



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Saafiyah N. Patel</b>	<b>Project Number</b> <b>J1018</b>
<b>Project Title</b> <b>Solution to Cooking Pollution</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I have asthma and allergies which becomes worse someone is cooking in the kitchen. This made me think what pollutants were causing me to cough. I decided to investigate more and designed an experiment to measure these pollutants emitted from cooking on stoves and the impact of the range hoods at low and high speeds and having the window open while cooking. I hypothesized that the amount of CO and NO<sub>2</sub> emitted during cooking will exceed the acceptable outdoor profiles as set by the Federal and State regulations when stoves are used without a range hood. I also hypothesized that the concentration of NO<sub>2</sub> and CO will be significantly lower when the range hood is on at high speed because the ventilation will dissipate the airborne chemicals that are created during the cooking process.</p> <p><b>Methods/Materials</b> I rented a wireless portable gas monitor with six sensors (MultiRAE), to measure NO<sub>2</sub>, CO, and O<sub>2</sub>. During the experiment, my constant variable was the amount of onions sautéed, the pan, the amount of olive oil, the flame of the stove, the cooking time, &amp; where the monitor was kept. My only manipulated variables were whether I used the vent, what speed I used the vent, and if I opened the window. Using the monitor, I established the background data for NO<sub>2</sub>, CO, &amp; O<sub>2</sub> by the stove, 10 ft, 20 ft, 30 ft away from the stove and also the outside air. I sautéed onions, a very common cooking ingredient, on the stove and measured the CO, NO<sub>2</sub>, and O<sub>2</sub> while cooking. Then, I did this 3 more times again except with the range hood open on low and high speed and with the window open. I repeated 2 more times for each different intervention for accuracy of my results. Between each reading, time was given for the monitor to recalibrate. Data was analyzed.</p> <p><b>Results</b> During the simple process of sautéing onions, I found out that high levels of NO<sub>2</sub> and CO are released. The levels of NO<sub>2</sub> exceeded ARB indoor air quality guidelines and ambient air quality standard of 250 ppb per hour and EPA's national air quality standards of 0.053 ppm. The levels of CO also exceeded ARB indoor air quality guidelines and ambient air quality standard of 9 ppm.</p> <p><b>Conclusions/Discussion</b> My experiment proved my hypothesis correct. During the simple process of sautéing onions, I found out that high levels of NO<sub>2</sub> and CO are released. All interventions evaluated had a great impact of minimizing indoor air emissions of NO<sub>2</sub> and CO resulting from sautéing onions.</p>	
<b>Summary Statement</b> Mitigating indoor air cooking pollution through the use of a vent hood.	
<b>Help Received</b> My parents helped and supervised.	