



Near Roadway Air Pollution (NRAP)
*Special concerns near busy roads,
highways and “hot spots”*
(marine ports, freeways, rail yards, warehouses and NOW - airports)

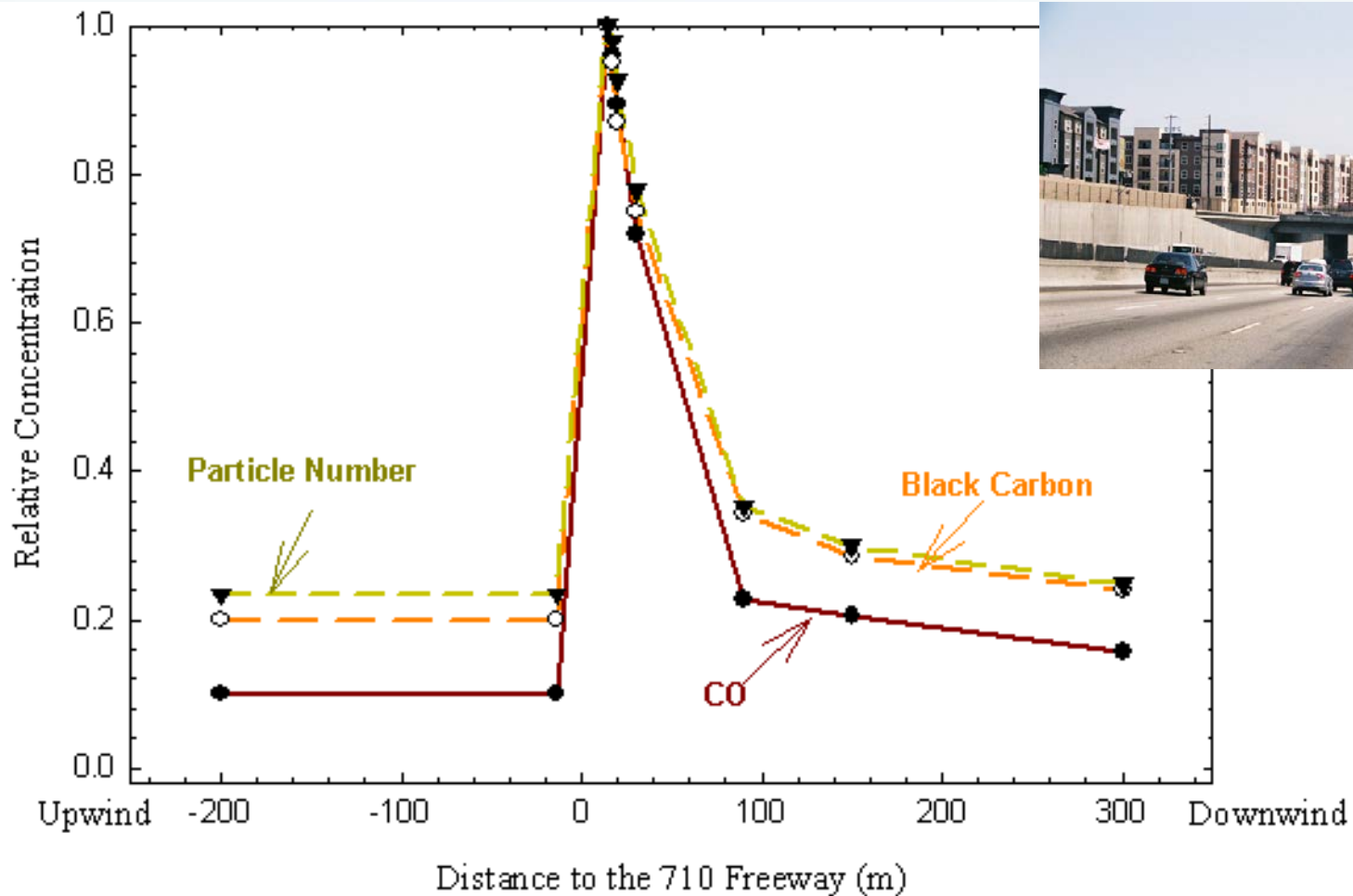
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An aerial, slightly hazy photograph of a city. In the center, a large stadium with a distinctive curved roof is visible. To the right, a bridge with multiple red towers spans across a body of water. The foreground shows residential buildings with red-tiled roofs. The overall scene is a dense urban environment.

WHY PROXIMITY MATTERS

Air Quality is Worse Near a Freeway

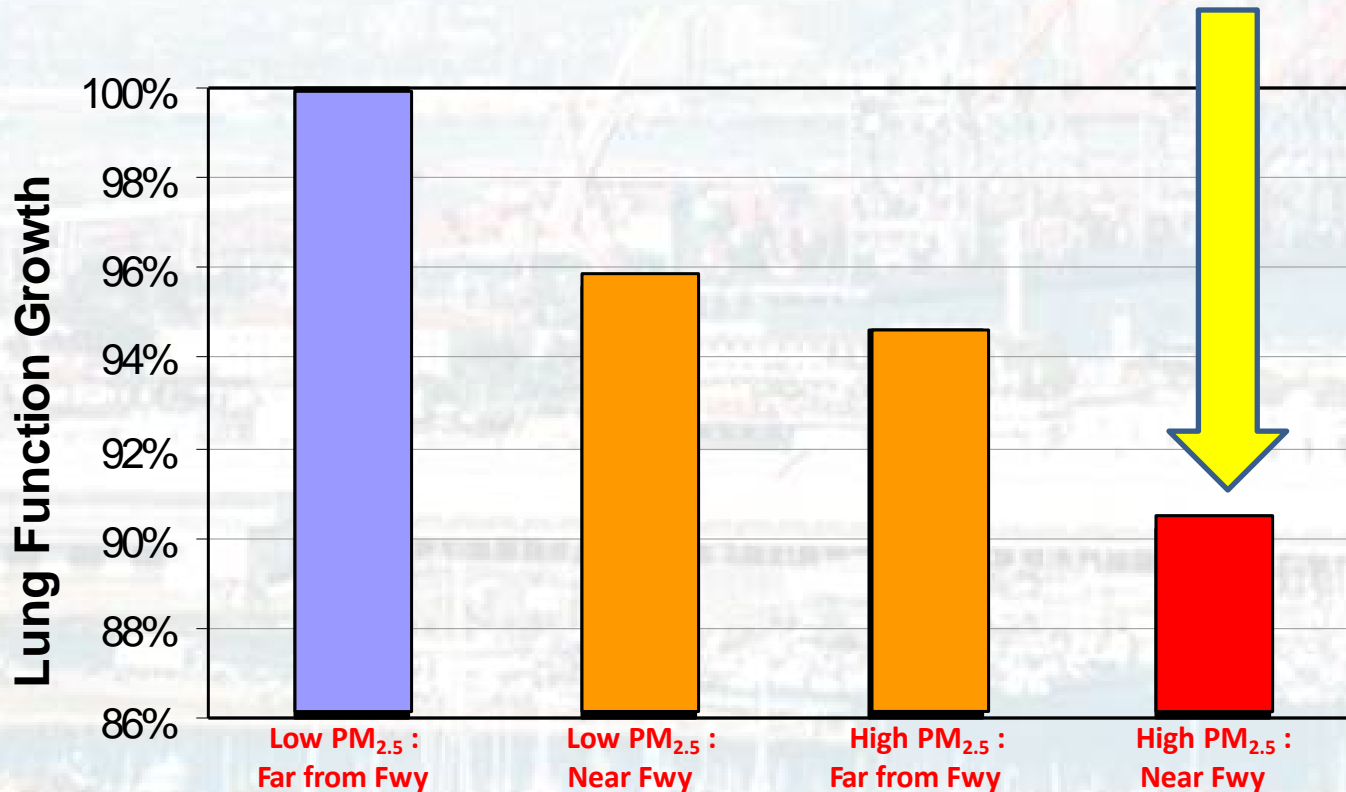


Black carbon as diesel marker and other pollutants are high near freeway (e.g. NO₂, benzene,...)

(Zhu et al., 2002, 2006)

Proximity To Traffic Matters

Lungs of children who live in areas with bad regional air pollution and near freeway traffic are impacted the most



Regional PM_{2.5} : Freeway Distance

Credit: Jim Gauderman, USC

PROXIMITY TO TRAFFIC POLLUTION - HEALTH OUTCOMES

- Children living near traffic-related pollution are more likely
 - to have reduced lung function
 - to get new cases of asthma
 - to have respiratory symptoms (bronchitis)
- Mothers are more likely
 - to have premature or low birth weight babies
- Adults are more likely to
 - die from stroke and heart disease (especially if they have diabetes) and from lung cancer
 - If near diesel exhaust emissions: lung cancer
- The elderly are more likely to
 - suffer accelerated cognitive decline

*McConnell R et al 2005, 2010
2*

Gauderman WJ et al, 2007

Maheswaran R and Elliott P, 2003

Kan et al. 2003-4.

Gatto NM et al, 2013

Weuve J et al, 2012

Kan H et al, 2008

*Wilhelm et al, 2011-
2*

Chen JC et al, 2009

Basu R et al, 2013

An aerial, slightly hazy photograph of a city. In the center, a large stadium with a distinctive, colorful, curved roof structure is visible. To the right, a bridge with multiple red towers spans across a body of water. The foreground shows residential buildings with red-tiled roofs. The overall scene is bright and clear, suggesting a sunny day.

EMERGING RESEARCH FINDINGS

Emerging research findings... pregnancy

- Prenatal exposure to PAHs (polycyclic aromatic hydrocarbons) is associated with obesity in childhood
- Living near traffic pollution when pregnant may increase the risk of having a child who develops autism

Rundle et al, 2012

Volk H et al, 2012-13

Emerging research findings - diabetes

- 2-4 times as many mice exposed to air pollution and fed a high fat diet developed Type 2 diabetes than mice exposed to clean air and the same high fat diet

Sun et al, 2009, 2013

Rajapolalan, 2012

Liu, 2013

An aerial photograph of a port area, likely Los Angeles or Long Beach, showing a dense concentration of shipping containers and large gantry cranes. The image is slightly blurred and has a light blue tint. The text is overlaid in the lower-left quadrant.

**“HOT SPOTS” NEAR
INTERNATIONAL TRADE
FACILITIES**



WELCOME
TO THE
PORT



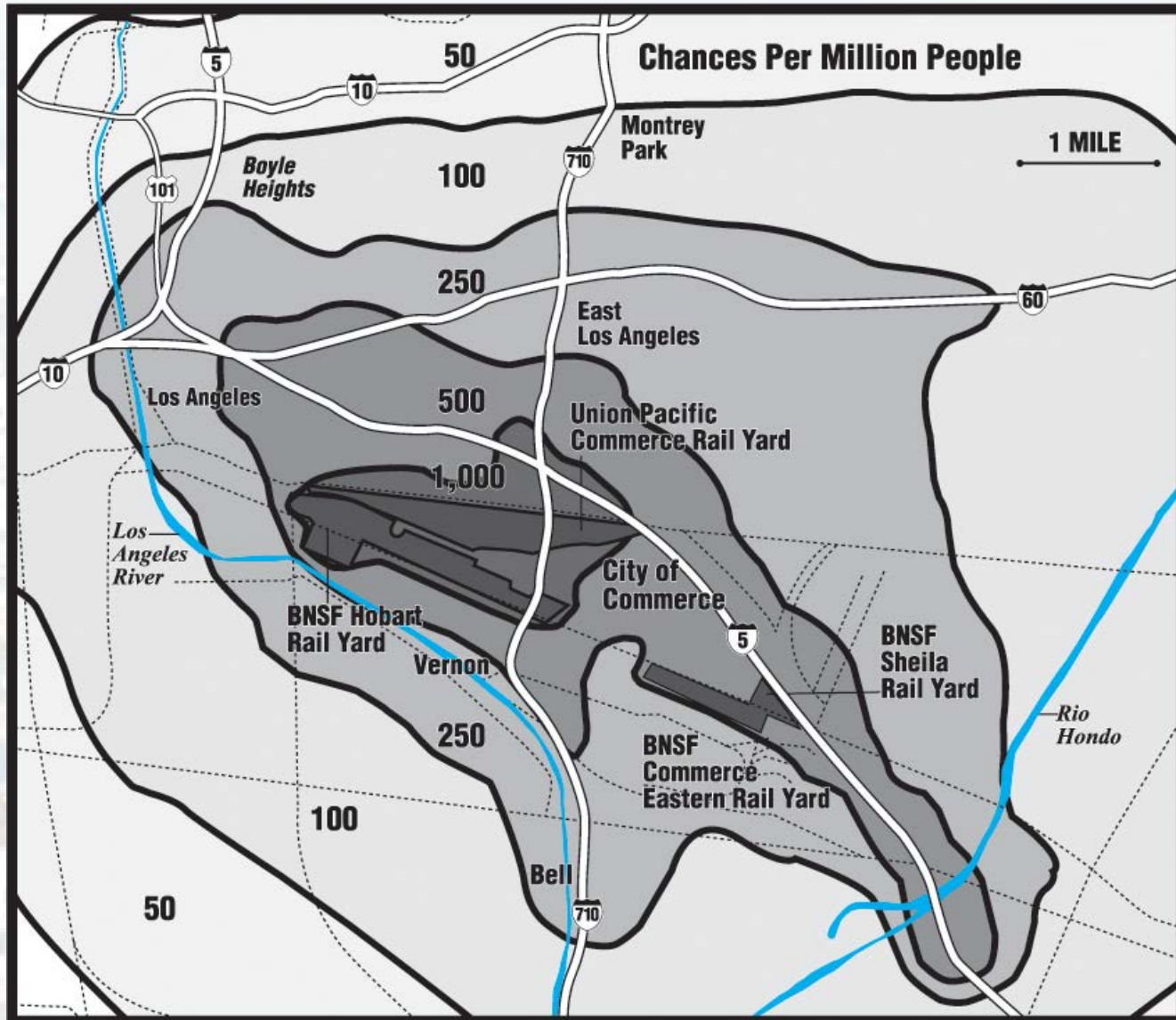
An aerial, slightly hazy photograph of a city. In the center, a large stadium with a distinctive, curved, metallic roof structure is visible. To the right of the stadium, a bridge with several tall, red, A-frame pylons spans across a body of water. The foreground shows a dense residential area with many houses and trees. The overall scene is a wide-angle, high-altitude view of an urban landscape.

DISPROPORTIONATE IMPACTS

Who lives in close proximity to ports and rail yards?

- In 2003, U.S. EPA commissioned studies on:
 - the U.S. population living near
 - 47 selected marine ports and
 - 37 selected rail yards
- *Results:*
 - at least 13 million people live in the vicinity of these facilities and are exposed to diesel particulate matter
 - includes a **disproportionate number of low-income households, African-Americans, and Hispanics**

Increased cancer risk found near rail yards – CARB HRAs



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Article

Global Trade, Local Impacts: Lessons from California on Health Impacts and Environmental Justice Concerns for Residents Living near Freight Rail Yards

Andrea Hricko ^{1,*}, Glovioell Rowland ¹, Sandrah Eckel ¹, Angelo Logan ², Maryam Taher ³
and John Wilson ³

An aerial photograph of a port area. In the center, a large white cargo ship is docked at a pier. The ship's deck is filled with colorful shipping containers. In the background, a city skyline is visible under a hazy sky. The foreground shows residential buildings and greenery.

**ONGOING CONCERN: SITING
RAIL YARDS WITH DIESEL
EXHAUST EMISSIONS NEXT TO
SCHOOLS AND HOMES**

BNSF rail yard – the
“SCIG”

Proposed to be built
in L.A. but next to
West Long Beach
neighborhood; lower-
income & very
diverse

Approved by Port of
L.A. and City of L.A.

7 lawsuits



Environmental Justice Implications

- When we are talking about ports, rail yards and other goods movement facilities – we are talking about **nearby communities that are more often working class/working poor communities of color**

Costs of freight transport on children's health



The health costs from living in “freight transport” communities with heavy traffic

- USC investigators
 - Studied children in Long Beach and Riverside CA
 - Heavy port-related truck traffic
 - LB also exposure to ship emissions
- Estimated burden of disease attributable to living near freeways and near the ports
 - Results
 - **Approximately 9% of all childhood asthma cases in Long Beach and 6% in Riverside were attributed to traffic proximity**
 - **Ship emissions accounted for 21% of bronchitis episodes in Long Beach children with asthma**
 - **Costs to these two communities per year: \$18 million**

Perez L et al, 2009

Brandt S et al, 2012

An aerial, slightly hazy photograph of a city. In the center, a large stadium with a distinctive curved roof is visible. To the right, a bridge with multiple red towers spans across a body of water. The foreground shows residential buildings and greenery. The overall scene is a wide-angle view of an urban area.

WORKPLACE EXPOSURES

30-40 studies of long-term effects of exposure to diesel

- Studies of workers

- Truckers
- Railroad workers
- Miners

- Most studies

- Show an elevated risk of lung cancer among exposed workers

- IARC

- 2012: Diesel exhaust causes lung cancer



Hart JE et al, 2006-2013

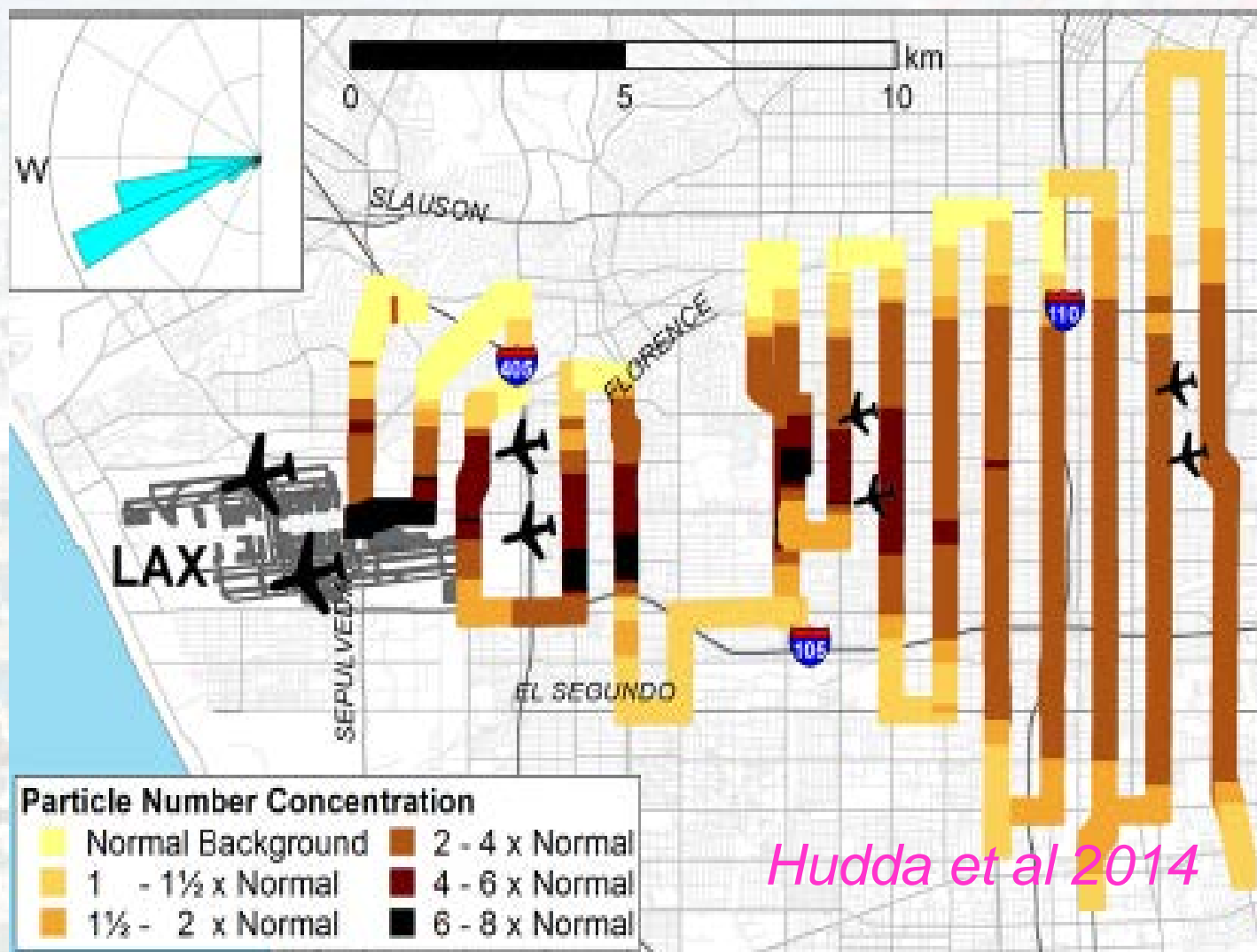
Attfield M et al, 2012

Garshick E et al, 2012

An aerial photograph of a coastal city, likely San Francisco, showing a large stadium with a distinctive red and white roof structure, a harbor with many boats, and surrounding urban buildings. The image is slightly blurred and has a light blue tint.

**AIRPORTS.... THE NEW
FRONTIER?**

Primary Finding: Particle Number “Impact” Area is 23 Square Miles! *In a minority, lower income neighborhood of L.A.*



Our Outreach Program – last week: h.s. students measuring UFPs under the flight path



Conclusion

- Proximity to traffic pollution matters
- There are disproportionate impacts on working poor communities of color when it comes to international trade and “goods movement”
 - Impacts may increase as imports increase
 - Expanded ports
 - New or expanded rail yards
 - Expanded highways
 - More huge warehouses/distribution centers
- New study by USC shows pollution in airport flight paths higher than previously believed
 - Again, disproportionate impacts

THANK YOU

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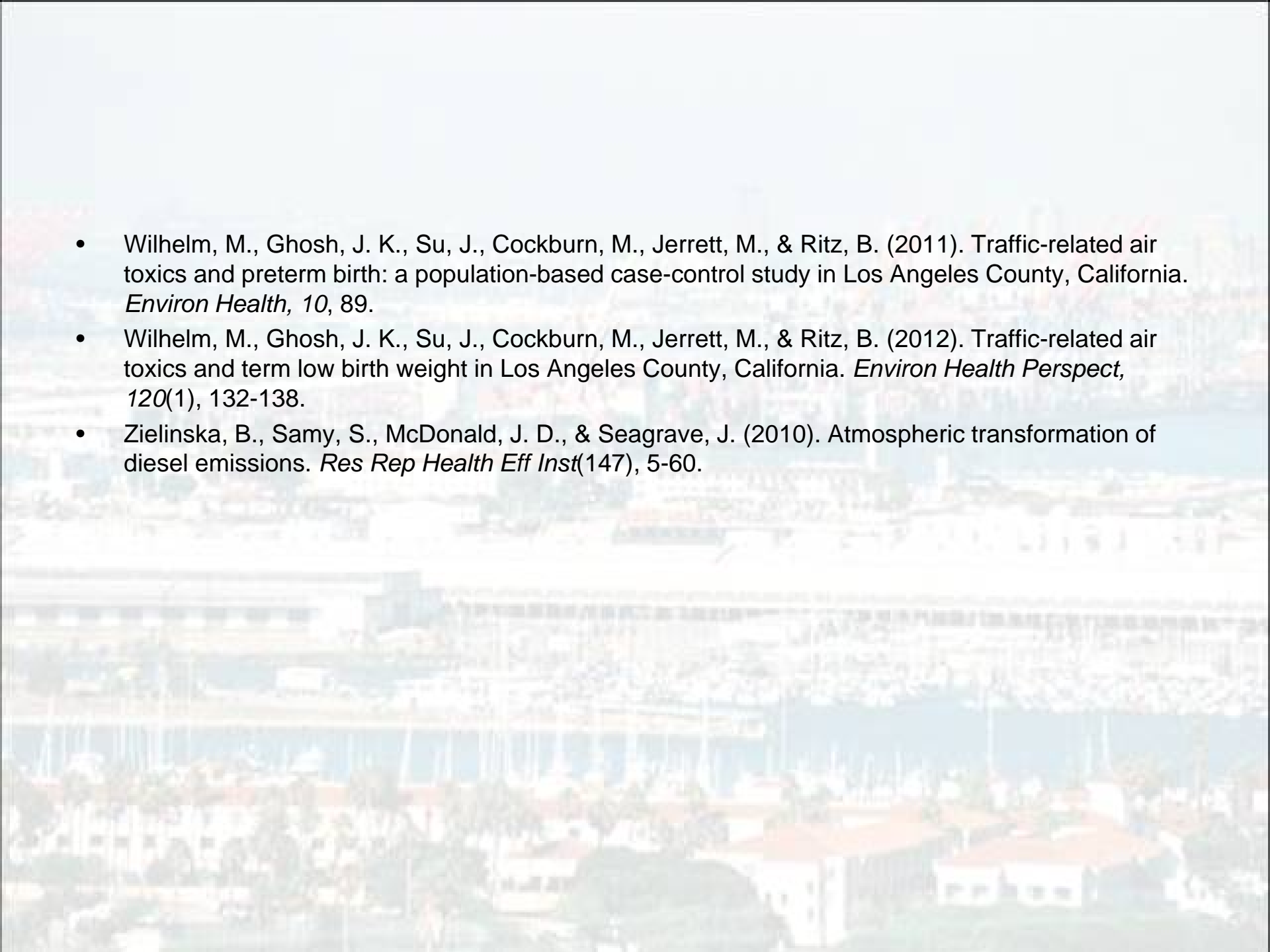
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Living close to busy highways and sources of heavy traffic pollution linked to adverse health effects



More to Obesity than Exercise and Diet

- Emerging evidence indicating environmental exposures could act as “obesogens”
- Built environment and its role in exercise and food consumption
- Many chemicals are implicated
 - Organochlorines (PCBs, DDT)
 - Bisphenol A
 - Cigarette smoke
 - Air pollution

Sharma Am J Epidemiol. 2008; Trasande, JAMA 2012, Valvi EHP 2012, Verhulst EHP 2009,