Translating Near Highway Research Into Action in Somerville, MA

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COMMUNITY ASSESSMENT OF FREEWAY EXPOSURE & HEALTH

Introduction:

Near-roadway air pollution is a significant public health problem that needs to move from observational studies to addressing the problem. Community Assessment of Freeway Exposure and Health (CAFEH) is a series of Community-based participatory research projects that began in 2008. CAFEH has carried out research on how traffic related air pollution affects cardiovascular health in neighborhoods in and near Boston.

Currently, the CAFEH team is completing a community-level intervention in Somerville, MA. In the 1970s, a thriving neighborhood and business district in East Somerville was demolished for the construction of Interstate 93 (I-93); residents were uprooted, and the local economy destroyed. Today, the Somerville stretch of I-93 carries over 200,000 vehicles per day through dense Environmental-Justice neighborhoods.

Figure 1: Short Term associations of UFP and health outcomes

Figure 2: Long Term associations of UFP and health outcomes

Bubble map of associations extracted from the literature plotted by year and by disease type. Green: No evidence of association, Orange: Some evidence of association, Red: Statistically significant association. CV = Cardiovascular, R= Respiratory O = Other

Figure 3: Annual average PNC predicted by Land use regression models.
Patton AP, Zamore W, Naumova EN, Levy JI, Brugge D, Durant JL. *Environmental Science and Technology* (2015).

Figure 4: Time activity adjusted annual average particle concentrations (TIA-PAC) by study areas
Lane K, Levy J, Scammell MK, Peters JL, Patton AP, Reisner E, Lowe L, Zamore W, Durant JL, Brugge D. *Journal of Science and Environmental Epidemiology* (2015).

Figure 5: Estimates of Excess Risk and Number of New Cases Among Somerville Residents Living within 400 meters of a Freeway over a 5-Year Period due to Exposure of Freeway Air Pollution

Figure 6: Mean Change in Systolic Blood Pressure. Unpublished study of 77 people monitored for blood pressure in a room near highway with air filters to regulate the UFP exposure.

Health Lens Analysis:

CAFEH has documented that this traffic causes high levels of near-highway air pollution and residents in close proximity to the highway reported suffering from excessive noise pollution. In response to this, community proposed an analysis of noise barrier installation along I-93.

Accordingly, the project team investigated the potential and likely health impacts of noise barrier installation through a Health Lens Analysis (HLA), a tool that assesses the health implications of a project or policy. We used HLA to increase awareness of the effects of near-roadway air pollution exposure and ensure that construction of noise barriers on I-93 would not inadvertently damage health quality or reinforce inequalities.

Figure 7: Health Lens Analysis

Figure 8: HLA Progression Completed

Figure 9: HLA Progression Ongoing

Community Engagement:

Central to this effort was robust community engagement. The project team held 5 multi-lingual community meetings, discussions with elected officials and community leaders, tabled at community events, and facilitated conversations with 2 ESL Classes. There have also been multiple meetings with MA DOT, which would need to be involved in sound wall

Figure 10: Somerville and MBTA (subway) lines

Figure 11: Somerville Focus Area

Figure 12: Somerville sound study to influence DOT about sound walls. One of the 8 measured locations.
Courtesy Doug Leaffer, PhD student CEE, Tufts and the Somerville Transportation Equity Partnership

design and installation. Upon testing multiple locations, noise was also determined to exceed health thresholds near I-93.

Residents pushed back against unadorned noise barriers, leading the HLA to consider the impact of esthetics and the role of vegetation in design and exposure reduction. It was found that although barriers could reduce noise and air pollution exposure and have a positive effect on the community, geographic and meteorological conditions may limit barrier installation and efficacy in some areas along the highway. This research culminated in a community participatory design charrette where participants generated evidence-based and actionable design recommendations.

Figure 13: November 2018 Design Charrette in Somerville