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Assessing the Public Health Benefits of Replacing Freight Trucks with Cargo Cycles in Last-Leg Delivery Trips in Urban Centers

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Introduction

The burning of fossil fuels from motorized vehicles has far-reaching impacts on the environment, health, and the economy. Air pollution is associated with a wide range of human illnesses including, asthma, birth defects, lung injures, brain damage, cancer, cardiovascular and coronary heart diseases, as well as cognitive disease. Noise pollution from motorized trucks increases levels of stress and risk of cardiovascular disease.

Urban design and traffic operations have been shifting towards a model that prioritizes quality of life and the physical, mental, and social wellbeing of city residents. This shift away from motorized vehicles is a move toward more sustainable forms of transportation. Replacing motorized trucks with cargo cycles during the last mile of delivery is consistent with emerging policies that underscore accessibility and the safety of all road users. Empirical evidence suggests that cargo cycles can be integrated into last mile can be cost-efficient (Koning & Conway, 2016; Choubassi et al., 2016; Fishman et al., 2015) and reduce tail pipe emissions (Schliwa et al., 2015, Conway, 2016, Melo & Baptista, 2017; Ren et al, 2019). Although cargo cycle use can increase risk of injuries, the health benefits of cycling far exceed the risk of injuries (Pucher & Buehler, 2008).

This study evaluates the emissions impacts of shifting to cargo cycle operations in last-mile delivery for the West Oakland neighborhood; assesses enabling conditions; and offers policy recommendations that incentivize the use of cargo cycles.

Study Method

This study used primary and secondary data collection to identify barriers and opportunities for cargo cycles and identify possible locations for transfer hubs in the study area. Primary data were collected using key stakeholder

interviews, focus groups, and field observations. Interviewees included government agencies, local nonprofits, businesses, residents, truck drivers and a mobile air pollution monitoring expert. Focus group participants included local business owners, delivery persons, bicycle, transit, environmental advocates, and residents. Field observations included including parking duration, idling, and illegal parking during peak times, and counts.

Secondary data including Dun and Bradstreet information of business establishments for 2018, the US population census, and truck counts from prior studies were used to estimate emissions and vehicle miles traveled savings for the focus-group identified preferred transfer hub location. We conducted sensitivity analyses to key simulation model inputs, and estimated possible savings for likely scenarios of two other possible transfer hub locations identified by the community.

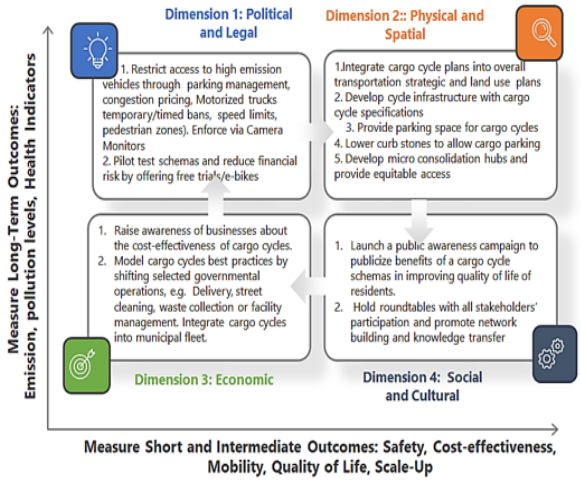
Findings

Focus group participants agreed that the benefits of replacing motorized trucks with cargo cycles include lower pollution, less noise, job opportunities for operators, less damage to roads from lighter vehicles, and opportunities for local cargo cycle businesses, including cargo cycle fabrication and maintenance, and a healthy lifestyle for cargo cycle operators. Enabling recommendations include: (a) create protected cargo bike lanes; (b) establish parking facilities/spaces for cargo cycles to ensure safety and avoid illegal parking; (c) provide cargo cycle operator trainings; (d) use physical traffic management schemas; (e) leverage safe street schemas to incentivize cargo cycles; (f) outreach to businesses/residents and the local community to activate demand for cargo cycle services; (g) incentivize business to use cargo cycle and offset human cost of running cargo cycle business; (h) limit speed for motorized vehicles and provide improved police enforcement to increase safety for cargo cycles; (i) make cargo cycle operator jobs accessible to community members; and (j) address safety for cargo cycle operators.

Results of the traffic simulations suggest that implementation of cargo cycles for the preferred transfer hub location with the most likely set of inputs can potentially reduce over 400 vehicle miles traveled (VMT) per day. Sensitivity of estimated reductions based on different model inputs ranged between 164 to 2,620 fewer VMTs per day. Using the most optimistic scenario, these reductions are equivalent to decreases in emissions of taking approximately 1000 Class 4 box trucks off the roads of West Oakland every day.

Policy/Practice Recommendations

Policy Implication: Development of Cargo Cycle Schemas along Dimensions of Influence



About the Principal Investigator

Dr. Jennifer C. Hartle is an Assistant Professor in the Department of Public Health and Recreation at San José State University in San José, California. Trained as an environmental health engineer, she is interested in developing concrete solutions and policies to reduce harmful environmental exposures. Her research focuses on mixed-methods, including interviews, surveys, and exposure modeling, to identify exposure sources; this data being used to inform preventive strategies.

To Learn More

For more details about the study, download the full report at **transweb.sjsu.edu/research/1952**

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