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# The Effect of Masks on Allergic Rhinitis Symptoms Related to Ragweed and its Influence on College Students

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# **The Effect of Masks on Allergic Rhinitis Symptoms Related to Ragweed and its Influence on College Students**

*Katherine A. Knutte*

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## ABSTRACT

**BACKGROUND:** This study explored the effect of masks on allergic rhinitis related to ragweed. Research shows surgical and KN95 masks reduce nasal symptoms arising from dust, pollen, and ragweed. Other studies have contradictory findings about the effect of masks on ocular symptoms. Very few studies have examined the effect of masks on early and late allergic rhinitis.

**METHODS:** This qualitative study involved thirty college students aged 18 to 25 from Olivet Nazarene University with self-reported or physician-diagnosed allergic rhinitis on November 15, 2022. Participants were randomly assigned to a control (no mask), surgical, or KN95 mask group and walked around Perry Farm Park for an hour to assess ragweed sensitivity. Data was collected manually using a modified survey from allergy specialists and summarized in the results as an outline for future study. Survey questions were sent via school-wide email and disseminated through flyers distributed in nursing classes and to the men and women's soccer teams.

**RESULTS:** The surgical mask preliminarily trended a higher correlation on decreasing nasal allergic rhinitis symptoms than the KN95 masks, majority reporting mild nasal symptoms during the experience and no nasal symptoms after the experience. Most surgical mask-wearers felt the mask helped moderately during the experience or reduced one to two symptoms. Surgical mask-wearers reported a likeliness to wear the mask in the future.

**CONCLUSION:** The study implies that the surgical mask may effectively reduce nasal allergic rhinitis symptoms related to ragweed. A broader study and repetition of the study in the future is necessary to examine the effects of environmental change, such as low or high ragweed counts, and how late allergic rhinitis is affected by mask-wearing.

**Keywords:** Allergic rhinitis, ragweed, masks, surgical, KN95, late allergic rhinitis

## LITERATURE REVIEW

### Introduction

Allergic rhinitis (AR), seasonal allergies, or *hay fever* is one of the most common chronic illnesses in the United States, and there are few interventions to avoid exposure to allergens (dust, pollen, mold, animal dander, ragweed, etc.). Allergic diseases require constant mitigation and treatment. Accompanied by symptoms such as itchy eyes, runny nose, and sore throat, AR can interfere with the quality of life of students. I examined how mask-wearing impacts ragweed allergies in college-aged students to determine the effectiveness of masks in deterring ragweed-induced AR. The review of current medical literature indicated that masks decrease the number of allergens exposed to, such as pollen and dust, although there has been limited research on the effect of masks on ragweed allergy for the general population.

### *Allergic rhinitis*

Allergic rhinitis is a disease affecting about 15% of the United States population on physician-based diagnoses and as high as 30% based on self-reported nasal symptoms (Wheatley & Togias, 2015). Common symptoms of AR include sneezing, pruritus (itching), nasal congestion, rhinorrhea (runny nose), feeling unfocused or tired, chronic viral infections, congestion, eye rubbing, and dark

skin underneath the eyes (allergic shiners). Some common causes of AR are dust, mold, animal dander, and pollen. Allergic rhinitis functions relatively the same no matter the trigger allergen and the allergic response varies based on its severity. There are three types: allergic rhinitis, nonallergic rhinitis, or localized allergic rhinitis.

Localized allergic rhinitis is associated with comorbidities in other mucosal organs. It means there are symptoms related to allergic rhinitis but the individual tests negative in allergy tests except for the nasal allergen challenge (Eguiluz-Gracia et al., 2019). Allergic rhinitis varies in severity from mild to moderate to severe. AR occurs intermittently or persistently and is seasonal, perennial, or occupational. AR is a complex condition affecting all aspects of life: physiological, psychological, cultural, and social. As a multicomplex disease, it has been found that rhinitis “decreases daytime arousal, cognition, mood, and overall social functioning” (Patterson et al., 2014). Allergic rhinitis can also have a large impact on daily activity, making it harder to breathe, exercise, or be involved in school activities.

The effect of AR on daily activity depends on its severity and can be explained in more detail based on quality of life (QoL) criteria. AR severity is based on four QoL conditions including the level of sleep disturbance; impairment of daily activities, leisure, or sports; impairment of school or work; and troublesome symptoms and diagnosed as mild for patients with none of the conditions met or moderate-severe for patients suffering from one or more conditions. Moderate-severe AR is more prevalent in patients with persistent AR, though mild AR is more prevalent in patients with intermittent disease (Cuvillo et al., 2017). AR is considered serious if it is a “persistent allergic rhinitis” in that the symptoms occur “at least 4 days a week and over a period of at least 4 weeks” (Klimek et al., 2019).

The quality of life conditions associated with allergic rhinitis are represented with a visual analog scale (VAS) that measures the severity. Zero is the lowest score and reflects no quality of life affected by AR, and 10 is the highest score as every QoL condition is affected by AR. It works similarly to a pain scale with 0 as no pain experienced to 10 as worst pain imaginable. These values reflect patients with mild AR would have zero to four QoL conditions impacted out of the 10. Moderate AR would have between four and seven, and severe would be between seven to 10. Overall, the visual analog scale provides quality of life context with the delineation of the allergic rhinitis severity relationship.

### *Masks and allergic rhinitis*

Masks became more readily accessible post-pandemic. COVID-19 changed the lifestyle of the average adult population and how their allergic diseases are treated or addressed (Zhang, Lan, & Zhang, 2021). Previously, there was limited data on the effect of masks on allergic rhinitis symptoms (Gani et al., 2019). However, current studies show that masks decrease allergic rhinitis symptoms for multiple allergens. According to a study conducted in Israel on 1,824 nurses, Dror et al. found 16.5% of the nurses reported having dust-related AR symptoms. They also found for nurses with mild, moderate, or severe allergic rhinitis symptoms, wearing a surgical or KN95 mask demonstrated a mild decrease in allergic rhinitis symptoms. Lastly, they found the N95 masks alone resulted in a significant reduction of AR symptoms.

In another study from Mengi et al. (2022), the use of surgical masks was studied for pollen allergy patients symptomatic from March to April during COVID-19 with data collected in April of 2020.

Mengi et al. (2022) found 86% of surgical-mask wearers reduced their frequency of nasal (sneezing and nasal discharge) symptoms related to pollen allergy. Bergmann et al. (2021) focused on those with pollen allergies. Subjects were exposed to grass pollen for two hours—wearing no mask, a medical mask, or a Filtering Face Piece 2 (FFP2), and both masks had no significant differences and shared the avoidance of nasal and conjunctival symptoms. The literature suggests that masks decrease allergic rhinitis symptoms for pollen allergies.

Dubini et al. (2022) studied the effect of a mask on ragweed-related allergic rhinitis for patients from European countries in heavily populated ragweed areas (Eastern France, Northern Italy). Claiming to always use masks since the outbreak of the Coronavirus Disease 2019 (COVID-19), the self-reported burden of ragweed oculorhinitis decreased significantly and all nasal screening symptoms (sneezing, rhinorrhea, nasal obstruction, and nasal itching) improved significantly. No change was found for ocular symptoms (watering, itching, soreness) compared to the previous year. This is consistent with the function of the face masks to protect the airway from inspiratory particles and supports my thesis that masks decrease symptoms of allergic rhinitis. Although this evidence supports the reduction of allergic rhinitis symptoms from wearing a mask, it may not be the most reliable due to the political nature of the pandemic and mask-wearing.

Although the COVID-19 pandemic had conflicting views related to mask-wearing, there are possible additional health benefits to their usage besides prevention of COVID-19. Mask-usage may lower the exposure to inhaled airborne particles with the physical filtering out of allergens or air pollutants and humidification of the breathing (Choi et al., 2019). Masks block the allergen particles from entering the lungs of the person and reduce the amount that is inhaled. Decreasing the length of exposure to an allergen with a mask may decrease allergic rhinitis symptoms. Liccardi et al. (2021) found that the daily amount of outdoor mask use from self-reported allergic rhinitis participants during the COVID-19 pandemic was from one to ten hours.

Another benefit of wearing a mask is that it could help to avoid early and late phase AR. Early phase AR can occur within minutes of allergen exposure from antibodies that initiate inflammation. This induces sneezing, pruritus (itching), rhinorrhea (runny nose), and nasal congestion. Avoiding these irritating symptoms can improve the quality of life of students. Late phase AR begins at four hours and peaks six to twelve hours after exposure. Late phase AR induces one of the most irritating AR symptoms of nasal congestion due to the release of inflammatory agents. Other late AR symptoms are feeling tired, chronic viral infections, sniffing, eye rubbing, blinking, congested voice, snoring, or dark skin beneath the eyes called allergic shiners (Minor 2013). Conditions that may interfere with the effects of mask-wearing on allergic rhinitis symptoms are related to the environment.

### *Confounding factors*

Increasing time indoors and household ventilation are likely to be favorable in decreasing AR symptoms. The use of face masks and low air pollution emissions from the initial COVID-19 lockdowns in 2020 may have decreased symptom severity in patients with AR (Choi et al., 2019). The concurrence of pollen season and the beginning of the COVID-19 pandemic may have led people to spend less time outdoors and may have reduced allergic symptoms. Additionally, face masks may protect against allergens, yet few studies have examined their effect. Even though initial research finds dust allergy patients appear to benefit from mask usage, house dust mite (HDM) allergy patients being more confined to the home environment may have increased their

AR course (Gani et al., 2022). Health risks associated with mask-usage include a lowered absolute concentration of oxygen in the air under the masks compared to room air. There are also increases in heart rate, respiratory rate, and carbon dioxide (Kisielinski et al., 2021). This study will focus on the effect of masks related to the effect of ragweed-induced AR in college students.

### *Ragweed*

Ragweed pollen is the most important cause of allergic rhinitis and pollen asthma in North America. Specifically, *Ambrosia artemisiifolia* (short ragweed) and *Ambrosia trifida* (giant ragweed) are the most prevalent ragweed pollen allergens. The size of the pollen particles and route of exposure determines the manifestation of the allergic response. Basically, particles of less than seven micrometers can get into the airway and cause asthma or difficulty breathing. Lei & Grammer (2019) share that pollen grains are approximately sixteen to twenty micrometers in diameter and are notorious for triggering allergic symptoms in the central and eastern United States. In the United States, weed pollen is emitted in the morning during the autumn season based on seasonal variations in daylight. A single ragweed plant can expel one million pollen grains in one day (Baxi, 2010). According to Damialis et al. (2017), pollen can travel hundreds of miles from its source. In the Chicagoland area, where this study was conducted, ragweed pollen is prevalent from August to early November and varies based on the year. Ragweed counts are measured by the local pollen counts online. The adaption of a mask can help to target this issue.

## METHODS

### **Overview**

This study consisted of thirty college students aged 18 to 25 from Olivet Nazarene University and was approved by the Institutional Review Board. Participants suffered from allergic rhinitis of all types (allergic, nonallergic, localized). Participants were chosen by responding “yes” to the question: “During the fall of 2022, have you experienced rhinitis symptoms such as sneezing, rhinorrhea, nasal obstruction, and nasal itching that were unrelated to the common cold (fever, sore throat) or COVID-19?” Evidence of a positive test for at least one allergen specific IgE (antibody) was not required for participation but was asked after this question. These questions were sent via school-wide email and spread through flyers handed out in nursing classes and through the men and women’s soccer teams. The research question was as follows: is there a relationship between wearing a mask and experiencing allergic rhinitis symptoms (itchy, watery eyes, sneezing, runny nose, sore throat) related to ragweed for college students?

### **Participants**

The population of college students was chosen and involved thirty participants male or female ages ranged from 18 to 23 with a mean age of 21. College students were chosen because of the interference of allergic rhinitis with school performance by decreasing alertness and cognition (Patterson et al., 2014). Participants were recruited by flyers and a school-wide email that inquired if they had a diagnosis of allergic rhinitis or were experiencing symptoms currently (within the past six months). Participants were not told the purpose of the experiment to avoid confounding variables. The incentive for the participants was to be entered into a drawing for one of two \$50 Amazon gift cards. They were then told to report to Perry Farm Park on a day where they would walk around the park for an hour. Once they arrived at Perry Farm Park, they were given a surgical mask, KN95, or no mask and encouraged to write down their allergic symptoms as they walked around. They were randomly assigned to an experimental or control group for the purposes of the

study and did not know that there were two kinds of masks involved: KN95 mask and surgical mask.

Participants were informed of the risks associated with mask usage (Kisielinski et al., 2021). The consent form delineated the risks associated with mask wearing. Participants were advised to consult with a doctor if having health conditions such as asthma, migraines, pregnancy and more, and were encouraged to seek for further clarification. Participants were asked to not take allergy medication during the day(s) of the experiment, but this was not a requirement and was up to their own discretion. The participants avoidance of allergy medications was displayed in the results section to avoid confounding results. Participants were also requested to keep a diary of the day to document their allergic symptoms including the type of symptom, the time of their occurrence, their severity, how long they lasted, and the effect of the mask on their symptoms.

### **Design**

Participants wore two kinds of masks, a KN95 or a surgical mask, or no mask from one trip to Perry Farm Park in early November, which nears the end of the peak period for ragweed. The participants were divided in thirds, with two groups as the experimental groups, one group wearing a KN95 mask, another group wearing a surgical mask, and the third or control group wearing no mask on a day when ragweed was low because of lack of park availability. To control for placebo effect, the control group wore no mask to see the effect of the ragweed without an intervention. When they arrived, participants walked around Perry Farm Park for one hour in the morning, when ragweed is usually the highest (Lei & Grammer, 2019). However, on this day the overall ragweed count was low compared to higher ragweed count days. Participants arrived between 8 and 11 AM, checked in with me when they got there, received their KN95 or surgical mask, or none, and then walked around the park for an hour.

The first group came from 8 to 9 AM and wore the KN95 mask. The second group wearing the KN95 mask came from 10 to 11 to ensure that the initial group did not see them because their survey responses might be influenced by seeing or communicating with the other groups. Control group or no mask came between the two groups. Even though the groups came at different times, the experiment was completed in the morning hours, so the ragweed count did not vary significantly between the groups. Once the experience was complete, the groups checked out with me and took off their masks if desired. I sent them an email with the Survey Monkey to complete before midnight. Once they got home, they were encouraged to change their clothes and shower to remove allergens from their clothing to avoid further allergen exposure or stay inside for most of the day if possible or desired.

### **Survey**

Survey responses included how many hours each participant spent outside later and the possible symptoms they experienced. If they were not wearing a mask at that time, the responses monitored the effect their allergens might interfere with the results of the study. For instance, if they went outside again later and were exposed to their allergen again, they may report nasal congestion on their survey, which was not related to the Perry Farm Park experience. Participants were required to fill out a Survey Monkey on their phone about their symptoms before the end of the day at 11:59 PM.

## Data collection

The questionnaire was modified from one developed and vetted by a team experienced in allergic rhinitis research for another mask study (Mengi et al., 2022). My survey questions included a Survey Monkey, located at the bottom of Appendix A. The questionnaire measured the effect of masks on allergic rhinitis symptoms related to ragweed and the relationship between wearing a mask and experiencing AR symptoms. The summary below is indicative of the future implications of the research. The data warranted studying the effect of early and late allergic rhinitis further. Data was on a personal computer that is password protected in a folder that encrypts with another password for confidentiality purposes.

## RESULTS

Statistical analysis did not quantify the preliminary data due to the limited number of participants, although the data can serve as an outline for future research. The Perry Farm Park trip had ten participants for each group of control, surgical-mask wearers, and KN95. Four participants (one in the control group, two in the surgical group, and one in the KN95) usually took daily allergy medication, and all decided to skip their medication on the day of the experiment. Most surgical mask-wearer results were trending with the hypothesis; this group will be the focus of the discussion. It is crucial to notice that the surgical mask group may have received better results because they came later in the morning when the severity of ragweed had lessened. The KN95 group may not have seen a significant decrease in allergic rhinitis symptoms because they came earlier in the morning and may have endured higher ragweed counts. The tables below summarize the surgical mask participants, KN95, and control study data. The first table discusses the nasal symptoms before and after Perry Farm Park. The second describes the perceived effect of mask usage and the likelihood the individual would wear them in the future.

Table 1: Nasal symptoms before and after Perry Farm Park

	Surgical mask	KN95	Control or no mask
Nasal symptoms experienced during Perry Farm Park	No nasal symptoms (5/10)	No nasal symptoms (2/10)	No nasal symptoms (5/10)
	Mild nasal symptoms (5/10)	Mild nasal symptoms (8/10)	Mild nasal symptoms (5/10)
Nasal symptoms experienced after Perry Farm Park	No nasal symptoms (7/10)	No nasal symptoms (3/10)	No nasal symptoms (5/10)
	Mild nasal symptoms (3/10)	Mild nasal symptoms (4/10)	Mild nasal symptoms (5/10)
		Moderate nasal symptoms (3/10)	



Table 2: Perceived effect of masks and future likelihood of use

	Surgical Mask	KN95
Perceived effect of mask during experience	<p>Made no difference (1/10)</p> <p>Mask helped a little (2/10)</p> <p>Mask helped moderately (6/10)</p> <p>Mask helped a lot (1/10)</p>	<p>Made no difference (5/10)</p> <p>Mask helped a little (5/10)</p> <p>Mask helped moderately (0/10)</p> <p>Mask helped a lot (0/10)</p>
Likelihood to wear mask in future	<p>Very unlikely (1/10)</p> <p>Unlikely (2/10)</p> <p>Neither likely nor unlikely (0/10)</p> <p>Likely (7/10)</p>	<p>Very unlikely (2/10)</p> <p>Unlikely (5/10)</p> <p>Neither likely nor unlikely (3/10)</p> <p>Likely (0/10)</p>

## DISCUSSION

Overall, nasal symptoms experienced during and after the experience was trending to imply that there may be a relationship between wearing a surgical mask and reducing nasal symptoms during and after exposure to a low pollen count. Due to the limited number of participants, statistical values were underdefined for nasal symptoms experienced during the Perry Farm Park experience. Statistical significance was unquantified in the number and severity of nasal symptoms experienced after the visit to Perry Farm Park or the late allergic rhinitis.

Other research supports the trend in reducing nasal symptoms related to mask-wearing. Dubini et al.'s 2022 study aligns with the nasal symptom-reducing effect from wearing a surgical or KN95 mask. Bergmann et al.'s 2021 study supported the findings by focusing on those with pollen allergies wearing a medical mask or a Filtering Face Piece 2 (FFP2), and both masks shared the avoidance of nasal and conjunctival symptoms. Dror et al. (2020) found KN95 respirators provided no additional reductions in allergic rhinitis symptoms over standard surgical masks.

Another category studied was the perceived effect of the mask on symptoms experienced during the Perry Farm Park experience. Most surgical mask-wearers felt their mask helped a little or reduced at least one symptom during the experience. However, most KN95 mask-users felt the masks made no difference to their allergic symptoms after the experience, which is unclear. The participants assigned to the KN95 group may not have had as severe allergic rhinitis as the surgical mask wearers or may have been uncomfortable wearing them. The relationship between late allergic rhinitis and experiencing nasal or ocular symptoms and their degrees of severity was considered, but further research and analysis is necessary. Most surgical mask-wearers reported being likely to wear the mask in the future to prevent allergic rhinitis. Additional data found the most disturbing symptom overall for the KN95, surgical, and control groups to be nasal-related.

Statistical analysis ceased to quantify due to the limited number of participants and the low ragweed count on the day of data collection. However, the surgical mask-wearers still appeared to trend with the hypothesis. Another study on a day with a high ragweed count and an ampler number

of participants may reflect the decrease in allergic rhinitis symptoms associated with mask usage. However, high ragweed counts might overcome preventive measures, so a mask designed for high ragweed days could be beneficial. A future study would benefit from surgical and KN95 mask-wearers completing the experiment simultaneously to prevent the groups from having different pollen exposures due to pollen being more prevalent in the morning. It would also benefit future research to examine the relationship between early and late allergic rhinitis.

Overall, the relationship between mask-wearing and experiencing allergic rhinitis symptoms associated to ragweed for college students was inconclusive, but the surgical-mask data was trending with the hypothesis. Some additional questions for further consideration or future studies would entail: Are masks helpful or harmful in promoting an improved quality of life through symptom reduction for college students with allergic rhinitis? Can masks relieve aggravating allergic rhinitis symptoms when engaging college activities outside? Lastly, do masks provide a similar extent of symptom reduction with the participants wearing masks during the high ragweed count as previous studies? Therefore, further research is necessary to determine if masks influence late allergic rhinitis, decrease allergic rhinitis symptoms, and their influence on quality of life.

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## APPENDIX A

### Survey Questions

- Question 1: Age?
    - 18
    - 19
    - 20
    - 21
    - 22
    - 23
    - 24
    - Other: please specify \_\_\_\_
  - Question 2: Gender?
    - Male
    - Female
    - Other: \_\_\_\_
  - Question 3: Do you receive medical treatment for your allergic symptoms?
    - Yes
    - No
  - Question 4: If yes to the previous question, did you take your allergy medication today and if so, what times of the day is it active (for this day)? Please include the number of hours that it is active in the spaces below. If no, please respond no in the space below.
    - No
    - Morning (0600-1159); \_\_\_\_
    - Afternoon (1200-1759); \_\_\_\_
    - Night (1800-2359); \_\_\_\_
    - Other: \_\_\_\_
  - Question 5: How would you describe your allergic nasal symptoms during this experience (the time spent at Perry Farm Park)? Please indicate the number of symptoms as well.
    - No nasal symptoms
    - Mild or class I nasal symptoms (runny nose and sneezing); \_\_\_\_
    - Moderate or class II nasal symptoms (more severe runny nose and sneezing); \_\_\_\_
    - Moderate, persistent or class III nasal symptoms (constant nasal stuffiness that is severe and limits the ability to do daily activities); \_\_\_\_
    - Moderate-severe, persistent, or severe-persistent, class IV nasal symptoms (severe ongoing nasal stuffiness, congestion, sinus drainage); \_\_\_\_
  - Question 6: How would you describe your allergic nasal symptoms after the time spent at Perry Farm Park? Please indicate the number of symptoms as well.
    - No nasal symptoms
    - Mild or class I nasal symptoms (runny nose and sneezing); \_\_\_\_
    - Moderate or class II nasal symptoms (more severe runny nose and sneezing); \_\_\_\_
    - Moderate, persistent or <sup>1</sup>class III nasal symptoms (constant nasal stuffiness that is severe and limits the ability to do daily activities); \_\_\_\_
-

- Moderate-severe, persistent, or severe-persistent, class IV nasal symptoms (severe ongoing nasal stuffiness, congestion, sinus drainage);\_\_\_
- Question 7: How would you describe your allergic eye symptoms during this experience (the time spent at Perry Farm Park)? Please indicate the number of symptoms as well.
  - No eye symptoms
  - Mild or class I eyes symptoms (itchy, watery eyes);\_\_\_
  - Moderate or class II eye symptoms (more severe watery eyes);\_\_\_
  - Moderate, persistent or class III eye symptoms (severe watery eyes and limits the ability to do daily activities);\_\_\_
  - Moderate-severe, persistent, or severe-persistent, class IV eye symptoms (severe sinus drainage impairing eyesight);\_\_\_
- Question 8: How would you describe your allergic eye symptoms after the time spent at Perry Farm Park? Please indicate the number of symptoms as well.
  - No eye symptoms
  - Mild or class I eyes symptoms (itchy, watery eyes);\_\_\_
  - Moderate or class II eye symptoms (more severe watery eyes);\_\_\_
  - Moderate, persistent or class III eye symptoms (severe watery eyes and limits the ability to do daily activities);\_\_\_
  - Moderate-severe, persistent, or severe-persistent, class IV, persistent eye symptoms (severe sinus drainage impairing eyesight);\_\_\_
- Question 9: What was your most disturbing allergic symptom during this experience (the time spent at Perry Farm Park)?
  - Nasal;\_\_\_
  - Eye;\_\_\_
  - None;\_\_\_
  - Other: please specify\_\_\_
- Question 10: What was your most disturbing allergic symptom after the time spent at Perry Farm Park and at what time did this occur?
  - Nasal: time occurred\_\_\_
  - Eye: time occurred\_\_\_
  - None
  - Other: please specify\_\_\_; hour of day it occurred\_\_\_
- Question 11: How did the mask affect your allergic symptoms during the time spent at Perry Farm Park?
  - Eliminated symptoms
  - Partially eliminated symptoms
  - No change in symptoms
  - Other: please specify\_\_\_
- Question 12: How did the mask affect your allergic symptoms after the time spent at Perry Farm Park experience?
  - Eliminated symptoms
  - Partially eliminated symptoms
  - No change in symptoms
  - Other: please specify\_\_\_
- Question 13: How would you describe the relationship of the mask to the allergy symptoms you experienced this day?

- Made no difference
- Helped a little (reduced at least one symptom)
- Helped moderately (reduced 1-2 symptoms)
- Helped a lot (reduced 3+ symptoms)
- Completely eliminated
- Question 14: How likely are you to wear a mask while outdoors in the future to prevent allergy symptoms?
  - Never
  - Not likely
  - Likely
  - Very likely
- Question 15: After going to Perry Farm Park, if you went outside, did you wear a mask? Insert the amount of time in hours you were outside in the blank space please.
  - No, I did not go outside
  - No, I did not wear a mask outside; \_\_\_\_\_
  - Yes, I wore a mask outside; \_\_\_\_\_
- Question 16: If you answered yes to going outside whether wearing a mask or not, how were your eye symptoms being outside after Perry Farm Park with/without a mask? Please indicate the number of symptoms as well. If you did not go outside, please choose not applicable.
  - Not applicable
  - No eye symptoms
  - Mild or class I eyes symptoms (itchy, watery eyes, ); \_\_\_\_\_
  - Moderate or class II eye symptoms (more severe watery eyes); \_\_\_\_\_
  - Moderate, persistent or class III eye symptoms (severe watery eyes and limits the ability to do daily activities); \_\_\_\_\_
  - Moderate-severe, persistent, or severe-persistent, class IV, persistent eye symptoms (severe sinus drainage impairing eyesight); \_\_\_\_\_
- Question 17: If you answered yes to going outside whether wearing a mask or not, how were your nasal symptoms being outside after Perry Farm Park with/without a mask? Please indicate the number of symptoms as well. If you did not go outside, please choose not applicable.
  - Not applicable
  - Mild or class I nasal symptoms (runny nose and sneezing); \_\_\_\_\_
  - Moderate or class II nasal symptoms (more severe runny nose and sneezing); \_\_\_\_\_
  - Moderate, persistent or class III nasal symptoms (constant nasal stuffiness that is severe and limits the ability to do daily activities); \_\_\_\_\_
  - Moderate-severe, persistent, or severe-persistent, class IV nasal symptoms (severe ongoing nasal stuffiness, congestion, sinus drainage); \_\_\_\_\_
- Question 18: Is there anything else you would like to add? Include empty space for response.