Background on Stanford Gas Stove Study

May 2024

FROM AGA PRESIDENT AND CEO KAREN HARBERT:
"Despite the impressive names on this study, the data presented here clearly does not support any linkages between gas stoves and childhood asthma or adult mortality," **said AGA President and CEO Karen Harbert.** "The two major cited studies used to underpin the Stanford analysis directly contradict the conclusions they have presented. In short, the interpretation of results by Kashtan *et al*. are misleading and unsupported."

BACKGROUND:
A new study by Kashtan et al. estimated the number of childhood asthma cases and adult deaths due to natural gas use based largely on two published meta-analyses. A meta-analysis is a statistical combination of results from multiple studies addressing a similar research question. The conclusions of this new Kashtan study rely on two major meta-analyses, **neither of which support the study's claims.**

- Kashtan *et al*. based their asthma analysis on a large 2024 meta-analysis by Puzzolo *et al*. published in *The Lancet* in February of this year, that focused on cooking or heating with natural gas and several health conditions. Puzzolo *et al*. found no association between cooking and heating with natural gas (vs. electricity) and childhood asthma.
- Kashtan *et al*. based their mortality analysis on estimates of nitrogen dioxide (NO_2) exposure from natural gas stove use and a 2018 meta-analysis by Atkinson *et al*. on long-term outdoor NO_2 concentrations and mortality. Atkinson *et al*. cautioned against concluding that outdoor NO_2 concentrations can increase the risk of dying because there were very small risk estimates, the study results were heterogeneous, and body mass index (a measure of body fat) and smoking – two key health confounders – were not always appropriately accounted for in underlying studies.
- In addition, it is notable that the only meta-analysis that looked at indoor NO_2 and asthma did not find an association. Lin *et al.* and Puzzolo *et al.* found a lack of association with gas use and morbidity. Collectively, these studies do not support an association of gas use with mortality.

In contrast to these expressly stated results, Kashtan *et al*. asserted both studies confirmed "well-established epidemiological relationships." Kashtan *et al*. used similar methods as a prior study by Gruenwald *et al*. to calculate what is known as a Population Attributable Fraction, or PAF, to estimate the percent of childhood asthma and adult deaths that could be attributed to cooking with natural gas. However, this extrapolation to the entire population is only meaningful if natural gas use can *cause* asthma or death, and the studies on which the calculation in Kashtan *et al.* are based do not support this assumption (and in fact contradict it), so it was inappropriate to even make such a calculation. Even setting that aside, the PAF for childhood asthma was not statistically significant, demonstrating that, contrary to the authors' interpretation, this study does not provide evidence that childhood asthma can be attributed to natural gas stoves.

IN THE WORDS OF PUZZOLO ET AL (see AGA's recent release on this study here): "For asthma, no significant increase in risk for children and adults was found for use of gas compared with electricity… We confirmed that that risk of asthma from gas use was potentially exaggerated in studies with no or limited adjustment for confounders versus those with adjustment for at least one key confounder. In addition, our analysis found no significant increase in risk of wheeze (similar in manifestation to asthma) for gas compared with electricity."

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"This Article demonstrates a significantly lower risk for key health outcomes when switching from polluting solid fuels or kerosene to gaseous fuels for cooking or heating, suggesting cleaner fuels could contribute to reducing the global disease burden from exposure to household air pollution."

IN THE WORDS OF ATKINSON ET AL: The substantial heterogeneity between studies serves as a red flag for suggesting causality: "Our study confirms the need for continued caution in respect of causality particularly since the revised meta-analyses suggest [risk estimates] close to one, with the possibility of further attenuation if meta-analyses are restricted to studies with individual measures of BMI and smoking. The substantial heterogeneity between study results also weakens the argument for causality. Unlike particles where unit mass concentrations might vary between locations in size, composition, and nature (primary/secondary), a unit mass concentration of NO_2 gas is the same everywhere. We therefore consider that as the evidence stands at present, the causal basis for estimating the burden of NO_2 on mortality and loss of life expectancy remains weak."

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