

## Appendix E3. Mitigation Evidence on Person-Level Interventions to Reduce Exposure to NRAP

CalSPEC also reviewed and evaluated evidence on person-level interventions. This document provides a narrative summary and evaluation on the effectiveness of person-level interventions on reducing exposure to NRAP.

### Person-Level Interventions

In addition to environmental and physical prevention and mitigation strategies that reduce NRIAP exposure its negative health effects, there are person-level interventions that may also be effective in mitigation. CalSPEC includes an evidence review of these options to acknowledge the breadth of policies available to mitigate harm; however these strategies were not included in the report body because they are downstream of more broad public interventions that have larger preventive and mitigating effects than per person implementation. Notably, the effectiveness of these strategies varies from person to person depending on their preexisting health conditions and proper implementation.

#### Respirators

Respirators are protective devices worn over an individual's nose and mouth to reduce exposure to fine particulate matter and other particles depending on the removal efficiency. Respirators, in declining order of protective value, include N95, N99, surgical, and cloth masks (Han et al. 2021). N95 and N99 respirators remove over 95% or 99% of inhaled particles at 0.3  $\mu\text{m}$  in size (Rajagopalan et al. 2020)..

**Based on two reviews of a total of 5 studies, CalSPEC found moderate evidence that respirators reduced exposure to pollutants with mixed health effects** (publication bias, and lack of adjustment for potential confounders were problematic in this body of literature) (Rajagopalan et al. 2020; Han et al. 2021 ). Laboratory experiments suggest that certain respirator designs remove a high percentage of particles. For example, N95 and N99 respirators capture 95-99% of particles 0.3  $\mu\text{m}$  in size (Rajagopalan et al. 2020), and use of a particulate matter respirator with a 3.4% penetration rate reduces small particulates (2.5  $\mu\text{m}$  or less) from 89  $\mu\text{g}/\text{m}^3$  to 2  $\mu\text{g}/\text{m}^3$ . However, filtering efficiency depends heavily on proper fit and consistent use in polluted areas, and the type of particle matter/gas pollutant measured (Han et al. 2021).

## Diet

One way that traffic-related air pollution harms human health is through oxidative stress (Barthelemy et al. 2020). Studies suggest that increasing antioxidant intake may prevent the pollution's adverse effects. Antioxidants are substances that protect against oxidative stress following absorption in the gastrointestinal tract. They can be consumed as part of the diet (e.g., in the so-called Mediterranean diet) or as supplements such as vitamin C, vitamin E, and fish oil (Barthelemy et al. 2020). While diet does not reduce exposure to harmful components of NRAP, it may reduce the negative impacts of NRAP on the human body.

**CalSPEC found mixed results on health effects based on moderate evidence**, mostly due to small numbers of participants and moderate generalizability of the underlying randomized controlled trials.

Health effects were mixed (Barthelemy et al. 2020). The Mediterranean diet and higher fruit and vegetable consumption was effective in mitigating the adverse health effects associated with NRAP. However, antioxidant supplements had conflicting evidence.

**Table 1. Summary of evidence about person-level interventions**

Strategies	Weight of Evidence		Effects of Strategy on Reducing:	
	Exposure/ concentrations	Health risks	Exposure/ concentrations	Health risks
<b>Respirators</b>	Moderate	Moderate	N95 and N99 respirators: 95-99%	Mixed
<b>Diet</b>	Insufficient	Moderate	-	Mixed

*Notes on effects: "-" means that diet as a strategy has no mechanism of reducing exposure/concentrations to pollutants; rather it is a measure for individuals to protect themselves against the adverse health effects of pollutants.*

### Person-Level Interventions Conclusion

Across the interventions assessed, CalSPEC found suggestive evidence that respirators are highly efficient at reducing personal exposure to concentrations, while diet may be protective against the adverse health impacts of near-roadway indoor air pollution. However, both interventions rely on individuals to protect themselves.