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Climate, Equity and Health Problems in Road Transport: Closing the Popular Transportation Gap

Jacqueline M. Klopp

Introduction

Despite the profound importance of ubiquitous popular or informal transportation in the Global South, these critical modes–and the people who use and run them–remain largely marginalized and outside of planning, investment and decision-making at local up to global levels. This is a remarkable and problematic gap in global and local policy, funding, governance, and action in the road transport sector, with important implications for cities; it is also an ongoing injustice. Stigmatized and largely unsubsidized, these forms of highly used, shared transport modes–from motorcycle taxis to rickshaws and minibuses–tend to emerge from long standing government failure to invest, enough and equitably, in public transport and related non-motorized infrastructure and services. These services are linked to

other constraints in cities, such as historically narrow streets and complex, spatially segregated built environments.

To fill the public sector vacuum, self-help and indigenous entrepreneurship have emerged to supply diverse mobility service businesses that provide critical access to cities, their opportunities and services. These businesses also employ large numbers of people, both directly and indirectly (Spooner 2019; Spooner et al. 2023) and also enable other livelihoods–for example, by providing travel and micro-freight support to vendors in markets. Increasingly, the sector is also adopting digital tools from payment systems to ride-hailing and tracking and, hence, are innovating and participating in digital economies (Schalekamp and Klopp 2018; Klopp et al. 2019). Indeed, most people across Asia, Africa, and Latin America and the Caribbean rely on these varied, privately provided shared mobility businesses, and the labor that run them, to access opportunities, jobs and vital services, including education and health care. Thus, popular transportation facilitates and is a key determinant of public health and sustainable and equitable development (Behrens et al. 2019; Campbell et al. 2019; Fried et al. 2020; Hosking et al. 2022).

This essay is designed to facilitate conversations about the popular transport gap: the great gulf between the importance of these modes and their recognition and status in planning, policy and decision-making. The focus is on how to close this gap and why it is important to do so for improving mobility as well as addressing climate, public health, the Sustainable Development Goals (SDGs), and questions of social, environmental, and climate justice. After a brief overview of popular or "informal" transport, we explore some potential, different ways that addressing popular transport and working with the sector, mainstreaming it into plans, strategies,

and investments, can create opportunities for accelerating needed changes in the road transport sector.

Brief Overview

Ranging from bicycles, motorcycle taxis or rickshaws that accommodate one to three passengers to shared car taxis, mini and large buses, and in some cases boats, popular transport is provided by local entrepreneurs, small businesses or cooperatives, and range widely in size, operations capacity and also across regions (Tun et al. 2020; Behrens et al. 2021). Shared basic data is very poor about many aspects of popular transport services (a serious gap), but estimates suggest that they provide the bulk of the motorized mode share for many, if not most, of the rapidly growing cities of the Global South (Behrens et al. 2016; Klopp et al. 2019; UITP 2024).

Popular transport is often called para-transit (instead of transit), or "informal", because of the diverse informalities associated with the sector–in their labor relations, service provision operations, and business models. Less recognized is what causes these diverse informalities as well as the benefits of these systems. First, where public transport exists, popular transport fills gaps in this service and also provides critical last mile connectivity for institutionally supported public transport transit systems. This service is provided at little to zero cost while enhancing ridership. Thus, these modes work as an essential part of the functioning of multi-modal public transport systems (UITP 2024). In many places, particularly in African cities, they are the main, and in some cases, only form of public service (Behrens et al. 2016). Second, these forms of shared mobility provide a great deal of livelihood and job support

in communities with high youth unemployment (Mutongi 2017; Hart 2016; Sopranzetti 2018). Third, widely used because of speed, availability and/or cost, these businesses also often pay for formal licenses and fees creating government revenue and supporting access and transport services with usually no government budget or investment.

The question of how informalities work in popular transport are often poorly understood and recognized. Different kinds of informalities that emerge in relation to these systems often stem from government failure and complex interactions and overlaps between government officials and popular transport (Klopp and Mitullah 2015; Sopranzetti 2018). For example, without planning or investment in public transport infrastructure and services by the government in certain areas, people who are unable to afford private means need mobility services. This creates demand for services which is filled by popular transport operators. These operators, then, also have to create their own infrastructures, for example, a bus stop, as well as do their own planning, including of routes. They then negotiate with state actors to attain various degrees of recognition and regulation. As popular transport businesses fill critical mobility needs in this context, they may become the target of police extraction and, to continue to provide service and employment, the businesses or those who work in them may choose to pay a police bribe–another form of informality that involves state actors abusing their office.

These kinds of informal transactions, as well as the involvement of government employees in the sector, in turn, may undermine enforcement of safety rules, creating many problems (Klopp and Mitullah 2015). Informal labor contracts also often generate

mistrust between owners and drivers, as well as incentivize speeding and violation of other traffic rules, contributing to an epidemic of crashes (Kelley at al. 2024). Hence, while these popular transport systems are often deeply rooted in communities (Mutongi 2017; Hart 2016) and provide important benefits, the way they are governed and engaged by the state generate some serious concerns that impact public health, climate, and equity. As part of some key problems, however, they must then also be a key part of finding solutions.

Air Pollution, Climate Change, Public Health

While providing access and opportunities to many people, popular shared transport modes are linked to key public health and emissions problems. These include high numbers of crashes and emissions. Their regular use means large numbers of passengers and workers are exposed to high levels of pollution with serious health impacts, including cardiovascular and respiratory illnesses (Ngo et al. 2015; Guzman et al. 2023). For example, two-stroke motorcycles and auto rickshaws, which are popular because of their accessibility and ability to circumvent traffic, can emit more pollution per mile than passenger cars. Minibus systems, widely used in most cities, often rely on modified fuels and old, poorly maintained vehicles, part of a used vehicles recycling economy that can shift serious emissions from North America and Europe to Asia or Africa, undermining climate goals (Boateng and Klopp 2022; UNEP 2020). Given that lower income urban residents tend to use these modes, improving these systems for safety and health–which includes reducing disease-causing emissions–is an important, unrecognized justice issue in the Global South, one

that has parallels with the environmental justice issues facing under-served communities in the United States and elsewhere (Klopp and Boateng forthcoming).

While likely to be worse polluters than many private vehicles, on a per capita basis, many of these popular modes, especially the minibuses, still tend to generate less emissions per capita than private vehicles–which are also often highly polluting used vehicles carrying fewer people. However, we have not adequately researched emissions from popular modes, and a great deal of data is missing, most likely meaning current transport contributions to emissions inventories[1] for many, if not most, metropolitan areas in the Global South are rough estimates–if they exist at all (Mbandi et al. 2023; Kustar et al. 2023). While some existing efforts to quantify popular transport emissions exist, these emissions are not always disaggregated carefully to allow us to isolate the total contribution from popular or "informal" transport even though this is critical for policy purposes (Kustar et al. 2023). To address the complex set of issues around popular transport emissions, it is necessary to properly gather data on fuels, vehicle miles traveled, and the number of vehicles by model and age, data that is conspicuously absent. With more techniques, we can measure pollutants from these modes and understand their specific contributing share to national and local greenhouse gasses (GHG) inventories and the health and equity impacts of this pollution, which the few existing studies suggest is substantial (e.g., Ngo et al. 2015; Guzman et al. 2023).

Another key future area of research and action is to understand not only the contributions to climate change of these popular transport

1. An emissions inventory is a database of the amount of air pollutants by source discharged into the atmosphere during a year or other time period for a particular place.

emissions but also the impacts of climate change on these systems. Increasing heat and extreme heat days make passengers using these modes, as well as workers, suffer health and income impacts since they typically do not have means to cool air. Increased likelihood and severity of flooding and flash floods are leading to dangerous conditions and losses as well as disruption of services. One innovative and rare study looked at transport and access disruptions of flooding in Kinshasa and estimates US$ 1.2 million worth of losses a day (He et al. 2021). These are climate injustices and the impacts, as well as the connection to growing "loss and damages" conversations, are aspects we are just beginning to explore. This situation in turn plays into our global struggle to reduce emissions to address both climate crisis and public health concerns.

Popular Transport, the Road Sector, and Transformation

Road transport emissions contribute substantially to GHG and, hence, climate change.[2] Climate change, in a vicious circle, has serious impacts on road transport and health (Hosking et al. 2022). It is clear that large reductions in GHGs are needed to meet global targets to stay within 2°C to avoid catastrophic implications, and this must include the transport sector. Instead, emissions from transport are stubbornly and rapidly climbing with growing contributions from transport related to rapid urbanization in the Global South[3] (Creutzig et al. 2015; Jaramillo et al. 2022, SLOCAT 2023).

2. In 2019, direct greenhouse gas (GHG) emissions from the transport sector accounted for 23% of global energy-related CO2 emissions with 70% from road vehicles (16% of global emissions). It is also unclear how well these emissions figures include popular transport emissions.

3. SLOCAT notes that it is the "combustion sector with the fastest CO2 emissions growth from 2010 to 2019: 18% growth" (SLOCAT 2023).

Road transport is also a major source of ambient air pollution linked to over 4 million premature deaths annually (WHO 2024). This pollution comes from both tailpipe exhaust (incomplete fossil fuel combustion), and tires and brakes which release particles including microplastics (Wang et al. 2023). Adding to this already terrible toll, traffic crashes remain the number one killer of 5-29 year-olds worldwide (WHO 2024). Overall, the environmental and public health costs of our road transport as it currently operates are devastating, and in the Global South popular transport modes and how they operate and are governed are one critically important piece of this global public health and climate problem.

The burdens and costs associated with the road transport sector are also distributed unevenly at all levels, disproportionately affecting vulnerable populations, communities, and countries in the Global South (Hosking et al. 2022; Klopp and Boateng forthcoming). In the last two decades, deaths from air and toxic chemical pollution have increased, with 90% of these deaths in lower income regions, threatening health and economic wellbeing (Fuller et al. 2022). Further, while Global South countries have contributed the least to historical GHG emissions (including in the road transport sector) and hence climate change, many are experiencing severe and growing impacts, and this includes their transport systems, making this a climate justice issue. To add onto this formidable set of challenges, as we have noted, the forms of road transport most used by vulnerable groups and communities in the Global South are often simply ignored in climate, transport and health investments. Overall, this makes the transformation of road transport a serious public health and social, environmental, and climate justice issue that demands urgent attention. The good news is that by drawing in the popular transport sector as an ally and providing smart

investments and improved governance, we can potentially accelerate needed transformations to address this problem, and there are growing efforts and experimentation in this direction from which to draw an evidence base for action and scale up.

Untapped Potential from Integrating and Improving Popular Transport

The best framework for addressing current problems in the road transport sector remains the Partnership on Sustainable, Low Carbon Transport (SLOCAT) framework. This Avoid, Shift and Improve framework involves several challenging but clear steps to take: 1) *create* denser more mixed land-use and other interventions to avoid motorized trips; 2) *shift* to low carbon and more efficient shared modes with multi-modal public transport systems at the core of this effort; and 3) *improve*, including by decarbonizing and rendering resilient[4] all transport modes.

Interestingly, lower income communities, typically living in denser and mixed use neighborhoods and using shared mobility, already roughly follow this framework by necessity but, until recently, popular transport has often been neglected within action around this framework (Kustar et al. 2023). Yet, large opportunities may exist to work with the sector to improve these shared modes of transport to both enhance public transport (a necessary condition for modal shift or stemming automobility), reduce emissions and, in the process, achieve global goals for the transport sector, equity, climate justice and the SDGs. Indeed, one model by the

4. The recent report NASAC and IAP (2024), *Decarbonization of Transport in Africa: Opportunities, Challenges and Policy Options*, has added "Resilience" as a fourth step in this framework.

International Transport Forum[5] suggests that by applying similar improvements to informal transport as to formal bus systems, we could see carbon dioxide emissions decline by an additional 12% by 2050 (ITF-OECD n.p.). Similarly, emissions reductions in popular transport through improved vehicles, operation and infrastructural improvements, and electrification, could have substantial public health and equity benefits (Khreis et al, 2024). However, we need more holistic benefits/cost analysis across transport (including livelihoods and access), environment, and public health, with an equity lens that is inclusive of popular transport.

Even without this analysis, evidence has accrued around the many benefits of popular transport recognition, engagement, improvements and integration. Many of these efforts are occurring at the city level, from electrification by auto-rickshaw operators in India (Harding and Kandlikar 2017; Saxena et al. 2024; UITP 2022) to the efforts by South African cities to improve minibus operational improvements (Schalekamp and Behrens 2010; Schalekamp and Klopp 2018; Saddier, McLachlan and Dass 2019) and Mexico City to help provide finance and capacity for upgrading popular transport (Ciudad de México 2024).

Recognizing the importance of popular transport in the road sector and including its actors in key decision-making and policy arenas, planning and investment plans can help turn mistrust into needed collaboration. Currently, efforts fall into roughly a number of categories and all these actions can be scaled up:

5. The modeling uses projections of transport activity from analyzing the drivers of demand. It then models how changes in mobility patterns affect CO2 emissions. The Schmidt-Sciences' Climate Institute is working on exploring improvements in modeling decarbonization pathways that include Global South conditions.

1. Creating access to concessional finance for vehicle and other technological upgrades, including electrification with catalytic philanthropic support (Saxena et al. 2024; UITP 2022).

2. Working with passengers and the sector on operational improvements to upgrade services (scheduling, digital technology application, capacity building) (Schalekamp and Klopp 2018; Ciudad de México 2024. See also: digitaltransport4africa.org).

3. Supporting infrastructural re-design and investments–including popular transport in public transport improvements, from dedicated lanes to signal prioritization, improved road design, bus stops and terminals, and NMT connectivity (increasingly important as part of climate adaptation and also for seamless multi-modal public transport integration and last mile connectivity) (Schalekamp and Klopp 2018; SLOCAT 2023; Liotta et al. 2023).

4. Supporting workers who are ultimately at the forefront of transformation with better conditions (less hours, better wages, stronger training, more respect). New work suggests better worker conditions in the minibus sector in African cities are associated with higher passenger satisfaction and may reduce crashes (Behrens et al. 2023; Kelley et al. 2024).

5. Investing in adequate, collaborative, and shared crosscutting data collection and research that focuses on improvements and measurements of real multidimensional and holistic impacts of these kinds of changes. This will help support smart integration of specific measures and investments in popular transport within sustainable transport, climate

and public health planning and investments. This includes improvements in air pollution and public health, and hence cost savings on health budgets; and carbon reduction, and hence inclusion in transport decarbonization pathways and also Nationally Determined Contributions (NDCs) (Kustar et al. 2023; GIZ et al. 2024).

We are at the cusp of a new paradigm, one that aims to overcome the popular transport policy gap and the injustices, costs, and human suffering around its neglect. This is by no means easy as we continue to also struggle to implement the Avoid, Shift and Improve framework in our cities (SLOCAT 2023). However, by recognizing, including and supporting popular transport users, workers and operators, and engaging them in these efforts, we gain critical allies in our ongoing and ever more significant inter-twined struggles for sustainable cities, justice and planetary health.

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