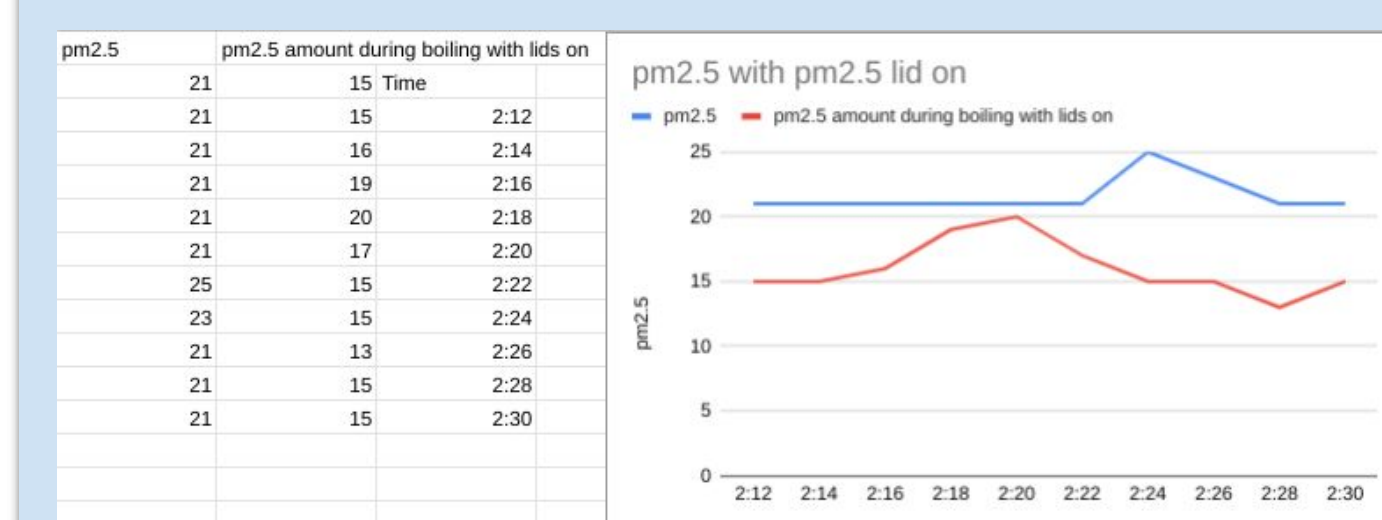


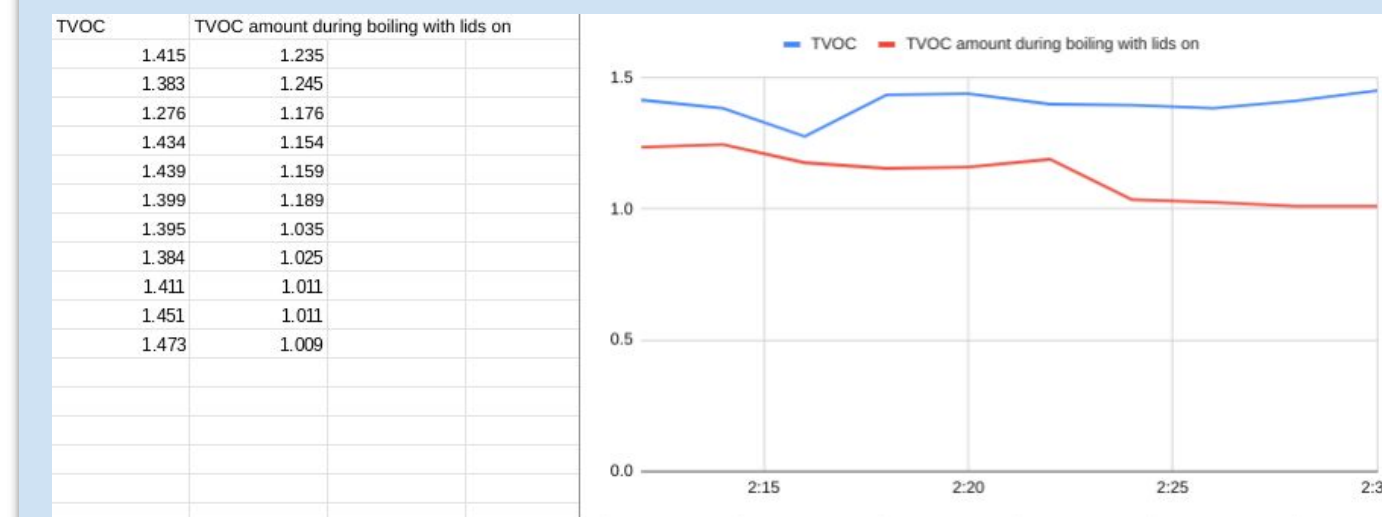
## INTRODUCTION

According to the World Health Organization, about 7 million people die every year from both indoor and outdoor pollution. About 53% of death is due to indoor air pollution. Air pollution is reported to cause many different kinds of diseases, such as pneumonia, stroke, heart diseases, chronic obstructive pulmonary and lung cancer. More than 60% of the diseases listed are associated with lung problems.

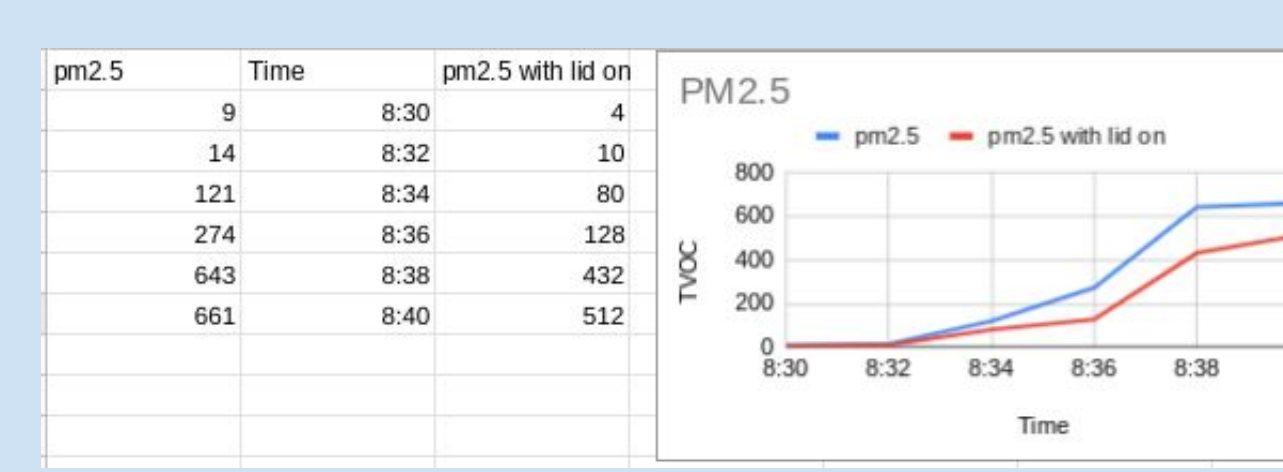
## DATA AND FINDINGS



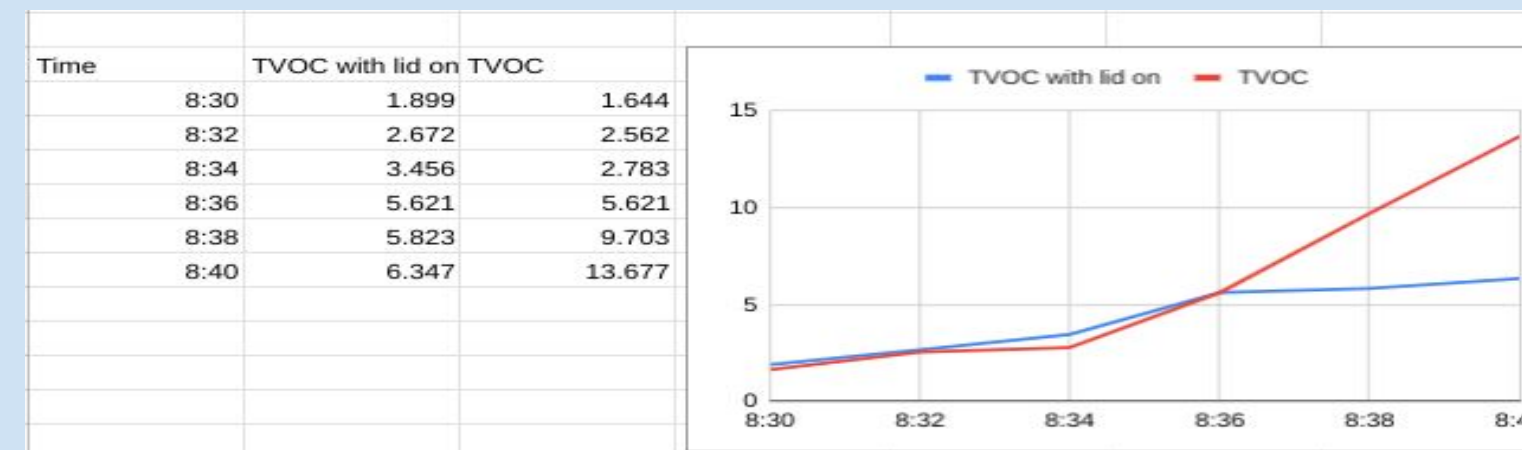
This result shows changes in PM2.5 levels over time during boiling potatoes when the wok lid was on (the bottom curve) or off (the top curve). The X-axis is the time of the day in 2-min intervals for a total of 24 min. There is a difference of six between the two minimum values and five between the maximum value



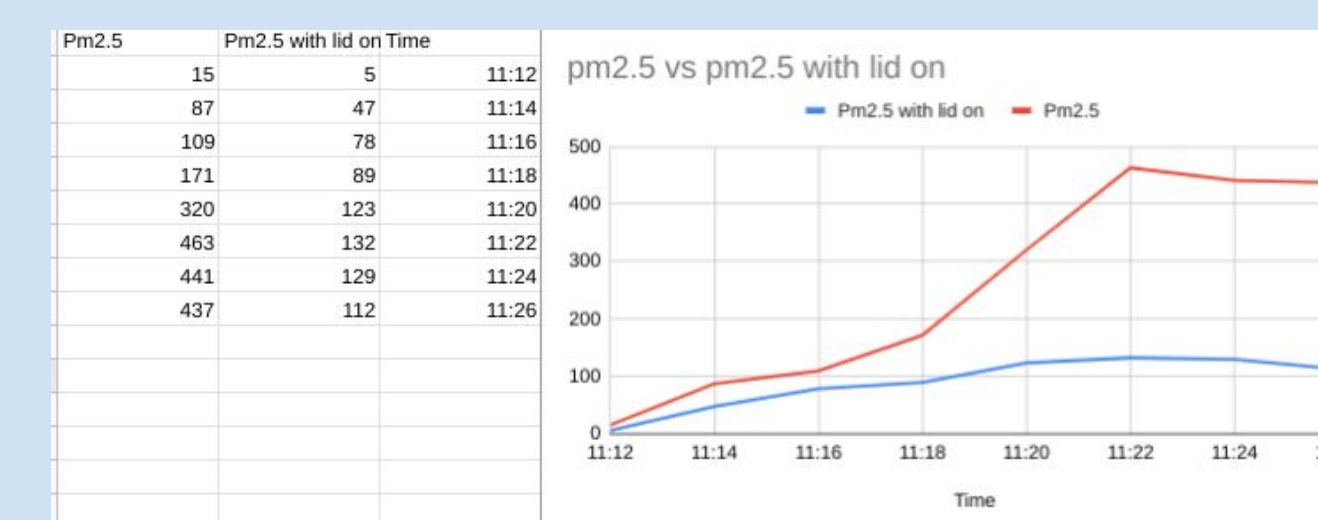
This graph compares the levels of TVOC during boiling potatoes when the lid was on (the bottom curve) or off (the top curve). There is a difference of 0.224 between the two minimum values and 13.67 between the two maximum value.



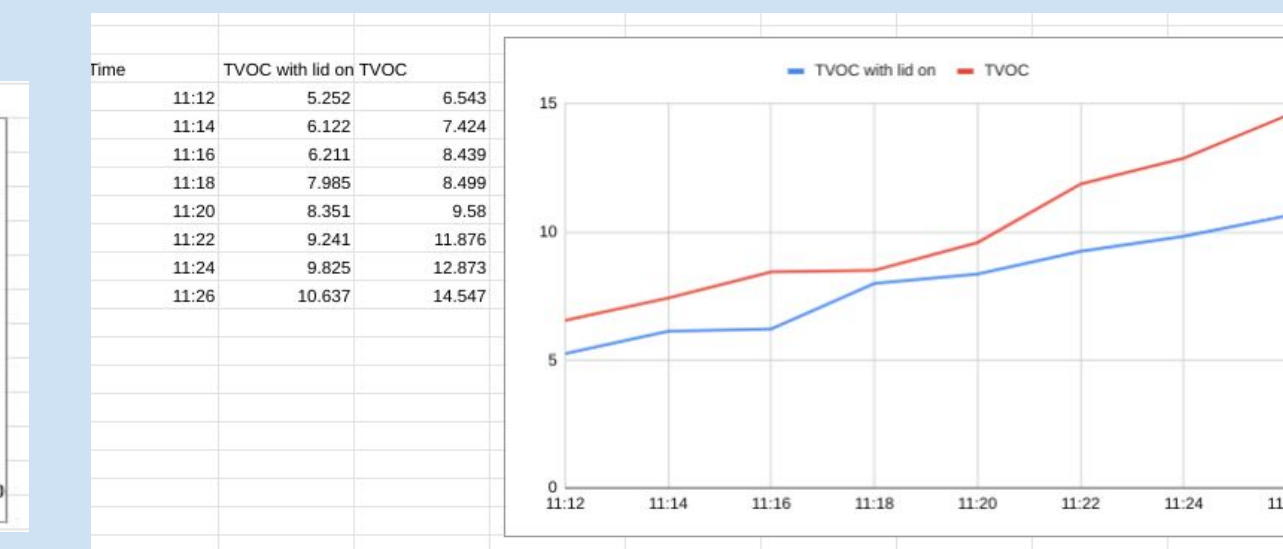
This is the comparison of PM2.5 levels during frying when the wok lid was on (the bottom curve) or off (the top curve). PM2.5 level was much higher when the lid was off (661) than that when the lid is on (512).



This result compare TVOC levels during frying when the lid is on (the bottom curve) or off (the top curve). There is a difference of 1.255 between the two minimum values. The maximum value for frying potato with no lid on is 13.677 while the one with lid on is 6.347.



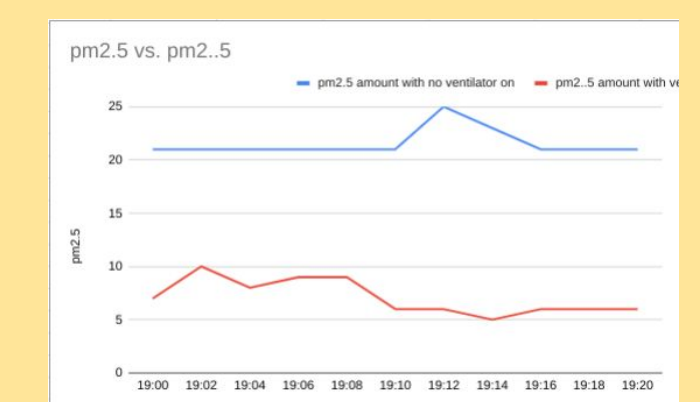
Compared here are the PM2.5 levels during stir frying when the wok lid was on (the bottom curve) or off (the top curve). As is clear, PM2.5 level was significantly higher when the lid is off (the maximum number 437) vs when the lid is on (112).



Shown in this data set is the comparison between TVOC with the lid on and off during stir frying. There is a difference of 1.193 between the two minimum values. The maximum value for boiling potato with no lid on is 14.547 while the one with lid on is 10.637.

## IMPLICATIONS AND NEXT STEPS

- The next step is to compare the levels of PM2.5 and TVOC produced during cooking, particularly during frying, with the exhaust ventilator on or off.
- Different kinds of cooking oils will also be used to compare the changes in PM2.5 and TVOC levels during cooking.
- Cooking different kinds of food, e.g. meat vs carbohydrates, will be compared in PM2.5 and TVOC levels.
- Mask will be used to see if it reduces the exposure levels of PM2.5 and TVOC.
- Expect results during cooking with ventilator on. The following graph is the results for pm2.5 amount during boiling with ventilator on and off.



## RESEARCH METHODOLOGIES

- I used a detection machine called "Precision multi-functional air quality detector (model no: GT58A)" (see picture at the bottom) to detect PM2.5 and TVOC (total volatile organic compound).
- The baseline levels of PM2.5 and TVOC were measured to see the air quality before cooking.
- After cooking I put the machine right near my chest to simulate human exposure and to see how much PM2.5 and TVOC one can breath in.
- The detection machine was kept on to monitor the changes of both PM2.5 and TVOC over time.
- The experiments were conducted under similar conditions such as similar temperatures.
- The levels of PM2.5 and TVOC were measured under different cooking conditions such as steaming, light frying and deep frying, by cooking different kinds of food. e.g. water, vegetable and meat, as well as by using different kinds of oils.



## CONCLUSIONS AND ANALYSIS

- PM2.5 can lead to many serious diseases.
- About 53% of people die from indoor air pollution, and this indicates that it is important to always open our window during cooking to decrease the amount of PM2.5 released during cooking.
- It is important to keep the lid on during cooking because it can decrease the amount of PM2.5 and TVOC during cooking.
- It is the responsibility of everyone in every country on this planet to reduce or minimize the production and release of PM2.5 into our air.

Health Parameter Guide							
PM2.5	PM10	AQI	CO2(ppm)	Status	HCHO(mg/m³)	TVOC ( mg/m³ )	Displayed Contents
0.0-12.0	0-54	0-50	0-700	Good	0-0.1	0-0.5	Safe
12.1-35.4	55-154	51-100	701-1000	Moderate			
35.5-55.4	155-254	101-150	1001-1500	Unhealthy for Sensitive Groups			
55.5-150.4	255-354	151-200	1501-2500	Unhealthy	> 0.1	> 0.5	Unsafe
150.5-250.4	355-424	201-300	2501-5000	Very Unhealthy			
≥250.5	≥425	≥301	≥5001	Hazardous			

## ACKNOWLEDGEMENTS / REFERENCES

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