**Introduction**

As-salamu Alaykum Mrs. Ba-Saddik! Today I will be presenting you with my science fair project regarding whether staying 6 feet or 2 meters apart necessary? And if yes, does it really stop the spread? I picked this for my project because this would be most relevant today due to the pandemic (Covid-19). But even though 2020 was a horrible year, Inshallah, we can start fresh and look forward to the future! So let's get started, shall we!

**Research**

Covid-19, also known as the 2019 novel coronavirus, is a disease that spreads from an infected person to another. It may spread by an infected person talking, singing, sneezing, yelling or breathing around others. The virus that causes covid-19 may linger in the air in some circumstances depending on the respiratory droplet’s size, and if you are in an enclosed space, it can stay remaining in the air for a prolonged period. Covid-19 is a strain of coronavirus, ‘CO’ standing for corona ‘VI’ standing for virus and ‘D’ standing for the disease. The Cdc has stated in one article that a sneeze from covid can spread up to 6 feet or 2 meters away, which is why a lot of stores and malls have 6 feet/2 meter away stickers everywhere.

**Hypothesis**

I believe that even with or without a mask, you will still spread respiratory droplets. That’s why the CDC and Health Canada has recommended that everyone stay 6 feet or 2 meters apart from each other with a mask on. Without a mask, you will spread respiratory droplets farther than if you were wearing a mask. I believe that if you weren't wearing a mask and sneezed or coughed, the respiratory droplets may spread over 6 feet. With a mask, I don't think that the respiratory droplets will spread past a foot or 30 centimeters.

**Procedure**

1.Grab a container

2. Grab 2 mini fans

3. Place the mini fan on the side of the container and mark it with a sharpie

4. Remove the fan and start cutting out the outline you made of the fan on the container

5. Place the fan in the hole without dropping it in the container and glue the fan to the container via the hole

6. Drill in the figure a nose and a mouth and behind the head to place the silicone tube

7. Drill a hole on the side of the container to fit the tube through

8. Connect the silicone tube to the air duster

9. Mix water and florescent paint in a bowl, then syringe 2 ml into the tube

10. Connect the air duster into the tube

11. Place the mask on the figure's face

12. Turn on the fans

13.Then spray the air duster to get your results

14. Now you can record your results beyond this point

**Calculations**

Scale Factor: 1:4.8

12 inches/4.8 = 2.5 inches

2.5 inches = 12 inches or 1 foot

50 cm/4.8 = 10.41 cm

10.41 cm = 0.5 meters

**Experiment Task and Notes**

**December 31, 2020** – Completed build of my Mucus Projectile Tester (MPT).

**January 01, 2021** – First test attempted using just water and failed due to multiple leaks. I fixed the leaks using super glue and duct tape on the figurine head and neck.

**January 2, 2021** – I tested the MPT again with water and passed with no leaks or concerns.

**January 12, 2021** - I did a test today with the masked I made and placed the data on my project slides.

**January 25, 2021** – I showed my science teacher how my project works today.

**February 08, 2021** – My brothers and I were diagnosed with Covid after a student in close contact with my brother tested positive, and we had to get tested. That gave me a realization of how real and meaningful this test was, so I decided to figure out how my family got exposed. It was evident that both my brothers and I did not wear masks during recess outside and thought about how far respiratory droplets can travel and how easily we could have been affected. I noticed that some of my friends and I barely kept their masks on an entire day or placed the mask over their mouths and not their noses. It caused me to rethink if my experiment was also flawed, so I decided to redo my experiment with properly fitted masks during the quarantine. I redid my experiment with more masks because I noticed that the figure's mask wasn't tightly on his face and seemed loose while watching my last project video. So, I decided to redo the project again with new masks like non-medical, KN95 and N95 masks!

**February 15, 2021** – It took a long time to find an N95 mask but luckily received one from my grandmother, who works as a home healthcare aid. It took all day to make sure I made the masks a perfect fit for the figurine.

**February 28, 2021** – Got out of Covid quarantine.

**March 08, 2021** – Tested all-new masks and was astonished on how different my test results were. The non-medical and N95 face masks didn't release any respiratory droplets! But the KN95 mask allowed the respiratory droplets to spread past 1 foot! This is crazy because a non-medical face mask did better than a KN95 face mask!

**Observations**

The test I done with no mask; the respiratory droplets reached and surpassed a staggering 6 feet / 2 meters. From my first test with a non-surgical mask, the outcomes seemed suspicious because I didn't put the mask on correctly. On my second test, I saw the following: the KN95 mask was the only mask that didn't keep the droplets inside the mask. The respiratory droplets spread past 1.5 feet / 0.5 meters, almost hitting the 2 feet / 0.6 meters mark! But a lot of the heavy respiratory droplets stayed in the mask while the majority of the droplets were on the figure's face. For the N95 mask, all the respiratory droplets stayed in the mask. For the non-surgical mask, everything remained in the mask as well. Luckily, because this non-surgical mask is the most popular and readily available face mask on the market, this will make a massive improvement in stopping the spread.

**Conclusion**

I can conclude that a mask is better than without a mask for sure. My hypothesis was a little off, for the non-medical and N95 masks did an excellent job at containing the number of respiratory droplets that leave the mask. No respiratory droplets escaped both of those masks except for the KN95 mask. Some of the respiratory droplets spread one foot and spread nearly to the two feet mark. Other than that, the masks did do well at keeping the large respiratory droplets in the mask. If you wear a good mask and maintain social distancing, you will not contract the virus or spread it to others! So the lesson we can all take from this project is that you should always keep your mask on and adequately. Otherwise, you may end up like me, who contracted Covid-19! Trust me, I know from experience covid isn't fun, and even though I survived, many others haven't. So be safe, wear a mask properly and please keep your distance as you may not be aware of the person near has their mask on correctly.

**Variables**

The controlled variable in this project was the amount of water and glow paint ‘mucus’ i put in the tube to make the figure sneeze and cough out. The responding variable is how far the respiratory droplets travel. Lastly, the manipulated variable is what I put on top of the figure’s nose and mouth, such as when I put on and took off the face mask on the figure. Or what kind of mask I put on the figure.