this information could be accessed by researchers and transport planners, the decisions they make could have a positive impact. Technology now provides an opportunity to collect this data through navigation apps, social media, crowdsourcing, and infrastructure sensors. The challenge is in protecting the privacy and fusing private and public data sources.

2. **How can transport/mobility data collected using innovative data collection methods, such as smartphone data, be shared and made easily available for researchers, urban planners, and policymakers?**

Rationale: The use of smart devices is growing rapidly. Currently, there are entities that already collect data on where we go and how we travel. If this information could be accessed by researchers and transport planners, the decisions they make could have a positive impact. Technology now provides an opportunity to collect this data through navigation apps, social media, crowdsourcing, and infrastructure sensors. The challenge is in protecting the privacy and fusing private and public data sources.

3. **How can we incorporate technology-enabled spatial analysis methods (such as location-based data analysis) and validate open data (e.g., census data, satellite data, GTFS data, POIs, etc.) to understand and respond to people's public transportation needs in a responsible manner?**

Rationale: Current transportation systems tend to be designed to serve central or commercial areas, and new data sources (ie, cell phone data) overrepresent high socioeconomic levels. It is important to figure out a way to address the bias issue in new sources of data.

4. **How can we incentivize people to take trips by sustainable modes, such as walking, biking, and/or public transit, rather than by personal motorized vehicles? Which governance frameworks and regulatory tools can we use to change transportation behaviors?**

Rationale: Researchers focus on incremental changes in behavior associated with different transportation and mobility conditions. For instance, there are greenhouse gas, health, traffic decongestion, employee attendance, public safety, even retail sales benefits from traveling under human power, along particular routes. Faced with the urgent and timely need to decarbonize the transportation sector, why not ask what it would take in terms of incentives to lower the transaction costs of even very small payments for these environmental benefits that might aggregate up to behavior-changing incentives? How would policy be guided if we were equipped with this information first and then looked for the co-beneficiaries of that change and see if we could devise ways to extract the

funding?

5. **Who gains and who loses with the operation of unconventional public modes of transportation like moto-taxis, non-registered mini-buses, and unregulated taxis? What policies could integrate informal and para-transit into formal transit infrastructure of cities for more sustainable service delivery?**

Rationale: Many authorities desire to ban or at least heavily regulate (often without much enforcement) unconventional modes of transport that usually serve low-income passengers that have no good alternatives. Informal transport is globally one of the most used forms of transit, often with organic routes that change dynamically and extensive first- and last-mile service provision that public transport can not manage. Establishing the costs and benefits of these informal transit modes and understanding who incurs them provides an equity and effectiveness lens to mobility policymaking. Currently, it is unclear what policies can be made that preserve the affordability and dynamism of informal transit and allow it to remain an income generation mechanism while making it safer and more reliable.

6. **What sources of data and methodologies are nowadays the most effective to use to calculate the modal share of a city?**

Rationale: There is a lot of work on how to use new data sources, which are often biased towards a particular mode (i.e. ticketing data for public transport), but we need more discussion on how to adapt traditional sources and combine them with the new ones. Looking at the methodologies and sources to calculate the modal share/modal split and figuring out which methods are most effective will better serve policymakers in utilizing this data for insight generation.

7. **How can we design, manage, and incentivize public transport services and infrastructures to be more inclusive, affordable, convenient, and friendly to the needs and expectations of vulnerable city users?**

Rationale: The provision of inclusive, safe, convenient, friendly, and affordable urban mobility services is important to achieve Sustainable Development Goal 11.2 on sustainable transport for all. In developing countries vulnerable individuals and groups like persons with disability (PWDs) are often denied (deliberately or not) access to public transportation services. As a result of most public transport services in developing countries being privately owned and operated for profit, there may be little incentive for the providers to give special care and attention to vulnerable individuals. Therefore, it is important to explore how such companies can be incentivized to prioritize vulnerable transit users. Currently, most mobility planning issues focus on optimization (level of service, travel time, etc.). Consequently, policies and strategies usually consider populations as a whole without attending to the conditions of particularly vulnerable

groups. Planners and practitioners must include the needs of those groups in urban and mobility planning to achieve urban social equity.

8. Where do travelers want to go, but cannot reach and why? How do place of residence, race, gender, ethnicity, and equity differences impact these decisions?

Rationale: Currently, the only open data available about job locations in Global South cities are either scraped from the internet (and are incomplete) or bought from a census authority (formal source yet still incomplete). By collecting detailed data from travelers, such as where they prefer to travel, but cannot; how they prefer to travel, but cannot; and when they prefer to travel, but cannot; governments could target transportation investments to suit these needs. Incorporating demographic data on these travelers could help governments better address equity in those investments. Research and analysis, as well as urban and transport planning, would greatly improve if we knew in reality where people want to go every day.

9. What are the impacts of women and marginalized communities' involvement in the governance and planning of active mobility spaces on the well-being and stress levels of women in transit?

Rationale: Spaces are gendered. Public spaces in particular have been masculinized, which has resulted in women having a higher fear of crime in open, walking spaces. Could women's involvement in the governance, and most importantly management, of such spaces especially at the local government level, reduce their anxiety when using such spaces and subsequently improve their wellbeing?

10. How can we measure/quantify the cost of urban road space and how can it be redistributed?

Rationale: Space needs to be reallocated to reflect population needs and maximize resource efficiency. This transition of reallocation of public space is taking too long and we need to push faster and further this transition.

APPENDIX A

Complete List of Bilingual Sourced Questions

Below is the list of initial questions produced by the bilinguals in the question sourcing stage. The questions are grouped thematically and lightly edited for clarity.

Performance, policies, and regulations

1. How much does pedestrian and bicycle infrastructure impact the adoption of active transport modes in dense urban settings?
2. How to control shared mobility and measure the effectiveness of compatible mobility policy?
3. What is the most important attribute for mobility decision-making? Price, service quality, safety, or comfort? Do they remain identical across geographies and demographics?
4. How does travel demand respond to dynamic, use/user-specific road pricing schemes? What are the equity impacts of alternative pricing approaches?
5. Which are the drivers to change attitudes and perceptions of the population toward actions for sustainable mobility?
6. How to accurately predict the influence of different combinations of strategies and actions in modal change at different stages?
7. What governance and regulation frameworks are necessary to improve the contributions of app-based transport to accessibility and social inclusion?
8. Which is the relation/association between vehicle-km traveled and sustainable mobility outcomes: access to opportunities, reduced emissions (local and GHG)/energy consumption, reduced fatalities, and equity (i.e. participation of women in the workforce, affordability of transport for low-income groups)?

9. What are the impacts of providing and promoting approaches (different than traditional predict and provide)?
10. How much does it cost to create 1km of high-quality bicycle paths (by city or country)?
11. How much on-street and off-street parking does each city have and how much of it can be repurposed (for example, on-street parking can be converted into bike lanes, and off-street parking lots can be turned into housing units)?
12. How much do you spend on transport options? Do you upgrade to private transport options?
13. Which approach (tools, timing, financing) is more effective for achieving the critical political feasibility to make efficient and fair transport interventions possible?
14. What level of incentive would it take to get people (who have choices of walk, bike and/or transit) to take those trips by sustainable modes, rather than by personal ICE vehicles?
15. How do we move finance into electrification, mass transit, and NMT and build accountability into transport investment?
16. How to improve the knowledge of politicians and the public about the real costs of cars and motorcycles (in terms of congestion, security, and the environment)?
17. How to make people understand - particularly in Latin America - that fees/charges for public transport, parking, using congested roads, etc., need to be paid for systems to work properly?
18. Does society truly understand the impact of choosing a car-oriented and car-centric development model? The impact on space, costs, the environment, and quality of life?
19. Does advocacy- and participatory-based approaches of an active mobility project guarantee its successful implementation and its lasting over time?
20. How is mobility affected in times of crisis (for instance during a pandemic) and how to assess the impact of emergency measures in a systematic way?
21. Why the quality of service and user experience is not the fundamental variable in mobility in Latin America?
22. How do travel patterns change day to day and throughout the year?
23. How to better assess positive and negative perceptions of public transport services?

24. How can we think about collecting transport data in a way that maximizes benefits for the majority of transit riders in developing cities (i.e. informal transport users) and not just transport planners/city governments? What impact can the collection of user-centric mobility data have on public transport ridership/demand?

25. What is the relationship between mobility costs and urban density; and who pays for them?

26. Who gains and who loses with the operation of unconventional public modes like moto-taxis, non-registered mini-buses, and unregulated taxis?

27. How can we include indicators related to the travel experience and calculate its cost for decision-making processes?

28. How could private companies massively coordinate and align to share their employees' routes, origins, and destinations into one—or several, platform/s that can maximize the probability of matching and pooling to increase private vehicle occupancy? What kind of data should be shared, in which format, and where should it be held? How should privacy terms and conditions be treated to make all users feel their concerns are being addressed?

29. How can we reduce physical and psychological car dependence?

30. What is the correlation between the development of protected bike lane networks in both urban and rural contexts respectively impacted 1) mode shift, 2) VRU deaths/injuries, 3) economic development, 4) GHG trip offset?

31. With the emergence of new data sources and the problems associated with collecting data from traditional sources (ie. non-response in surveys), how are we going to calculate modal share?

32. How do we democratize access to the new information that is useful for analyzing mobility?

33. What have been the levers to manage on-street parking to disincentivize car use in low-middle income countries?

34. What are the strategies and tactics employed by civil society organizations and change-makers within government bureaucracies to generate political will for walking and cycling?

35. What are the strategies and tactics employed by civil society organizations and change-makers within government bureaucracies to generate political will for land-use and transport integration?

- 36. Where and when are people currently traveling and by what mode?
- 37. How can the private sector be attracted to sustainable mobility?
- 38. What new best practices for sustainable, socially just street retrofits will emerge from the COVID19 pandemic?
- 39. How can professional organizations, such as the Institute of Transportation Engineers and the Transportation Research Board, establish universal standards for collecting and sharing transportation-related data, including infrastructure supply and quality, vehicle ownership and use, travel activity, user and external costs, and other impacts?

Economic opportunity and mobility

- 40. Where do citizens work, both formally and informally, in cities of the global south? This can help answer questions related to accessibility, equity, and housing.
- 41. What is the potential socio-economic, environmental, and health impact of zero-rating bicycles in developing countries? How does this compare with the zero-rating of motorcycles and what potential would such an approach offer in promoting active mobility and inclusion of vulnerable population groups?
- 42. How does parcel delivery data correlate with the distance to designated retail shopping areas? How do findings differ based on preferred modes of transport in the area?
- 43. What is the impact of specific improvements in transportation infrastructure (e.g. new metro or BRT line in a given city) on the probability of being employed and on job quality (wage, formality)?
- 44. What are the economic and equity impacts of transportation systems that focus performance metrics on the speed of travel for vehicles, versus those that measure affordable access to jobs and daily destinations?
- 45. How do different forms of mobility relate to retail activity?
- 46. How do different forms of mobility relate to street vending?
- 47. Should public transport be seen as a public good and what would this mean for inclusive and affordable access to create livable cities?
- 48. Can we assess whether the lack of safe mobility options (public transport) in a city impacts women's access to economic opportunities and participation in the labour force?

49. What are the opportunities for wellbeing (social, educational, health, economic, etc.) that people identifying as female are forgoing or not doing because of the absence of safe, effective, accessible, and efficient transport?

50. What are the populations under-served in terms of mobility in developing countries and how can we address their mobility needs in relation to the job, health, and educational opportunities access?

51. How can we quantify return on investment of providing Universal Basic Mobility?

52. How could we reshape our understanding of transport systems and networks as a means to guarantee access to services, education, health, jobs, and parks, while minimizing physical travel and reducing distances? How can we clearly identify groups and populations that can't afford to travel but need to, groups that need to travel and can travel, and groups that don't need to travel and can access services virtually, and how to reallocate resources to match these group needs?

53. What percent of households don't use a car to get to work/education?

54. How can we use the new data sources to analyze the mobility patterns of different socioeconomic levels or minorities?

55. Are the mobility services provided by the cities supporting an easier, more flexible, and reliable commute from the peri-urban areas? If yes, by how much compared to driving their own cars?

Social justice

56. How to design and manage public transport services and infrastructures to be more inclusive of the needs and expectations of vulnerable city users (SDG 11.2-Sustainable Transport for All)?

57. How can we implement effective policy to make mode choice more equitable across demographic groups (race, age, income)?

58. In what ways can the providers of public transport services be incentivized to prioritize the provision of safe, convenient, affordable, and friendly services to persons with disability, children, and vulnerable population groups?

59. Which are the social justice benefits generated by individual modal changes in daily urban transport?

60. How include the needs of neglected groups (children, elderly, physically impeded) into mobility planning?

61. What are the mental health inequalities of urban transport (in)accessibility?

62. How can we engage and mobilize citizen science/scientists in an ethical fashion to aid the improvement of situational analysis? [And how do we encourage policymakers to listen and address the issues they raise?]

63. How unequally distributed is the cost of transportation in terms of time, safety, and health impact?

64. How do we support the upgrading of "informal" or popular transport (dominant modes in most of the world) and integration into mass transit including providing an adequate investment of well-designed infrastructure for these upgraded systems from bus or tuk tuk stops, cleaner fuels or electrification to dedicated lanes to digital services?

65. Cycling infrastructure and better transportation are related to gentrification?

66. Why is the gender approach in mobility limited to advertising campaigns and there is no transversal approach from the technical side?

67. How can transport planning and policies respond to the mobility of care?

68. How is access to transportation modes distributed in the city?

69. What are the most efficient and just incentives to better allocate urban public space, including pricing schemes, and which should be the key indicators to measure, prioritize, and evaluate this redistribution? What is the specific data needed to be collected and shared?

70. How does affordability—or lack of—and travel times/distances affect low-income population access to formal job opportunities, hence affecting access to financial services and mortgages, professional training and education, and social security? How does this reflect in intergenerational poverty? How can we better balance routes, frequencies, and fares with the post-covid financial situation of urban transport systems, in order to improve the low-income population access to formal jobs?

71. Can informal and para-transit be integrated into formal transit infrastructure of cities for more sustainable service delivery?

72. What is the equity impact of private sector investments in new technology for infrastructure, vehicles, and operational characteristics?

73. What is the impact of transportation policy based on class issues and NIMBY on the inaccessibility of low-income workers to specific urban areas?

Wellbeing and safety

74. How to reduce the social impact of control measures on pedestrians and cyclists?
75. Should the provision of infrastructure be considered equivalent to improved mobility or accessibility?
76. In what contexts and under what conditions can parents and caregivers be held accountable in ensuring safe travel and mobility of their children? How can such information be used to educate and sensitize citizens (including parents and caregivers) to improve choice of safe travel modes for children?
77. Which indicators are relevant regarding social justice (equity)?
78. Connecting road safety and other sustainable mobility outcomes?
79. Which cities are the most child-friendly and why?
80. Do you feel safe on public transportation in your city during the day?
81. How do work-from-home impact non-commuting travel behaviors and life satisfaction?
82. How do we build the coalitions and awareness to claw back space in cities from roads and cars to build complete streets and more compact, mixed-use neighborhoods that are attractive for people?
83. Does the location of the bike lane to the left, right, and center of a street have an impact on its use depending on gender, age, and other people's conditions? Especially for new users, women, children, and elderly people.
84. How does mobility vary across gender and socio-economic status, how does it relate to other types of inequality?
85. What are reliable and actionable indicators of road perilousness in developing countries where one expects traffic growth associated with the rapid urbanization?
86. In what contexts can the involvement of women in the governance of walking spaces improve their well-being and reduce their stress levels?
87. Do you feel safe traveling between 6am and 11pm? (or, maybe the question is simply, "do you feel safe getting around where you live?"

88. What type of information should we develop and use to convince decision-makers from the public sector (local governments) and private sector (real state developers, car producers) to make significant changes in our urban development patterns and to implement more sustainable transport solutions?

Environmental impact

89. How to measure the impact of vehicular congestion on the level of CO2 emissions from motor vehicles based on fossil fuels?

90. Which are the environmental benefits generated by individual modal changes in daily urban transport?

91. What is the correlation between electric vehicle usage and "environmental behavior" (e.g. electricity and water usage, trash volume)? Does the purchase change behavior?

92. To what extent is high-speed rail replacing short-haul flights? Are there differences between regions/countries according to their economic development stage?

93. How is climate change impacting the mobility and migration of historically vulnerable and disadvantaged populations? How can public policy help ensure those populations have the resources and opportunities they need to thrive?

94. How to satisfy individual mobility needs while containing environmental impact and fostering sustainable development?

95. How to improve the resilience of transport systems and adapt them to climate change effects?

96. In which circumstances, does an increase in investment in public transit services create an actual modal shift?

97. What is the relationship between gender, environment, and mobility?

Innovation and technology

98. How to integrate the means of payment for last-mile transport into the integrated public transport system without increasing the cost of the service?

99. Does democratization of data increase trust in the governance framework and depoliticize decision-making?

100. How to incorporate technology-enabled spatial analysis methods (i.e. Urban Informatics) in transport planning?

101. How to aggregate/ validate open data (e.g., census data, satellite data, GTFS data, POIs, etc.) to be used for transport planning?

102. What are the risks for cities holding large amounts of granular mobility data at rest? How vulnerable are such data to theft, de-identification, and misuse? What risk assessment methods are available, and what approaches could be developed or improved?

103. Using new technologies to generate relevant mobility data and improve decision-making?

104. What are the trade-offs between delivery and travel behaviors?

105. How can private sector expertise in mobility data collection, production, and maintenance be leveraged to improve developing city governments' approach to public transport planning?

What are the critical levers that need to be implemented and barriers that need to be overcome to create successful public-private partnerships on transport data activities in developing city governments?

106. How can public offices procure technological tools that can foster innovation and competition, while demanding key performance indicators, as well as guaranteeing legal stability to startups and new developments? What are the specific regulatory, legal, and market conditions that should be combined to create and foster an innovative environment?

107. Where do travelers want to go, but can't?

108. How can transport data be shared and made available (for research, planning, and policymaking) using innovative data collection methods?

109. How will urban roadway infrastructure change to accommodate the shortcomings and/or capitalize on anticipated efficiencies of automated vehicles?

110. What is the impact on citizens' trust level in the local authorities when mobility data of better quality are made available to them?

Other - Land Use

111. What is the relationship between land use (density and mix of uses) and reliance on auto travel?

112. In many countries, local parking requirements are part of an assumption of auto-centricity, that not only increases the cost of housing (because often expensive parking requirements are built into the rental or purchase price of housing), but may cause people who now have housing with parking included, to purchase a vehicle, and use it for most trips. This is true even when frequent transit service is convenient and available.

Other

113. How can we improve "situational analysis" by including geographic contexts at progressively larger scales, starting at the scale of the dwelling unit?

APPENDIX B

Bilingual Expert Directory

NAME	POSITION, ORGANIZATION
Adham Kalila	Custom Projects Engineer, Streetlight Data Inc.
Adie Tomer	Senior Fellow, Metropolitan Infrastructure Initiative, Brookings Metro
Alimar Benitez	Head of Intelligence, Mobility Secretariat, Bogotá, Colombia
Alok Jain	CEO and Managing Director, Trans-Consult Ltd.
Andrea Marpillero-Colomina	Sustainable Communities Program Director, GreenLatinos
Andrea Gorrini	Transport Research Consultant, Systemica
Andres Alcala	Principal Executive, Urban Mobility, CAF - Development Bank of Latin America
Angie Palacios	Principal Executive, Gender and Transport, Transport Unit, CAF - Development Bank of Latin America
Anindita Datta	Professor, Department of Geography, University of Delhi
Anne Wairimu Kamau	Research Fellow, Institute for Development Studies, University of Nairobi
Anthony Townsend	Urbanist in Residence, Cornell Tech's Jacobs Urban Tech Hub
Benjamin Welle	Director Integrated Transport, World Resources Institute
Benjie de la Peña	CEO, Shared-Use Mobility Center
Bernardo Baranda	Director, Latin America, Institute for Transportation and Development Policy
Brendon Hemily	Senior Advisor, Transit Analytics Lab, University of Toronto

Carlos Cadena Gaitan	Assistant Professor, EAFIT University
Carlos Pardo	Senior Advisor, New Urban Mobility Alliance
Catalina Vanoli	Transport and Urban Mobility Specialist, CAF - Development Bank of Latin America
Cecilia Vaca Jones	Executive Director, The Bernard van Leer Foundation
Christopher Zegras	Professor of Mobility and Transportation, MIT
Daniel Oviedo Hernandez	Lecturer in Urban Transport & Development Planning, University College London
Daniel Orellana	Principal Professor, University of Cuenca
Daniel Rodríguez	Co-Chair and Professor of City and Regional Planning, University of Berkeley
Darío Hidalgo	Pontificia Universidad Javeriana
Dimitris Zisis	Associate Professor, University of the Aegean
Dorina Pojani	Senior Lecturer, University of Queensland
Eleonora Pazos	Head of Latin America Regional Office, International Association of Public Transport
Elsa Marie DeSilva	Founder, Red Dot Foundation (India)
Enrique Zapata	Data Coordinator, GovTech and Open Government, CAF - Development Bank of Latin America
Ernest Okot	CEO, SafariShare
Ester Litovsky	Strategic Planning Director, Emova
Frederic Charlier	CEO, ClearRoad
Frederic Tesfay	Project Manager, TUMI
German Escovar	Advisor to Secretary on IT, Mobility Secretariat, Bogotá, Colombia
Gina Porter	Durham University
Gert Hilgers	Honorary Research Fellow, University of Warwick
Guilherme Dourado	Project Coordinator, Cooperative Research Network Hub for Urban Mobility
Guillermo Alves	Research Economist, CAF - Development Bank of Latin America
Harriet Tregoning	Director, NUMO
Harvey Scordia	Urban Transport Specialist, CAF - Development Bank of Latin America

Holly Kearl	Founder, Stop Street Harassment Foundation
Hue-Tam Jamme	Assistant Professor, Arizona State University
Jackie Klopp	Co-Director, Center for Sustainable Urban Development, Columbia University
James Leather	Chief of Transport Sector Group, Asian Development Bank
Jan Wegner	Associate Professor, University of Zurich
Jens Aerts	Urban Planning and Mobility Specialist, Sweco
Joost Vantomme	CEO, Urban Planning and Mobility Specialist
Josh Johnson	Senior Public Policy Manager, Spin
Joshua Blumenstock	Associate Professor, University of Berkeley
Juan de Dios Ortuzar	Professor Emeritus, Pontificia Universidad Catolica de Chile
Juan José Mendez	Buenos Aires City Government
Juan Pablo Bocarejo	Teacher, University of Los Andes, Bogotá Colombia
Justin Coetzee	CEO, Go Metro
Kalpana Viswanath	Co-Founder, Safetipin India
Katherine Hay	Distinguished Fellow in Gender Equity and Health, The University of California San Diego
Kennia Aguirre	Co-Founder, BikeNCity
Laetitia Gauvin	Senior Research Scientist, Data Science for Social Impact and Sustainability, ISI Foundation
Lake Sagaris	Adjunct Associate Professor, Pontificia Universidad Catolica de Chile
Laura Ramírez	Universidad Nacional de Colombia
Leah Lazer	Research Associate, NUMO
Lena Plikat	Junior Transport Policy Advisor, GIZ
Lina Marcela Quiñones	Independent
Louise Ribet	Partnerships Lead, WhereIsMyTransport
Luis Quintero	Assistant Professor, Johns Hopkins University
Luis Willumsen	Managing Partner, Nommon Analytics
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ABOUT US

About the 100 Questions Initiative

The 100 Questions Initiative is presented by The Governance Lab, originally founded at the NYU Tandon School of Engineering and currently affiliated with Northeastern University. This initiative seeks to map the world's 100 most important questions in the most critical domains, such as gender, migration, and air quality, that could be answered if datasets and data science were unlocked and leveraged to their full potential, in a responsible manner. It is supported by a global advisory board comprising data science and subject matter experts from the public, corporate, and non-profit sectors.

Members include **Ciro Cattuto**, scientific director of ISI Foundation; **Gabriella Gómez-Mont**, founder and former director at Laboratorio Para La Ciudad; **Molly Jackman**, leader of Content-Product Data Science and Engineering at Netflix; **Vivienne Ming**, founder of Socos Labs; **Wilfred Ndifon**, director of research at AIMS Global Network; and **Matthew Salganik**, professor of sociology at Princeton University. For more information, visit the100questions.org or the100questions.org/faq

About The Governance Lab

The Governance Lab's mission is to improve people's lives by changing the way we govern. Our goal at The GovLab is to strengthen the ability of institutions — including but not limited to governments — and people to work more openly, collaboratively, effectively, and legitimately to make better decisions and solve public problems. We believe that increased availability and use of data, new ways to leverage the capacity, intelligence, and expertise of people in the problem-solving process, combined with new advances in technology and science, can transform governance. We approach each challenge and opportunity in an interdisciplinary, collaborative way, irrespective of the problem, sector, geography, and level of government. For more information, visit thegovlab.org



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