Vermont Mask Survey

Final Report

May, 2021

(Revised January, 2022)

"First, Do No Harm."

Hippocratic Oath

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CONTENTS

SUMMARY

The Vermont Mask Survey was created to gather information about the negative health effects Vermonters are experiencing as a result of wearing masks.

Public officials began mandating the use of face masks in community settings in the spring of 2020 in response to COVID-19. However, research on the effects of mandating masks among the general public had only just begun.(1) While protections for workers who wear face masks for respiratory protection in industrial settings and medical fields have been in place for decades, protections for average citizens are nonexistent. The Vermont Mask Survey (VMS) is an initial contribution to these efforts.

The purpose of the VMS is to gather evidence of the negative mental, social, and physical impacts Vermonters are experiencing as a result of wearing face masks. It is not a poll, and is not gathering opinions. It has a specified target population: people who are experiencing the expected harms. Being a small sample, this survey is not intended to produce a statistical analysis, and more work needs to be done if the magnitude of the problem is to be fully understood.

Advertising for the survey was done primarily through posters on bulletin boards throughout the state (<100 posters total), which referred people to the website where the survey form could be found. Participants completed surveys by printing and mailing them, or emailing electronic versions. The process of responding intentionally required a number of steps in order to better ensure respondent authenticity. The author avoided using online survey services in order to decrease the quantity and increase the quality of responses.

The survey asked how often respondents experienced the following 7 difficulties:

1. Headaches
2. Difficulty Breathing
3. Skin Irritation
4. Difficulty Communicating Clearly
5. Physical Discomfort
6. Mental/Emotional Discomfort
7. Difficulty cleaning your hands every time you touch your mask

The list of 7 difficulties was based on the World Health Organization's list of "likely disadvantages" community members would experience if required to wear masks.(1-p. 8)

Validity:

The results of The Vermont Mask Survey (VMS) are validated by several factors. First of all, research suggests that small samples can be accurate representations of the larger population.(2) Though small, the VMS captured testimony from a broad range of settings and demographics, including many of the specific populations likely to be affected most. Decades of research exist documenting the effects of

mask use on the human body and how factors such as prolonged use and specific pre-existing conditions can worsen the effects. Nearly all of the special conditions described in the research were represented in this survey's results. The results also closely match the findings in the existing and emerging research in terms of the symptoms experienced.

While small, the number of responses was in line with expectations, since most direct-delivery surveys can expect a response rate of about 33%.(3) The VMS relied upon a poster campaign, therefore a response rate of around one response per poster seems appropriate. Small sample surveys can have important impacts. For example, a United Kingdom survey of 83 healthcare professionals with hearing impairment helped spur a parliamentary investigation into the effects of the corona virus response on people with disabilities.(4)(5)

The results of the VMS are also validated by their similarity to other surveys of mask use conducted in 2020, such as a survey of over 20,000 parents in Germany in the fall.(6) Two Vermont surveys were conducted over the spring and summer: the Vermont *No Mask Petition* received thousands of responses, and the Vermont Department of Health (VDH) online survey received over 600 responses. (7)(8) These Vermont surveys also received comments about the negative health effects, including the complication of pre-existing conditions, and the necessity of wearing them for employment, further confirming the experiences described by participants in the VMS.

Key Results:

From July, 2020 through April, 2021, the Vermont Mask Survey (VMS) received 82 responses from seven Vermont counties. Testimony was gathered from a diverse range of populations, including: people with pre-existing health conditions, elders, pregnant and menopausal women, and working people.

The survey discovered that among respondents who experience difficulties ***every time*** they wear a mask: most experience multiple difficulties every time; pre-existing conditions are worsening; and several are not accessing essential services because they cannot wear a mask. People with hearing loss are unable to communicate with others, and healthcare patients are required to wear them even if they have an oxygen requirement. The most common problem was *Difficulty Breathing*. *Difficulty Communicating*, *Mental/Emotional Discomfort*, and *Physical Discomfort* were the second and third most common. Only one respondent reported ***never*** having Difficulty Cleaning Hands.

Over half of respondents who experience difficulties ***every time*** are required to wear a mask by their employers, and most of them reported working an average of 4 - 5 days per week and between 5 - 8+ hours each day. A health care and construction worker both described their employers' use of disciplinary measures, (i.e. discipline and fines,) in order to achieve mask compliance. The survey also uncovered supply problems for those in construction who can no longer acquire the respiratory protection their work requires. Existing research specifically warns against the use of masks during pregnancy, yet one respondent reported she is required to wear a mask continually at work and has observed her blood oxygen levels dropping as a result.(9)

As the mandates and emergency use orders shift over time, those who are most vulnerable to complications from masks may still be required to wear them, or may continue to wear them due to conditioning. Greater awareness of the difficulties of wearing masks is needed if we are going to be able to address the harms and put the proper protections in place.

While the true extent of the health dangers and long-term consequences community members are facing is unknown, these survey results suggest that caution around their use is warranted, and more research needs to be done to assess and address the short and long term health implications.

INTRODUCTION

Historical Perspective:

"A major variant is the single-use, or disposable, dust respirator shown in typical use in Fig. 5-13. .. This class of respirator accounts for as much as 90% of total sales."

- A Guide to Industrial Respiratory Protection by John A. Pritchard (10)

Figure 5-13.
Typical single use dust respirators.

The negative health effects of wearing masks experienced by workers in industrial and health care settings has been the subject of research for decades. Since 1971 Federal regulations have been in place to protect the health of employees required to wear respiratory protection in occupational settings, including dust masks and half-face masks such as are being recommended currently in response to COVID-19.(11, 12)

In 1961 The British Occupational Hygiene Society and the Ergonomics Research Society held proceedings to gather and review the design and use of respirators used against dust and toxic vapors. 16 papers were presented and discussed by the 89 participants. "From the discussions it was clear that modern filters and absorbers are remarkably effective, but it was equally clear that the main limitations of a respirator are facepiece leakage, resistance to breathing, poor speech and vision, and discomfort…"(13)

In 1976 John A. Pritchard of the Los Alamos Scientific Laboratory wrote A Guide to Industrial Respiratory Protection. This guidebook was written for use primarily by occupational safety and health professionals, and was supported by the U.S. Department of Health, Public Health Service, The U.S. Centers for Disease Control and Prevention (CDC), and the Occupational Safety and Health Administration (OSHA).(10)

The guide gives a detailed overview of the respiratory system, including the mechanics of biology and breathing. "Because of its critical relationship to the immediate functioning of the body, the respiratory system demands the utmost protection and care." The author notes that this is the reason respirators have always been designed for the lowest breathing resistance possible, due to the negative health effects restricted breathing can cause. Every cell in the body requires a constant, fresh supply of oxygen in order to burn the fuel (glucose) it needs to live and function. The brain is particularly susceptible to damage due to oxygen deprivation.(10, p. 9, 11)

Pritchard recommends that respirators used on the job site be periodically inspected, and wearers should be consulted about: discomfort, resistance to breathing, fatigue, interference with vision or communications, interference with job performance, and confidence in the respirator. "Problems discovered during the random inspections must be rectified."(p. 59) On page 87 the book lists OSHA rule 1910.134 and Section 3.7 of ANSI Z88.2: "[N]o one should be assigned to tasks requiring the use of respirators unless he has been found physically able to do the work while wearing a respirator." Pritchard goes on to summarize: "The results of periodic inspections of respirator use, consultations with wearers, measurements of hazard levels in work areas, and medical surveillance of wearers should be reviewed, studied, and analyzed to determine the effectiveness of the respirator program."(10)

Biology:

In the 1976 guidebook, Pritchard notes that the body cannot store oxygen, and our lungs must be able to constantly make efficient, rapid exchanges of fresh oxygen (O2) with the waste product, carbon dioxide (CO2). Each breath brings "approximately 500 milliliters (ml) of air into the lungs. However, only about 350 ml of the fresh air reaches the alveoli [where the exchange of O2 and CO2 takes place] because the first air that reaches them is the old air left in the respiratory tract at the end of the previous exhalation… Increasing the dead space volume, as by wearing a respirator, may have important consequences."(10, p. 12)

Even though they have been designed for optimal airflow and comfort, N95's restrict airflow by 37%. (14)

A pilot study on the effects of wearing N95 and surgical masks found that changes in the nasal passages as a result of wearing the masks persisted for over an hour afterwards:

"*Wearing N95 respirator and surgical facemask would increase the breathing resistance due to the presence of extra layer through the breathing path. An increase of mean resistance during 1.5 hours post mask-wearing period was identified in both sessions, indicating potential change of the upper airway conditions."*(15, p. 99)

Another pilot study on the effects of long-duration wearing of masks by health care workers measured the O2 and CO2 levels inside an N95 after 1 hour of realistic work rates (walking on a treadmill) and found that the available air under the respirator contained levels below, and above, the workplace standards set by OSHA.(16)

According to the OSHA standards, less than 19.5% of O2 is considered oxygen deficient, and more than 0.5% CO2 is considered abnormal. The pilot study found the air under the respirators contained only 16.6% O2, and CO2 levels were 2.9%. The authors note that OSHA standards apply to the available air in the environment, not the air under the mask. They continue:

"*Nonetheless, breathing-environment CO2 greater than 3% has been associated with detrimental physiological effects, and prolonged breathing of CO2 at greater than the atmospheric level can cause*

symptoms (eg, headache, anxiety, confusion) and the additional physiological stress of compensatory mechanisms."(16-p. 575)

A Guide to Industrial Respiratory Protection
Chart of CO2 limits (10, p. 107)

(c) During the testing required by paragraphs (a) and (b) of this section, the concentration of carbon dioxide in inspired gas at the mouth will be continuously recorded, and the maximum average concentration during the inhalation portion of the breathing cycle shall not exceed the following limits:

Where the service time is:	Maximum allowable average concentration of carbon dioxide in inspired air, percent by volume
Not more than 30 minutes	2.5
1 hour	2.0
2 hours	1.5
3 hours	1.0
4 hours	1.0

Due to the breathing resistance, the dead-air volume in the lungs, dangerously high CO2 levels and a 16.6% O2 level under the mask, there is going to be less O2 and more CO2 building up inside the lungs. Pritchard warns that many of the early symptoms of oxygen deprivation may not be noticeable:

A Guide to Industrial Respiratory Protection
Chart of oxygen deficiency symptoms (10, p. 17)

EFFECTS OF OXYGEN DEFICIENCY

O_2 Vol % At Sea Level	Physiological Effect
16-12	Increased breathing volume, Accelerated heartbeat, Impaired attention and thinking, Impaired coordination.
14-10	Very faulty judgment, Very poor muscular coordination Muscular exertion causes rapid fatigue that may cause permanent heart damage, Intermittent respiration.
10-6	Nausea, Vomiting, Inability to perform vigorous movement, or loss of all movement, Unconsciousness, followed by death.
Less than 6	Spasmatic breathing, Convulsive movements, Death in minutes.

The beginning stages of O2 deprivation are often not detectable, either. Our blood levels of O2 and CO2 do not usually change, even when we engage in physical activity which requires increased exchanges of those gases in order to fuel our muscles. This is why blood levels of O2 and CO2 are not an indicator of oxygen deprivation at a cellular level.(10-p.12) For example, a study of nurses in 2013

found that: "Although physiologic measures of heart rate, O2, and CO2 did not reflect a difficulty with gas exchange, nurses reported feeling more short of breath the longer they wore respiratory protection."(17, p. 1221)

The first randomized cross-over study assessing the effects of surgical masks and N95 masks on cardiopulmonary and cardiac capacity of healthy adults was published in December, 2020, in the midst of COVID-19 mask mandates.(18) The authors note:

"From our data, we conclude that wearing a medical face mask has a significant impact on pulmonary parameters both at rest and during maximal exercise in healthy adults…. Increased breathing resistance [caused by surgical and N95 masks] requires more work of the respiratory muscles... leading to higher oxygen consumption."(18-p. 1528)

The authors also note that their study was conducted on young, healthy volunteers, and "the impairment is likely to be significantly greater, e.g., in patients with obstructive pulmonary diseases." As face masks are being encouraged for use among the general public, the study's authors warn:

"Medical face masks have a marked negative impact on cardiopulmonary capacity that significantly impair strenuous physical and occupational activities. In addition, medical masks significantly impair the quality of life of their wearer. These effects have to be considered versus the potential protective effects of face masks on viral transmission."(18, p. 1529)

Exertion:

A Guide to Industrial Respiratory Protection
Table 3- Rates of air flow by exertion level (10-p. 13)

TABLE 3-1

MINUTE VOLUME AIR FLOW RATES

Activity	Minute Volume (lpm)
Sleep	6.0
Rest	9.3
Light work	19.7
Medium work	29.2
Med heavy work	40
Heavy work	59.5
Maximum work	132.0

13

The resistance caused by wearing a face mask automatically causes respiratory muscles to work harder. As our respiratory muscles work harder, we need more oxygen to supply them. As the work rate increases, so does the respiration rate and volume, further increasing our body's need to bring in oxygen (O2) and expel carbon dioxide (CO2). As our muscles require more O2, less and less of it

becomes available under the mask. Any additional exertion (stress, thermal regulation, etc…) will also increase the need for O2.(10-p. 13)

A 1991 study found that the subjects consumed 10% more oxygen if they wore a disposable dust mask while riding a bicycle. While the subjects were able to complete cognitive (thinking) tasks, the respirators did "significantly" affect their performance of physical tasks, such as accuracy of movement and steadiness.(19)

A study of 10 healthy men conducted in 2010 titled *The Physiological Cost of Wearing a Disposable Respirator* found that breathing resistance, heart rate, blood pressure, and temperature of the face all changed during respirator use (3M Model 8715). They concluded that "The use of a disposable respirator is associated with significant physiological costs, especially at moderate and heavy work loads."(20)

In 2018 a study was done examining the effects of wearing a surgical mask while walking 6 miles. While the walking distance was not affected by wearing the mask, the authors noted that participants experienced dyspnea.(21) *Dyspnea*, or shortness of breath, is "often described as an intense tightening in the chest, air hunger, difficulty breathing, breathlessness or a feeling of suffocation."(22)

Concern about exertion and exercise while wearing masks has grown over the past year, as these authors of the article *Exercise with facemask; Are we handling a devil's sword? – A physiological hypothesis* explain:

> *"Exercising with facemasks may reduce available Oxygen and increase air trapping preventing substantial carbon dioxide exchange. The hypercapnic hypoxia may potentially increase acidic environment, cardiac overload, anaerobic metabolism and renal overload, which may substantially aggravate the underlying pathology of established chronic diseases. Further contrary to the earlier thought, no evidence exists to claim the facemasks during exercise offer additional protection from the droplet transfer of the virus."*(23)

Health Care Workers

Most of the research on the health risks of wearing masks has focused on health care professionals and their use of personal protective equipment (PPE). The discomfort, health risks, and effects on performance associated with the use of masks in health care settings is well known. In the spring of 2020, researchers were still trying to assess if the benefits of wearing masks in the health care field outweighed the costs, and were treating their use with caution.(1, 24)

According to the World Health Organization (WHO):

> *"The potential harms and risks of mask and respirator use in the health facility setting include:*
>
> - *contamination of the mask due to its manipulation by contaminated hands (53, 54);*

- *potential self-contamination that can occur if medical masks are not changed when wet, soiled or damaged; or by frequent touching/adjusting when worn for prolonged periods (55);*
- *possible development of facial skin lesions, irritant dermatitis or worsening acne, when used frequently for long hours (56-58);*
- *discomfort, facial temperature changes and headaches from mask wearing"*

(Citations refer to the WHO document)(25)

Among surgeons working in air-conditioned operating rooms "...it is known that heat and moisture trapping occur beneath surgical masks..." and that this can affect their performance.(26, p. 122) There is also concern that surgeons may be experiencing induced deoxygenation when wearing surgical masks during surgery.(26) For this and other reasons, masks with low air-flow resistance which allow surgeons to "breath freely," are recommended.(27)

In their study titled *Preliminary report on surgical mask induced deoxygenation during major surgery*, published in 2008, the authors describe their findings and suggest that age may play a factor:

*"This study was undertaken to evaluate whether the surgeons' oxygen saturation of hemoglobin was affected by the surgical mask or not during major operations… Our study revealed a decrease in the oxygen saturation of arterial pulsations (SpO2) and a slight increase in pulse rates compared to preoperative values in all surgeon groups. The decrease w*as *more prominent in the surgeons aged over 35…."*(26-p. 121)

Proper mask hygiene is crucial if masks are not going to become sources of contamination, and proper training is essential. For example, surgical masks worn during surgical procedures are known sources of contamination, and there is concern that surgeons are not always following the proper procedures, including re-use of masks.(28) "People often tend to skip steps in daily routines, even in important fields such as surgery."(27) Prolonged use of medical masks increases the amount of respiratory viruses found on them.(29)

In a 2013 study on mask compliance among intensive care nurses, researchers studied the effects of N95's on ten "healthy subjects." After excluding individuals for a variety of physical and psychological factors (such as history of smoking, heart disease, or claustrophobia), one out of the ten "healthy subjects" "withdrew because of unwillingness to continue wearing the respiratory protection; this subject wore it for approximately 30 minutes before withdrawing from the study."(17)

Of the remaining nine subjects, "...symptoms related to wearing an N95 included nausea, headache, light headedness, visual difficulties, shortness of breath, palpitations, confusion, and difficulty communicating." The number of times participants removed their masks was measured, and reasons for removal included comments such as: "It is getting hard to breathe," "[the N95] is uncomfortable," and "I can't breathe."

Mask-induced headaches have been linked to a lack of oxygen in studies of health care workers. "The etiopathogenesis of N95 face-mask-associated headaches could possibly be related to hypoxemia

[abnormally low concentration of O2 in the blood], hypercapnia [an abnormal build-up of CO2 in the blood], mechanical factors or the stress associated with its use."(30-p. 201)

According to a 2020 study titled *The Physiological Burden of Prolonged PPE Use on Healthcare Workers during Long Shifts*, other health complications associated with increased CO2 include:

"*Nervous system changes (e.g., increased pain threshold, reduction in cognition – altered judgment, decreased situational awareness, difficulty coordinating sensory or cognitive abilities and motor activity, decreased visual acuity, widespread activation of the sympathetic nervous system that can oppose the direct effects of CO2 on the heart and blood vessels).*"(31)

Aside from physical discomfort for the wearer, masks have been shown to impact doctor/patient relations, leading to a sense of less empathy and connection. As the authors of a randomized controlled study concluded in 2013:

"This study demonstrates that when doctors wearing a facemask during consultations, this has a significant negative impact on the patient's perceived empathy and diminish the positive effects of relational continuity. Consideration should be taken in planning appropriate use of facemasks in infectious disease policy for primary care and other healthcare professionals at a national, local or practice level."

- Effects of facemasks on empathy and relational continuity: a randomised controlled trial in primary care (32)

In 2018 The Ontario Nurses' Association of Canada won its lawsuit against St. Michael's Hospital and The Ontario Hospital Association. (While the case was successful, parts of this initial decision were later overturned on appeal.) The Nurses' Association filed the lawsuit to address the Hospitals' "Vaccine or Mask" (VOM) policy, which required staff to wear a mask at all times if they declined to receive the annual influenza vaccine. The arbitrator states: "I conclude that the Policy operates to coerce influenza immunization." Later in the decision, he continues:

"*Although challenged, the evidence was largely uncontradicted that wearing surgical and procedural masks over the course of an entire shift day in and day out for weeks and months on end was extremely uncomfortable for the nurse and problematic for patient care, a point established in the evidence of two long-service nurses. They testified about adverse reactions to the vaccine, the discomfort they experienced from wearing masks for prolonged periods, that wearing the masks attracted negative attention, that it seemed like a punishment for not being vaccinated, that it disturbed patients who were concerned whether they – the HCWs – were infectious, and that it frequently interfered with their care.*"(33)

- William Kaplan, Sole Arbitrator

The body of research documenting the harms healthcare workers experience when wearing respiratory protection can be used to inform us about the potential effects masks may have when used in community settings. However, community settings are not kept as sterile as medical facilities. Also, health care professionals are not representative of the general population. People who work in the health care field are adults and their jobs require that they are functionally able-bodied. Many of

the studies cited above included young (under 50 years old), "healthy subjects" and excluded subjects with pre-existing health conditions such as pregnancy, heart problems, obesity, and being a current or previous smoker.(20, 31)

The general public is made up of people of all ages, sizes, and health conditions. While N-95's and surgical masks have been the subject of evaluation and study for decades, the safety and effectiveness of paper and cloth "face masks" used in community settings has not yet been determined, as explained in the next section.

Definitions:
FFR's, Surgical Masks, and *Face Masks*

> *"Non-medical masks are not considered appropriate for protection of health workers when working in patient care areas or caring for patients. Material thickness and weaving standards vary widely; hence, the barrier (filtration efficiency) against microorganisms passing through the fabric is unknown. In addition, non-medical masks are often designed with multiple layers of hydrophilic materials such as cotton, and thus may retain moisture, become contaminated and act as a potential source of infection to a wearer. Although current recommendations advise the use of synthetic, hydrophobic materials on the outer layer, the overall use of non-medical masks is for source control purposes.* ***There is no current evidence to show that these masks perform adequately or consistently as PPE."***
>
> - WHO December Interim Report, *Mask use in the context of COVID-19* (25, p. 13-14)

The term **respirator** describes a device used to protect the respiratory system, and there are many types.(10) **Medical masks** such as *FFR's* and *surgical masks* are examples of respirators which have been approved for use in healthcare settings. As described in the previous chapter, their effectiveness and safety has been debated for decades. *Face masks* are a new type of **non-medical mask**, and are not appropriate for medical settings. Face masks not considered respirators, but are recommended by authorities for use in community settings in response to COVID-19 in order to protect supplies of approved medical masks for those who need them most.(25-p. 4)

> *"We did not consider the use of respirators in the community. Respirators are tight-fitting masks that can protect the wearer from fine particles and should provide better protection against influenza virus exposures when properly worn because of higher filtration efficiency. However, respirators, such as N95 and P2 masks, work best when they are fit-tested, and these masks will be in limited supply during the next pandemic. These specialist devices should be reserved for use in healthcare settings or in special subpopulations such as immunocompromised persons in the community, first responders, and those performing other critical community functions, as supplies permit."*
>
> - CDC *Nonpharmaceutical Measures for Pandemic Influenza in Nonhealthcare Settings—Personal Protective and Environmental Measures* (34)

Following are the definitions and uses of the most common types of masks:

MEDICAL MASKS:

Filtering Facepiece Respirators (FFR): Certified FFR's, such as N95's, can filter about 95% of airborne particles larger than 0.075 micrometers because of their tight fit and filtration capacity, thereby protecting the wearer. FFR's meet minimum safety and quality performance standards. Proper fit-testing and training are crucial to their effectiveness. Any factor that causes leakage, such as facial hair or poor fit, will greatly decrease their effectiveness.(35, 36)

Surgical Masks: Surgical masks are appropriate protection against splashing and large droplets.(34, p. 2) Surgical masks protect against "splashes and sprays" and "may also be worn to contain the wearer's respiratory droplets" larger than 3 micrometers. They are used when in close contact with openings in the body, such as while performing surgery or dental procedures. However, they "will not protect the wearer against airborne transmissible infectious agents due to loose fit and lack of seal or inadequate filtration."(35, p. 42)

NON-MEDICAL MASKS:

Face Masks: "Face mask" refers to any mask that covers the user's nose and mouth that is not medically approved, such as a cloth or paper mask. These have never been approved for medical purposes before, and have only been approved for use in community settings under the U.S. Food and Drug Association (FDA) COVID-19 Emergency Use Authorization (EUA) in response to COVID-19. The FDA temporarily approved the use of face masks in community settings in order to free up supplies of medical masks for those who need them most.(36)

Face masks are not approved for medical use because they have not been found to be effective in preventing flu-like viruses, and are a source of contamination due to the moisture retention, reuse, and poor filtration.(37) The breathability and safety of the various kinds of masks being worn under the FDA EUA is unknown.(1, 24)

According to the FDA's EUA: "face masks... may or may not meet fluid barrier or filtration efficiency levels... Coth face coverings should NOT be worn instead of a respirator or surgical mask if more than source control is needed."(35, p. 2)

> *"WHO is collaborating with research and development partners and the scientific community engaged in textile engineering and fabric design to facilitate a better understanding of the effectiveness and efficiency of non- medical masks. WHO urges countries that have issued recommendations on the use of both medical and non- medical masks by healthy people in community settings to conduct research on this important topic. Such research needs to look at whether SARS-CoV-2 particles can be expelled through non-medical masks of poor quality worn by a person with symptoms of COVID-19 while that person is coughing, sneezing or speaking. Research is also needed on non-medical mask use by children and other medically challenging persons and settings as mentioned above."*
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> - WHO December Interim Report, *Mask use in the context of COVID-19* (25-p. 10)
>
> (Citations refer to the WHO document)

"A non-medical mask, also called fabric mask, community mask or face covering, is neither a medical device nor personal protective equipment. Non-medical masks are aimed at the general population, primarily for protecting others from exhaled virus-containing droplets emitted by the mask wearer. They are not regulated by local health authorities or occupational health associations, nor is it required for manufacturers tocomply with guidelines established by standards organizations."

- WHO December Interim Report, *Mask use in the context of COVID-19* (10-p. 19)

When used in this Final Report, the term "*mask*" will be inclusive to mean all medical and non-medical masks, since all types are being used interchangeably in community settings.

Timeline of Community Use:

February 4, 2020: The Secretary of the U.S. Department of Health and Human Services determined that the virus that causes COVID-19 presented a public health emergency.(39)

The Secretary also issued a declaration making the manufacture, administration, and use of countermeasures against COVID-19 (such as the use of face masks) free from legal responsibility (a.k.a. "The PREP Act").(40)

April 3, 2020: The U.S. Centers for Disease Control and Prevention updated its guidance and began recommending the use of face masks as a prevention measure among the general public when unable to remain at least 6 feet from others.(41)

April 18, 2020: In order to meet the increased demand for face masks in the general public, the U.S. Food and Drug Administration (FDA) issued Emergency Use Authorization (EUA) related to the use of facemasks. This authorization will remain in effect as long as the federal state of emergency continues. (42)

Among other things, the FDA EUA:

- expanded the use of face masks to include any device that covers the user's nose and mouth, even if it does not meet the filtration efficiency levels necessary to block viruses, and approved these for use in the general public;
- loosened some of the restrictions on manufacturers in order to increase production;
- and expanded the types of filtering facepiece respirators that are approved for use in medical settings to include ones previously only approved for industrial use.(42)

The FDA's EUA was written without prior public comment, however:

"FDA will periodically review the circumstances and appropriateness of an EUA, including circumstances that might warrant revocation of the EUA. … reports of adverse events (number or severity) linked to, or suspected of being caused by, the EUA product; product failure; product

ineffectiveness (such as newly emerging data that may contribute to revision of the FDA's initial conclusion that the product 'may be effective'...).”(43-p. 33)

April, 2020: The Vermont Departments of Health and Labor began requiring “cloth face coverings” in the workplace as part of the COVID-19 mitigation efforts in the spring of 2020. Employers in Vermont were required to provide training to all employees in order to reopen their businesses. The training included the following statement: “Employees must wear face coverings over their nose and mouth when in the presence of others. Medical (such as N95’s) and surgical masks should be reserved for health care workers.”(44)

June 5th, 2020: The World Health Organization (WHO) issued Interim Guidance recommending the use of face masks in community settings “with known or suspected widespread transmission and limited or no capacity to implement other containment measures such as physical distancing, contact tracing, appropriate testing, isolation and care for suspected and confirmed cases.”(1-p. 7)

June 16th, 2020: The Vermont Department of Health and the Agency of Education released guidance for the re-opening of schools in the fall: “All staff and students (of all ages) are required to wear facial coverings while in the building. They must also wear them when outside of the building if adequate physical distancing of at least six (6) cannot be maintained.”(45-p. 19)

July, 2020: A petition against a mask mandate was started by two Vermont residents in late July. (As of May, 2021, the “No Mask Mandate” petition has been signed by over 4,000 people who feel the decision to wear a mask should be a choice.)(7)

August 1, 2020: The Vermont Mask Mandate, made by Executive Order by the Governor, went into effect. It required the use of “masks or cloth facial coverings” in all public spaces where a distance of 6 feet or more could not be maintained. It required businesses to post signage requiring the use of masks for entry. The order states that “nothing in this or any other State health and safety guidance shall require the use of a mask or cloth facial covering when someone is engaged in strenuous exercise or activity.” It also provided exemptions for “any child or adult with a medical or developmental issue or challenge that is complicated or irritated by a facial covering, anyone with difficulty breathing…”(46)

October, 2020: The Vermont Mask Survey released it’s initial findings in a Fall Report that was distributed to the health departments and other relevant agencies in the state.(47)

March, 2021: University of Vermont students started a petition to protest the “unrealistic” COVID 19 protocols for students, which include stripping of scholarships and suspensions for violations. As of May, the petition has collected almost 4,000 signatures. It cites several incidences involving students punished for not wearing masks. “New regulations have not only been costly to the school, but also catastrophic to the mental health of their students.”(48)

March 12, 2021: Vermont Superior Court upholds an injunction filed by the Attorney General against a business owner, alleging “that Defendants are in violation of the law for refusing to comply with rules that include the requirement that persons who work in businesses wear masks in the presence of others.”(49)

May 10, 2021: A Federal Court judge in Burlington agreed to hear the case of several citizens who are requesting, among other things, that the court "[g]rant a preliminary injunction against all current state actions and orders in Vermont issued under Declaration of Emergency in Response to COVID-19" due to the fact that "the Governor overreached his emergency powers when he issued emergency orders and mandates."(50)

THE VERMONT MASK SURVEY
METHODS

The Vermont Mask Survey was advertised using posters (<100 total), which were hung up on bulletin boards at locations in 10 Vermont counties during the three months of the survey. Posters directed participants to a website for a downloadable copy of the survey (vtmasksurvey.com). Completed surveys were mailed in or emailed by the participants.

Social media and online surveying was avoided to preserve confidentiality and respondent authenticity. These measures were expected to decrease the number of potential respondents. Several respondents commented that they had difficulty submitting their surveys due to the fact that they had to be either mailed or sent as an attachment electronically. Due to funding and time constraints, the author intentionally kept number of responses small enough to be manageable.

The 7 health difficulties asked about in the survey were based on the "likely disadvantages" most commonly cited in the research (1, p. 10)

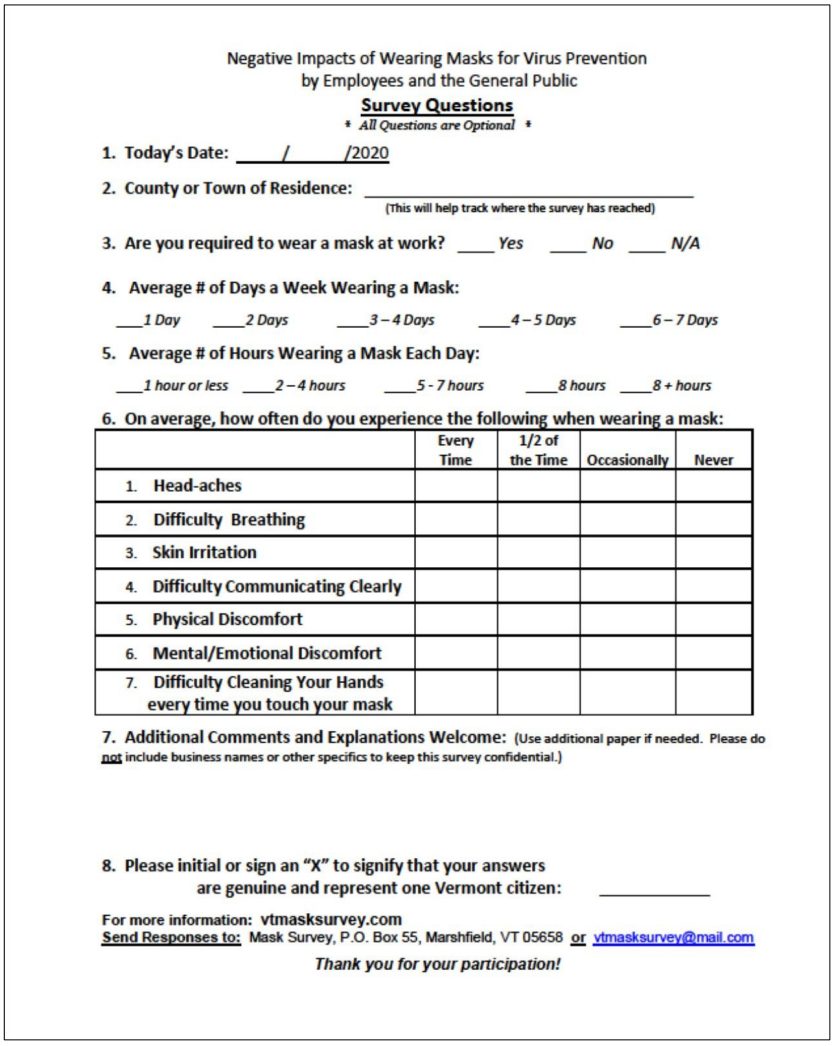
1. Headaches
2. Difficulty Breathing
3. Skin Irritation
4. Difficulty Communicating Clearly
5. Physical Discomfort
6. Mental/Emotional Discomfort
7. Difficulty cleaning your hands every time you touch your mask

Participants were asked to report how often they experience each of the difficulties or symptoms when wearing a mask: ***Every Time***, ***½ the Time***, ***Occasionally***, or ***Never***.

Other information requested on the survey included the date, county of residence, whether the respondent was required to wear a mask at work, the average number of days a week, average number of hours at a time, and additional comments. Participants could leave any of the answers blank.

Survey results were gathered from July through the first week of October, 2020, and the results were published in a Fall Report. The Fall Report was distributed to all the health departments and media outlets in the state in October, 2020 and peer reviewed by the Primary Doctors Medical Journal.(47)

This Final Report includes the results of surveys received over 9 months, from July, 2020 - April, 2021.



Negative Impacts of Wearing Masks for Virus Prevention
by Employees and the General Public

Survey Questions

* *All Questions are Optional* *

1. Today's Date: ____/____/2020
2. County or Town of Residence: _____
(This will help track where the survey has reached)
3. Are you required to wear a mask at work? ____ *Yes* ____ *No* ____ *N/A*
4. Average # of Days a Week Wearing a Mask:
___*1 Day* ___*2 Days* ___*3 – 4 Days* ___*4 – 5 Days* ___*6 – 7 Days*
5. Average # of Hours Wearing a Mask Each Day:
___*1 hour or less* ___*2 – 4 hours* ___*5 - 7 hours* ___*8 hours* ___*8 + hours*
6. On average, how often do you experience the following when wearing a mask:

	Every Time	1/2 of the Time	Occasionally	Never
1. Head-aches				
2. Difficulty Breathing				
3. Skin Irritation				
4. Difficulty Communicating Clearly				
5. Physical Discomfort				
6. Mental/Emotional Discomfort				
7. Difficulty Cleaning Your Hands every time you touch your mask				

7. Additional Comments and Explanations Welcome: (Use additional paper if needed. Please do not include business names or other specifics to keep this survey confidential.)

8. Please initial or sign an "X" to signify that your answers are genuine and represent one Vermont citizen: _____

For more information: vtmasksurvey.com
Send Responses to: Mask Survey, P.O. Box 55, Marshfield, VT 05658 or vtmasksurvey@mail.com

Thank you for your participation!

THE VERMONT MASK SURVEY RESULTS

Overview:

82 individual survey forms were received, plus one narrative. Respondents were from seven of Vermont's fourteen counties: Chittenden, Rutland, Caledonia, Lamoille, Washington, Windham, and Windsor. Responses came from a wide spectrum of citizens, suggesting that impacts are being experienced across demographics.

38 of the survey respondents reported experiencing difficulties ***every time*** they wear a mask, 32 ***occasionally***, and 12 ***never***. The responses of these three sets are summarized separately in order to elicit more detailed information based on the severity of symptoms.

RESULTS

First Set of Surveys:
Experience Difficulties "Every Time"

"Feasibility considerations should include:
can the targeted population tolerate possible adverse effects of wearing a mask?"
- World Health Organization's December, 2020 Interim Report on Masks, p. 10 (25)

The first set was made up of 38 surveys and a narrative from respondents who reported experiencing difficulties ***every time*** they wear a mask. The arrival dates of the first set were spread throughout the nine months of the survey, and were received both online and through the mail.

All but two of the 38 respondents reported experiencing three or more difficulties ***every time*** they wear a mask. Twenty of the respondents experience 5 or more difficulties ***every time***. Three of them reported experiencing all of the 7 difficulties ***every time***.

Number of Difficulties Experienced *Every Time:*

# of Difficulties Experienced "Every Time"	***# of Respondents***
All 7 Difficulties	3
6 Difficulties	6
5 Difficulties	11
4 Difficulties	6
3 Difficulties	7
2 Difficulties	1
1 Difficulty	1

Every Time received the most responses overall, indicating that people in this set experience a high severity of symptoms. The most common problem was Difficulty Breathing, with 35 out of 38 respondents experiencing this difficulty ***every time*** they wear a mask, and none of the respondents reporting they ***never*** have this difficulty.

Difficulty Communicating, Mental/Emotional Discomfort, and Physical Discomfort were the second and third most common. Only one respondent reported ***never*** having Difficulty Cleaning Hands, and 30 experienced this difficulty half the time or more.

Almost a third of respondents reported experiencing Skin Difficulties ***every time***, yet that complaint also had the highest number of ***never*** responses. Experiences of Headaches was also similarly split,

with precisely the same number experiencing them often (***½ of the time*** or more) as hardly ever (***occasionally*** or ***never***). This even split in the responses is in direct line with research on these issues, which shows that people prone to these conditions are more likely to experience them.(17, 30, 51)

Number of Responses Per Difficulty:

Type of Difficulty	**Every Time**	**½ of the Time**	**Occasionally**	**Never**	**Blank**
1. Headaches	12	5	11	6	3
2. Difficulty Breathing	35	1	1	0	1
3. Skin Irritation	11	5	5	14	2
4. Difficulty Communicating Clearly	29	5	3	0	1
5. Physical Discomfort	28	4	4	0	1
6. Mental/Emotional Discomfort	29	4	3	1	1
7. Difficulty Cleaning Your Hands every time you touch your mask	25	5	4	1	2
TOTAL Responses:	169	29	31	22	11

Prolonged Use:

I am not able to wear a mask for very long. 10/20 minutes at most, due to adverse side effects."

"If I'm running errands and in a store for more than 30 minutes, I'll get a headache."

-Survey Respondents

Wearing a mask an average of 4 - 5 days per week was the most common answer from respondents who experience difficulties ***every time***. Three of the respondents who left this question blank explained in the comment section that they avoid going places where they are required, including the use of public transportation and other essential services.

TOTAL
Average # of Days a Week Wearing a Mask:

# of Days	**# of Respondents**
BLANK (Comment: avoid places that require them)	6 (3)
1 Day	5
2 Days	5
3 – 4 Days	4
4 – 5 Days	14
6 – 7 Days	4

TOTAL
Average # of Hours Wearing a Mask Each Day:

# of Hours	# of Respondents
Blank	3
1 or Less Hours	8
2 – 4 Hours	10
5 – 7 Hours	8
8 Hours	3
8 + Hours	6

Required by Employer:

Over half of the respondents reported that they are required to wear a mask at work. All but one of the respondents who reported wearing a mask for 5 or more hours a day also reported that they are required to wear one at work.

Of those required to wear a mask by their employer, most are wearing them 4 or more days a week, and between 5 and 8+ hours each day.

Are You Required to wear masks at work?

	# of Respondents
YES	**22**
NO	**6**
N/A	**5**

Of Those Wearing a Mask at Work,
How Many Days per Week:

Days a Week	# of Respondents
BLANK	1
1 Day	1
2 Days	4
3 – 4 Days	2
4 – 5 Days	12
6 -7 Days	2

Of Those Wearing a Mask at Work,
How Many Hours per Day:

Hours Each Day	# of Respondents
1 Hour or less	1
2 – 4 Hours	5
5 – 7 Hours	7
8 Hours	3
8+ Hours	6

Additional Comments:

Survey respondents were invited to include additional comments. Of those experiencing difficulties ***every time*** they wear a mask, eight respondents described the negative impact the masks are having on their pre-existing health conditions, including mental and physical conditions. Four reported feeling light-headed. One stated she is pregnant, and found her blood-oxygen levels drop after wearing a mask. Two reported that their employers are imposing disciplinary actions against those who are caught "dropping their mask".

Additional Comments by Category:

Type of Difficulty	*Comments*
1. Headaches	*every day*
2. Difficulty Breathing	*very light headed, coughing, suffocating*
3. Skin Irritation	*rash on ears, breaking out like a teenager*
4. Difficulty Communicating Clearly	*elderly do not hear well, strained voice, glasses fog up, unable to read lips*
5. Physical Discomfort	*hot, sweating, not enough air, fabric is uncomfortable, sore throat*
6. Mental/Emotional Discomfort	*panic attacks, feel sad, claustrophobic, avoid going places, no smile to greet customers*
7. Difficulty Cleaning Your Hands	*no chance due to work conditions, it's a joke*
Pre-existing conditions impacted:	*asthma, breathing problems, PTSD, heart condition, hearing impairment, hot flashes, age, pregnancy*

RESULTS

Second Set of Surveys:
"Occasionally" and "Never" Experience Difficulties

A second set of surveys was received. These respondents reported experiencing the difficulties ***occasionally*** and ***never***. None of the surveys in this set selected ***½ of the time*** or ***every time*** for any of the difficulties.

There were striking similarities among the survey responses in this set. 28 of the 32 surveys arrived by mail over three weeks, with only 5 different post-mark dates on the envelopes (dated between July 16th and August 3rd.) The envelopes, signatures, and handwriting had distinct similarities, suggesting a common source. (These similarities did not appear in the first set.)

Due to these factors, and so that those with more severe difficulties can be weighed distinctly, this second set of responses has been tallied separately.

In the second set of surveys *Cleaning Hands* and *Communicating Clearly* were the most common difficulties identified. *Difficulty Breathing* and *Mental/Emotional Discomfort* were tied with only 5 responses each, whereas those difficulties were experienced most often by nearly everyone in the first set. This group also reported no skin irritation at all. In fact, this group reported ***never*** experiencing difficulties 75% of the time.

SECOND SET- Number of Responses Per Difficulty:

Type of Difficulty	**Every Time**	**½ of the Time**	**Occasionally**	**Never**
1. Headaches			1	30
2. Difficulty Breathing			5	26
3. Skin Irritation				31
4. Difficulty Communicating Clearly			15	11
5. Physical Discomfort			4	26
6. Mental/Emotional Discomfort			5	26
7. Difficulty Cleaning Your Hands every time you touch your mask			24	8
TOTAL:			54	158

Almost all of the responses in the first set of surveys reported three or more difficulties ***every time***. However, 80% of the second set of surveys reported only 1 or 2 difficulties ***occasionally***.

SECOND SET- Number of Difficulties experienced OCCASIONALLY:

# of Difficulties Experienced "Occasionally"	***# of Respondents***
4 Difficulties	1
3 Difficulties	6
2 Difficulties	12
1 Difficulty	13

Additional Comments:

There were no additional comments on any of the 28 surveys in this set which arrived by mail. Most of those which which were sent electronically included comments.

"I think everyone should be required to wear a mask… but not all customers are fine with it. As an essential worker of vulnerable age, it is scary to even think that some folks refuse to mask up and I will not let them in the store."

"I will gladly accept any discomfort out o[f] care and respect for my community. it's a small price to pay to keep VT. safe."

"I would much rather deal with wearing a mask than having COVID-19 or unknowingly giving my co-workers COVID-19. Wearing a mask is not a problem for me at all."

"It's hard to wear a mask so much. However, not acquiring or spreading COVID is more than worth it. These measures are not unprescidented and, despite claims to the contrary, there HAS been research done on the health implications of wear masks longterm: it prevents the spread of pathogens and does NOT cause any serious health issues."

- Survey Respondents, second settings

There appears to be a stark contrast between those who experience difficulties ***every time*** and those who only experience them ***occasionally*** or ***never***. There also appears to have been a concerted effort to skew the results in this set, validating the decision not to conduct an online survey where discrepancies would have been less detectable.

RESULTS

Third Set of Surveys:
"Never" Experience Difficulties

A third set of 12 surveys were received with the response ***never*** selected for each difficulty. The target population of The Vermont Mask Survey are people who do experience difficulties. Therefore the responses from those who do not experience difficulties were omitted from the previous tallies.

RESULTS

Evidence of Stigma

Two responses included comments indicating that they "do not sympathize" with non-mask wearers. Some comments also included insults, name-calling, and threats.

A number of people who responded denied the importance, and even the very existence, of negative effects from wearing masks. Two respondents shared their belief that health care workers are able to wear them for hours without difficulty. There appears to be a strong emotional response from some people who are advocates of wearing masks, and this makes any discussion, or in this case research, about the harms more challenging.

Interestingly, the negative responses were all from people who reported they rarely if ever experience difficulties. The resulting stigma against those who are suffering may be causing health issues of its own.

THE HARMS

The 7 Difficulties

What follows is a discussion of the 7 Difficulties included in this survey.
Respondent comments, data collected, and research validating the effects are included:

1. Headaches:

"I'm an old lady. Hardly ever have headaches. Since the mask thing started I have occasional headaches. I work one day a week… and I put the mask on only when people are in the store."

"I am unable to wear a cloth mask at a doctor's appointment or haircut as I'll get a headache and very stressed."

-Survey Respondents

Only four survey respondents in the first set reported they ***never*** have headaches.

Headaches are a well known side effect of wearing N95 masks in health care settings, and evidence shows that their frequency increases over time.(17-p. 1211, 30) "Most healthcare workers develop de novo [new] PPE-associtated headaches or exacerbation of their pre-existing headache disorders."(52, p. 864) While the cause is still under investigation, researchers suspect it is related to changes in oxygen and carbon dioxide levels caused by restricted breathing, although dehydration may also play a part. (30-p. 201, 31)

2. Difficulty Breathing:

"I have great difficulty breathing when wearing a mask, I feel like I can't get enough oxygen and I am suffocating in the hot steam of my own exhaled carbon dioxide. I start to feel lightheaded and confused and just want to get out of the store and end up forgetting half the things I needed there. I also start to feel panicky as one does when you can't breathe or get enough oxygen."

"Everyone I talk to has difficult time breathing."

"Dizziness, shallow breathing, etc…"

"Get no fresh air."

"Being that masks are often a cause of stress, I am frequently having to excuse myself from conversations and meetings so I can 'cheat' and breathe. This will occur numerous times within an hour."

"Masks make me have coughing fits and then people think I have a cold."

"It's hot and not clean air!"

-Survey Respondents

The most common problem in the first set was Difficulty Breathing, with 35 out of 38 respondents experiencing this difficulty ***every time*** they wear a mask, and none of these respondents reporting they ***never*** have this difficulty.

Breathing difficulties can be experienced by anybody who wears a mask.(1, 10, 13) Breathing difficulties are supposed to be addressed and rectified in random inspections by employers who require the use of masks.(10) Due to it being the primary concern related to mask use and its supervision, more thorough discussion of this issue can be found throughout this document.

In addition, specific populations are already experiencing difficulty breathing, a condition which can be exacerbated by the use of masks. In Vermont, 11% of adults and 10% of children have asthma and about 5% of Vermonters are living with COPD.(53, 54-p. 15) On April 3rd, 2020 the American Lung Association (ALA) issued a press release advising that everyone wear a mask, without any mention of complications for those with respiratory problems.(55)

Over the summer of 2020, the ALA issued advice for children returning to school: "Children with asthma should be able to wear a cloth face covering if their asthma is well-controlled."(56) Yet, there was no advice given for those whose asthma is not well controlled. According to the Vermont Department of Health, almost half of Vermonters with asthma report that their asthma is not well or poorly controlled.(57)

3. Skin Irritation:

"Severe acne from mask rub even though minimal wear."

"I'm 50+ years old and my face broke out like a 16 year old!"

"Rash on my ears."

"Skin irritation.

-Survey Respondents

About a third of respondents in the first set reported ***never***, and another third reported ***always*** experiencing skin irritation.

A significant amount of moisture is trapped and retained inside of masks, which creates an environment where the skin may begin to break down and infections are more likely to occur.(16-p. 7-8))

About one in four Americans are impacted by skin disease, thereby pre-disposing them to chronic irritation from masks.(58) A questionnaire of over 2,000 first responders during the COVID-19 pandemic found that participants with pre-existing skin conditions such as sensitive skin and dermatoses were "significantly predisposed" to developing a condition they called "mask itch." The study found that wearing masks causes itchiness in about 20% of wearers, leading to scratching, which "would markedly affect the effectiveness of face masks."(59)

A study titled *The adverse skin reactions of health care workers using personal protective equipment for COVID-19* found that wearing N95's for extended periods caused adverse skin reactions in 95% of the 61 participants.(51)

A survey of over 20,000 parents in Germany found that face masks were causing skin problems in youth required to wear them, "especially increased pimples, rashes and allergic phenomena around the mouth area up to fungal diseases in and around the mouth."(6)

An article from Johns-Hopkins Medicine titled *Coronavirus: Tips to Avoid "Maskne" Skin Irritation* describes how common this problem is, who is most vulnerable, and includes suggestions such as not wearing masks treated with formaldehyde and other allergens, and when to seek medical treatment.(60)

The Mayo Clinic warns prolonged skin irritation can cause infections and scarring, loss of sleep, and depression. They suggest the irritant should be avoided, and that treatment should be sought if irritation persists.(61)

4. Difficulty Communicating Clearly

"The elderly do not hear well."

"...having to speak louder to be heard, which makes my throat raw and sore."

"It is really quite simple: I am significantly hearing-impaired. Despite having excellent hearing aids, I am still very reliant on lipreading in order to comprehend speech. Speech discrimination is also aided by the ability to read the totality of the speaker's facial expressions. Since the pandemic has resulted in virtually universal mask wearing, I have often found myself in situations within normal hearing distances where I cannot understand what is being said directly to me by someone who is masked. This is a serious detriment to communication, and more: it imposes a significant level of stress onto my overall physical health, to say nothing of my mental well-being."

-Survey Respondents

All of the respondents in the first set reported some level of difficulty with communication when wearing face masks.

In a study titled *The negative impact of wearing personal protective equipment on communication during coronavirus disease 2019*, communication was found to be negatively affected, resulting in miscommunication and other issues. "Where attempts to deliberately raise voice volume or shout through PPE were simulated, understanding significantly improved as expected. The raising of voice for prolonged periods may lead to issues with voice strain and abuse, in addition to frustration or miscommunication."(62, p. 4)

The recent universal use of face masks are proving to be devastating to those with hearing loss, and is causing increased isolation and other problems.(63, 64) For example, people with hearing loss are

experiencing difficulties communicating with their medical care providers, leading to growing health concerns.(65)

The experience of deaf healthcare professionals during the coronavirus pandemic has been well documented in the United Kingdom, where a survey of professionals found that:

"D/deaf HCPs felt left behind, isolated and frustrated by a lack of transparent masks and reasonable adjustments to meet their communication needs. Loss of experienced, qualified HCPs has a significant economic and workforce impact, particularly during a pandemic…. The lack of support for communication in the workplace continues to have significant impact on the well-being of D/deaf healthcare professionals….
"Policymakers must ensure equality impact assessments are routinely undertaken, and that the ongoing efforts to improve equality and diversity include those who are D/deaf and disabled."(4)

The results of the survey were shared with the U.K. Parliament during hearings which investigated the overall effects of the government's response to COVID on those with disabilities, including delayed care and increased pressure to sign and implement *Do Not Resuscitate* orders, among other issues. Testimony on the effects on people with hearing impairment included the following:

"...it is absolutely impossible to communicate with someone who is wearing a face covering… people who are deaf or have hearing loss rely heavily on visual cues for effective communication. This includes body language, gestures, facial expressions and lip reading. Being able to see lip patterns and facial expressions is also vital for those who communicate through British Sign Language. People who are deaf or have hearing loss told us that they are struggling to communicate with health and social care professionals during face to face consultations and interactions as a result of visual cues being masked by PPE."

- Ayla Ozmen, Head of Research and Policy at Action on Hearing Loss (5)

5. Physical Discomfort

"This is particularly difficult as I deal with hot flashes when stressed, thereby needing to take off my mask so that I can breath without passing out from becoming overheated..."

"I experience numbness in my lips, and face: cheeks, chin, jaw. I get headaches, have trouble breathing and when worn for a long time, vertigo and nausea."

"Get headaches due to sweating non-stop from the mask, don't sweat when not having hot air on my face from my own breath."

"Fabric is uncomfortable: paper/blue masks cause sore throat…"

- Survey Respondents

Research conducted and published in *The Journal of Laryngology and Otology* in July, 2020 found increased use of PPE during the coronavirus response was causing throat strain as a result of the need

to speak louder in order to be heard.(62) Masks are often made with ingredients that can pose a health risk.(25-p. 22) Throat pain is a warning sign that the wearer is inhaling unsafe materials.(66)

N95's and surgical masks have been shown to cause increases in heart rate, overheating, itchiness, general fatigue, feeling unfit, and other physical sensations in health care workers.(67)

Pain and discomfort, whatever the causes, are warning signs that our bodies are experiencing stress, and should not be ignored. In a paper titled *The Physiological Burden of Prolonged PPE Use on Healthcare Workers during Long Shifts*, the authors state: "Dizziness is an important warning sign, as it can be caused by dehydration, hyperventilation (gasping for breath), elevated carbon dioxide levels in the blood, low blood sugar, and anxiety, among other things."(31)

Wearing a mask causes heat -strain by itself, and working in hot environments with masks on is a known workplace hazard. OSHA has developed guidance on the use of cloth face masks in settings where workers already experience heat strain, such as commercial kitchens and manufacturing. It clarifies that masks are only necessary when workers cannot maintain 6' distance, and that employees should increase the frequency of hydration and rest breaks to cool off. It also suggests that workers should be trained on recognizing and treating heat illness in themselves and others.(68)

In 1976 Pritchard noted in his guidebook for OSHA supervisors: "A more subtle psychological consideration is comfort. Obviously, if a respirator with an ill-fitting or irritating facepiece causes continual discomfort, it is bound to have an adverse psychological effect."(10-p.82)

<u>6. Mental/Emotional Discomfort</u>

"Due to these side effects and the required masking I have panic attacks while wearing the mask when I need to take care of necessities: grocery shop, etc…"

"[Masks] cause panic as I'm very claustrophobic...[I] have no history of any mental health issues, but this fear mongering and mask requirement has been devastating…"

"I have PTSD and it causes me great distress wearing a mask.."

"I wear glasses, they fog up constantly making it difficult to see and causing discomfort. I feel stressed out and unhappy when I wear a mask."

"I definitely feel stressed when wearing a mask…."

- Survey Respondents

Nearly all the respondents in the first set reported mental and emotional discomfort ***every time*** they wore a mask. Several respondents who live with PTSD also reported they were denied essential services due to their inability to wear masks.

Shortness of breath, or *dyspnea*, is "often described as an intense tightening in the chest, air hunger, difficulty breathing, breathlessness or a feeling of suffocation."(22) This condition can mimic the symptoms of an anxiety attack, and can be caused by wearing masks.(21)

There are several members of the community who are more likely to feel anxiety when their face is covered and breathing restricted. As already discussed, a large number of community members may have had a history of suffocation trauma due to a health condition such as asthma or COPD.(53, 54) Additionally, between 3% and 10% of women in our country have experienced strangulation, perhaps as many as 1% per year.(69)

Those who are already prone to anxiety attacks may find their condition worsened by wearing masks. When we are under stress, such as remembering a past trauma, our heart beat and breathing rate increases, and our bodies use extra oxygen.(70-p. 42 & 270) As described by respondents, the added stress can quickly become intolerable when already experiencing the respiratory stress of wearing a mask.(15)

People with PTSD, whatever the cause, are more likely to experience severe difficulties when wearing masks. In the spring of 2020, a civil rights complaint was filed in a Florida U.S. District Court by two veterans and a car accident survivor:

"Israel Ham, a U.S. Army veteran, wrote that he suffers from post-traumatic stress disorder, depression and severe anxiety because of his military service. He said he was denied a ride on the bus and a job interview because he was not wearing a mask.

"Phillip Hooks, a Vietnam war veteran, wrote that he is diagnosed with PTSD and anxiety because of his military service. He said wearing a mask makes him hyperventilate and panic like if he's suffocating. He said he was denied entrance to three Gainesville stores for not wearing a mask.

"Tolar Powel wrote he suffers from asthma, fibromyalgia and PTSD because he was involved in a fatal car accident. He said he went to a Walgreens to pick up a prescription and was questioned by three different employees about his medical status. He said he was told to leave the store and was only allowed to pick up his prescription from the drive-thru window. He couldn't shop for other items in the store."(71)

If parity for mental health issues is a value we are working towards in Vermont (8 V.S.A. § 4089b), how do we weigh the fact that a significant portion of the population is likely to experience disabling effects, such as anxiety attacks, when wearing masks?

Seeing masks in the community on others can cause a fear response, even for people who have not had previous trauma. For one thing, it creates a feeling of ever-present danger by bringing up fear of contagion.(72)

In Germany parents reported that their children have been experiencing increased fear and nightmares since masks have become mandatory in school. Bullying also seems to be increasing: "Parents,

teachers and doctors report stigmatization, exclusion and aggressive behavior towards children who do not wear a mask for psychological or medical reasons."(6)

For those fleeing violence or abuse, not being able to recognize faces could increase their perceived and/or actual danger around others. It may also make human traffic activity easier to hide.(73)

The increased sense of fear may be appropriate, because masks may actually increase the incidence of violence. Previous research on aggression shows that wearing masks decreases empathy and increases people's willingness to use violence. There is concern that their universal use is currently causing an increase of aggression.(74)

"Psychologically, wearing face masks fundamentally has negative effects on the wearer and the nearby person. Basic human-to-human connectivity through face expression is compromised and self-identity is somewhat eliminated [47–49]. These dehumanizing movements partially delete the uniqueness and individuality of person who wearing the facemask as well as the connected person [49]. Social connections and relationships are basic human needs, which innately inherited in all people, whereas reduced human-to-human connections are associated with poor mental and physical health."

- Baruch Vainshelboim, *Facemasks in the COVID-19 era: A health hypothesis*
(Embedded citations refer to the document) (75)

7. Difficulty cleaning your hands every time you touch your mask

"And 'cleaning my hands every time I touch my mask' is a joke! I have never witnessed this and I work around a lot of people!"

"Behind the shield we can wear [the mask] *below the nose,*
out on the floor it has to be up and over the nose!

"Put the mask on and off several times. I hate hand sanitizer. Hand washing not convenient."

- Survey Respondents

Difficulty cleaning hands was, far and above, the most common complaint in the second set of surveys. Inability to practice proper hand hygiene was experienced by more survey respondents overall than any other issue, suggesting that it is rarely able to happen in community settings.

A primary reason people are wearing masks is to protect others, yet improper hand hygiene may actually make matters worse by increasing the risk of infection.(1, 24)

The research supporting the need for proper mask hygiene comes from mask use in the medical field, and even in those environments there is concern that they may cause more contamination than they prevent.(26, 28, 29)

Medical professionals receive training on proper mask hygiene, work in sterile environments, and have ample access to hand-washing facilities. Understanding contamination issues in public settings, such as schools, restaurants, and grocery stores, is requiring new research.

Improper hand hygiene can spread many dangerous diseases in food service settings.(76) How is the current use of masks by staff and customers in restaurants contributing to hand contamination and the incidence of food-borne illnesses?

Improper mask hygiene poses a serious risk, and the importance of this message has been stressed by the public health campaigns.(1-p. 6, 24, 77 - 80) For example, the CDC recommendations include: "Don't put the mask around your neck or up on your forehead. Don't touch the mask, and, if you do, wash your hands or use hand sanitizer to disinfect."(77) "Educate patients, visitors, and HCP about the importance of performing hand hygiene immediately before and after any contact with their facemask or cloth face covering."(81)

> *"Be aware that masks can become contaminated on the outside. Avoid moving or adjusting the mask. Assume the mask has been contaminated and take proper precautions.*
>
> *Critically, if you wear a mask, you must wash your hands before putting it on, as well as before and after taking it off.*
>
> *Cloth masks should be worn only a short time, as there is some evidence that they can trap virus particles after they become damp, which may put the wearer at greater risk.*
>
> *For those choosing to wear non-medical masks, it may be prudent to carry a bag with several clean masks in it, as well as a plastic bag that can be used to safely store used masks until they can be washed at home.*
>
> *It is critical that used masks be carefully handled to avoid spreading infection to others."*
>
> - Alberta Health Services, COVID-19 Scientific Advisory Group (24)

How is mask hygiene practiced currently, in the general public? The Livinguard "Mask Sentiment" Survey in the fall of 2020 received just over 1,000 responses. They found that less than half (46%) of the respondents who wear reusable cloth masks wash their masks every day/after each use, 44% wash it weekly, and 8% don't wash it at all.(82)

A survey of 2,315 students in Poland in the spring of 2020 found "some practices among young people could be regarded as inappropriate. This can lead to decreased efficacy of face protection and eventual spread of viral infection. Therefore, we believe that our results might be of value in construction of general public education campaigns on the proper use of face masks…"(83-p. 3)

Over the summer of 2020 a study conducted by the University of Vermont and co-authored by the Vermont health commissioner and found that mask use was associated with increased COVID-19

infections.(84) However, the health commissioner has not been role modeling proper mask hygiene, as seen in the weekly press conferences, nor is the Vermont Department of Health tracking use of masks to determine the level of infection associated with them.(85-minute 58)

Additional Harms

Pre-existing Conditions

"I have diagnosed COPD, and cough as soon as I put on a mask."

"As I have asthma, I feel like I am having a panic attack."

"I have breathing issues and get very light headed due to wearing a mask."

*"When I have to wear a mask for a longer time (more than 15 minutes),
like when grocery shopping, working, hair cut, my heart condition that I had been able to control
the past two years with diet and exercise starts to come back.
I'm worried this will come back permanently."*

"I have been advised by my doctor to wear the mask as little as possible."

- Survey Respondents

People with pre-existing conditions are known to be at greater risk of suffering health difficulties when wearing masks. OSHA standards require that a person required to wear a respirator for work must be medically able to do so.(86)

As Pritchard points out in his 1976 guidebook for OSHA:

"Wearing any type of respirator imposes some physiological stress on the wearer… If the worker's cardiovascular or pulmonary function is significantly impaired, wearing a respirator could constitute an unacceptable risk… Other physical conditions such as diabetes, or grand mal epilepsy may limit wearing of respirators...How is the person responsible for overseeing the physical well-being of those who must wear respirators supposed to make the decision? The only practical approach is to treat each case individually…"(10-p. 81)

The effects of masks on people with pre-existing conditions is virtually unknown since they are excluded from most studies of masks for safety reasons.(16) In a study titled *Physiologic and other effects and compliance with long-term respirator use among medical intensive care unit nurses* the authors explain: "Exclusion criteria [for the study] included any medical or physical symptom/condition that could potentially put subjects at risk from prolonged N95 use, including pregnancy, arrhythmias, hypertension, poorly controlled asthma, history of panic attacks or claustrophobia, and/or seizure disorder."(17)

The increased effects on people who have higher body mass indexes (BMI) warrants attention. It may indicate that masks impose excessive strain on the respiratory and circulatory systems of those who are carrying more weight on their bodies. In the study cited above, the authors go on to note:

"Nurses with higher BMIs reported higher perceived exertion, perceived shortness of breath, perceived discomfort, complaints of feeling warm while wearing the N95, headaches, lightheadedness, visual challenges, and impeded communication than nurses with lower BMIs, independent of time the N95 was worn or whether they wore an N95 alone or with a mask."(17-p. 1221)

Pregnancy

"I am pregnant. My blood oxygen level decreases to 94% after wearing a mask."
- Survey Respondent

The survey had one respondent who described concern about how the mask was effecting her pregnancy. She was required to wear one by her employer, and reported working 8+ hours a day, 6 – 7 days a week.

It is surprising that health officials have not issued warnings about wearing masks while pregnant, since this is a concern well documented in research. Pregnant healthcare workers, as well as others with health conditions that may be complicated by wearing a mask, are routinely excluded from participation in studies.(17-p. 1219)

A controlled clinical study in 2015 found that wearing an N95 mask decreased the oxygen levels of pregnant health care workers. The study concludes:

"Breathing through N95 mask materials have been shown to impede gaseous exchange and impose an additional workload on the metabolic system of pregnant healthcare workers, and this needs to be taken into consideration in guidelines for respirator use. The benefits of using N95 mask to prevent serious emerging infectious diseases should be weighed against potential respiratory consequences associated with extended N95 respirator usage."(9)

Researchers did a systematic review in 2020 and found four reliable studies of the effects of N95 respirator use on pregnant health care workers. These four studies found that less than one hour of use did not cause significant changes. However, the authors note "it is possible that prolonged use may have a greater physiologic impact… Further studies are therefore needed… with particular focus on the effects of increasing CO2 levels."(87-p. 999)

In its general advice about the use of respirators during pregnancy, the CDC's National Institute for Occupational Safety and Health explains:

"Some respirators (like negative pressure respirators) make you work harder to breathe. Because pregnancy can also make women work harder to breathe, this can sometimes cause difficulties (particularly in late pregnancy)."(88)

The few studies specifically targeting the effects of masks on pregnant healthcare workers do not address long-term use, or compare the effects at different stages of pregnancy.

Healthcare Settings

"We have been threatened with consequences ranging from being written up to termination… People have been snitching on each other for 'dropping their masks' and people have been 'spoken' to regarding this. I've seen co-workers resort to eating and drinking in the bathroom so they wouldn't get caught removing their masks."

- Survey Respondent

A nurse wrote in to The Vermont Mask Survey to describe the conditions health care providers are experiencing, and also went on to describe the conditions for patients in the hospital:

"Surgical patients are being required to wear masks while in recovery from surgery- even if they have an oxygen requirement."

- Survey Respondent

OSHA states cloth face coverings: "May be used by almost any worker, although those who have trouble breathing or are otherwise unable to put on or remove a mask without assistance should not wear one."(89)

The WHO's guidance on the use of masks in health care settings states: "Inpatients are not required to wear a mask (medical or non-medical) unless physical distancing of at least 1 metre [3 feet] cannot be maintained (e.g., when being examined or visited at the bedside) or when outside of their care area (e.g., when being transported)."(25-p. 5)

While there is little research on the effects of putting masks on patients, there was a study done in 2004 which found significant health effects:

"Most patients with end-stage renal disease (ERSD) visiting our hospital for hemodialysis treatment during the SARS outbreak wore an N95 mask… Seventy percent of the patients showed a reduction in partial pressure of oxygen (PaO2), and 19% developed various degrees of hypoxemia. Wearing an N95 mask significantly reduced the PaO2 level, increased the respiratory rate, and increased the occurrence of chest discomfort and respiratory distress."(90)

The use of masks in healthcare settings in Vermont exceeds the recommendations of the WHO. In their December report, titled *Rational use of personal protective equipment for COVID-19 and considerations during severe shortages*, the WHO recommendations much less stringent mask use, even in this current COVID era, encouraging the use of PPE only when around patients with suspected, probable, or confirmed infection. They also warn that the excessive use of PPE could increase the risk of contamination.(12-p. 5)

How is the wearing of masks by patients and staff affecting treatment and recovery? Are there particular risks involved with the use of masks by patients who are already suffering from respiratory complications?

Denied Service

"I am upset about the mask mandate because businesses decline my entry and it makes it harder to get my daily needs done. I don't have a car and the bus requires a mask so I have to walk everywhere."

"I apologize for this poorly filled out survey. I cannot wear a mask so I don't have access to printing services because the library where I go for printing doesn't allow entry without a mask."

"I limit where I go so I don't have to wear one often."

"Not leaving the house because of the mask situation.
I get very upset when I have to wear the mask. It makes me very sad."

- Survey Respondents

The Vermont Mask Survey found evidence that there are essential services for which accommodations are not being provided, such as medical appointments, transportation, and public library services.

Due to the increased health risks associated with wearing a mask, the Vermont Mask Mandate exempts people from wearing masks for if they have a medical or developmental condition, or trouble breathing. The Vermont Mask Mandate states:

"Nothing in this Order or any other State health and safety guidance shall require the use of a mask or cloth facial covering when someone is engaged in strenuous exercise or activity, for anyone under the age of 2, any child or adult with a medical or developmental issue or challenge that is complicated or irritated by a facial covering, anyone with difficulty breathing or as further set forth in guidance issued by VDH."(46)

The onus for enforcement of the mask mandate was put on business owners. The mandate states businesses shall:

"implement measures notifying customers or clients of the requirement to wear masks or facial coverings, which may include, but shall not be limited to, posting signage stating that masks or cloth facial coverings are required and denial of entry or service to customers or clients who decline to wear masks or facial coverings."(46)

The Agency of Commerce and Community Development has clarified in their *Vermont Forward Plan*:

"*Businesses, non-profit and government entities may decline service to individuals who are not wearing a mask. This includes refusing service to those who are exempt from the mask mandate,*

however, the business shall provide an alternate way for those unable to wear a mask to access the business, such as offering curbside pick-up, delivery, or other innovative solutions."(91)

The Americans with Disabilities Act (ADA) website confirms that there are a number of people with physical, mental, and developmental disabilities who are not able to wear a mask. The website states that while the ADA does not have any rules related to government or business requirements concerning the use of masks, those agencies and private businesses must still consider reasonable modifications so that the person with a disability can "participate in, or benefit from, the programs offered."(92)

Working Conditions

"It is very difficult to cut hair with a mask on my client."

"As an 'essential worker' I was instructed by my supervisor to wear a mask…."

"Considering lawsuits."

"I work in construction, up until about a week ago masks were optional [now] *they're mandatory, inside and outside (ridiculous)… (my boss usually leaves a box on job sites) thinking of how dirty, and dusty jobsite*[s] *generally are with materials I can only imagine the settled dust that gets on the masks..."*

"We have been threatened with consequences ranging from being written up to termination… People have been snitching on each other for 'dropping their masks' and people have been 'spoken' to regarding this… I've seen co-workers resort to eating and drinking in the bathroom so they wouldn't get caught removing their masks."

"...some companies are fining people $200 if found improperly wearing the mask!"

- Survey Respondents

Over half of Vermont Mask Survey respondents who experience 3 or more of the difficulties ***every time*** they wear a mask reported that they were required to wear them at work. Being required to wear masks at work was associated with prolonged use: most reported 5 or more hours a day, and 4 or more days a week.

Business owners, most of whom did not have previous experience with using masks (respirators) before this, were asked to require wear face masks in order to re-open during the COVID-19 emergency. They were made responsible for requiring and supervising mask use among their employees, customers, patients, and students.

A Guide to Industrial Respiratory Protection
Supervision: Random Inspection (10-p. 59)

SUPERVISION OF RESPIRATOR USE

Random Inspection

Respirators in use shall be randomly inspected frequently to ensure that those selected for the job are being used and that they are in good condition. Respiratory protection is no better than the respirator in use. Periodic monitoring of respirator use should include:

1/13/22

- Determination that the proper respirators are being used.
- Determination that respirators are being worn properly.
- Consultation with wearers about:
  - Discomfort
  - Resistance to breathing
  - Fatigue
  - Interference with vision
  - Interference with communications
  - Restriction of movement
  - Interference with job performance
  - Confidence in the respirator

Problems discovered during the random inspections must be rectified.

Existing OSHA standards still apply, even while implementing the additional COVID-19 standards.(93) Under OSHA standards published in the *Small Entity Compliance Guide for the Respiratory Protection Standard*, as it applies to OSHA standard 1910.134, employers requiring the use of respirators (including ½ face masks) must:

1. Evaluate the respiratory hazard in the workplace (p. 18) and select respirators designed for that specific use. (94-p. 21)
2. Use only "As a last resort after other environmental controls have been deemed insufficient." (94-p. 12)
3. Develop a written respiratory protection program which includes training, medical evaluation, and fit-testing for employees and proper storage and supervision of supplies.(94-p. 15)

The OSHA *Small Entity* G*uide* explains that a medical evaluation is important because "A respirator wearer's health could be jeopardized due to an undetected medical condition (e.g., asthma, heart condition.)" "[E]very employee who has been selected to use any type of respirator must" complete portions of a medical questionnaire to see if they are medically fit.(94-p. 98)

After answering the medical questionnaire, a medical examination must be offered, and follow-up must be conducted periodically afterwards if they answer yes to any of the questions related to these health conditions: smoking; seizures; diabetes; allergic reactions that interfere with breathing; claustrophobia; lung problems; symptoms of lung problems such as shortness of breath or coughing/wheezing; heart problems; symptoms of heart problems such as tightness/pain in chest or heartburn; use of medications for lung, heart, or seizure disorder; and previous problems wearing respirators, including anxiety, skin reactions, or fatigue.(94, p. 98-99)

Are physicians prepared to provide the necessary medical examinations? The Journal of the American Medical Association (JAMA) published an article titled *Mask Exemptions During the COVID-19 Pandemic – A New Frontier* in July, 2020 provided suggestions to physicians who are asked to provide exemptions. The article focused largely on avoiding false claims. It states that "[f]ew guidelines exist regarding medical exemptions, beyond the CDC's recommendations." They note that there is a lack of

objective measures to assess patients. The authors note that physicians "...do, however, have a clear obligation to address individual patients' concerns, discuss appropriate alternatives, and offer clear recommendations for risk reducing measures when patients are venturing into the public sphere." The article does not provide any resources or references about the need for exemptions, how to make assessments, or how to support patients whose health is being compromised.(95)

Enforcement of the mask mandate in Vermont has been complaint-driven. Callers who would like to report a business for not enforcing the mandate are directed to the Vermont Department of Health (VDH). According to a phone interview with a staff at VDH, they are currently accepting complaints about food and lodging-related businesses that are not following the mask mandate. All other business complaints were being referred to the Department of Safety, but are currently (May, 2020) not being accepted at all. When a complaint is received, the state office will follow up with the business to let them know a complaint has been filed, but have no jurisdiction to enforce in any way. Enforcement is up to the Attorney General and the Agency of Commerce.

At the time of this writing, there has been only one business penalized by the Attorney General for non-compliance with COVID-19 emergency measures. In March, 2020 a Vermont court upheld an injunction against a business owner for "...failing to comply with rules applicable to business operations adopted pursuant to the Governor's Executive Order." The decision concludes: "The facts are clear that both the business entity, HNR Desautels LLC, and Mr. Desautels personally were in violation of the ACCD rules on February 18 and 22, 2021, and on other days in which the store was open for business and he was not wearing a face covering over his nose and mouth when in the presence of others." However, the ruling does not appear to address the business owner's decision to honor his employee's medical exemption.(49)

Supplies

> *"Another consequence of these masks, is that the work I do requires the n95 in certain circumstances ie: sanding drywall, installing insulation etc... I can't find them anywhere! Hardware store say they can't get them from distributors, all they carry are those stupid* [paper masks] *that do absolutely nothing for protection. So the people that ACTUALLY need these masks cant get them, and when I can get my hands on some I keep reusing them, CUS I CANT FIND THEM, and I'm reusing a mask that 100% has bad stuff on it from other jobs."*
>
> - Survey Respondent

The survey also uncovered supply problems for those in construction who can no longer acquire the respiratory protection their jobs require.

Although the original Food and Drug Associaion's Emergency Use Authorizaion was intended to protect the supply of proper respirators (such as N95's) for health care workers and others who need them, there are professionals in the field who are currently working in dangerous environments without the protection they need. According to OSHA's *Guidance on Preparing Workplaces for COVID-19*,

published in the spring of 2020, employers should still be following existing workplace standards (93, p. 17).

Employers also have a duty to supply face masks to their employees. Supplies must be stored and cleaned properly because "[a] dirty respirator could cause dermatitis" and "[a] dirty or poorly disinfected respirator could cause an unnecessary inhalation hazard." Considerations should include: Would the temperature and humidity affect the comfort of the wearer?" and "Are your employees wearing respirators able to communicate with one another and warn one another of hazards?" "Would a fast work pace lead to discomfort, causing the employee to move the respirator and, thus, affect the protection afforded by the respirator?"(94-p. 16)

Political and Social Pressure

"...data doesn't support the government overreaction."

"*Frankly, the whole business is silly."*
- Survey Respondents

Two other surveys of mask use and perceptions were conducted in Vermont in the past year. Though both gathered evidence that people with pre-existing conditions were experiencing difficulties, this was not the focus of the research. The purpose of both surveys was to develop ways to increase compliance.

A small survey titled *A Motivational Interviewing Approach Toward Mask Wearing in Franklin County, Vermont* was conducted by a University of Vermont student over the summer of 2020. 50 patients at a community health clinic were asked how often they wear a mask, and if they do not often wear one, what are the barriers? Barriers shared in the report included: discomfort, claustrophobia, communication problems, and glasses fog up. Other reasons shared in the report were: "[People who don't wear masks] think it's all a big farce," "[It is] more about rebellion," and a belief that COVID-19 is "a hoax."(96)

In the conclusion, the medical student who conducted the survey suggests areas for future improvement, and suggests the need to: "Explore the political motivations behind some of the reported barriers to mask wearing, especially moving toward the 2020 presidential election. Some reported barriers in the survey were politically-charged." Health reasons for not wearing masks were not addressed with the patients or in the report.(96)

The Vermont Department of Health (VDH) conducted a *Mask Perceptions and Behavior Survey* in the spring of 2020. The online survey collected over 650 responses, and a summary of the results are available on the VDH website. The survey asked how often the person wore a mask in the past month (***Always***/***Often***/***Rarely***/***Never***), and what was the main reason. It found that 85% of Vermonters were ***Always*** or ***Often*** wearing masks at that point (before the state mandate).(8)

Due to the relevance of the VDH survey, the author of The Vermont Mask Survey requested and received a spreadsheet with the complete online responses from the Chronic Disease Information Director at the Vermont Department of Health. This author tallied the results of the *VDH Mask Perceptions and Attitudes* survey according to subjects, and found the following themes:

ALWAYS/OFTEN WEAR A MASK
# of Responses = Reasons:
Most = To Protect Others/Safety
12 = Required/Rules
8 = Required to for work
7 = I'm not stupid/an idiot
5 = Have Pre-existing Conditions (pregnancy, high blood pressure, asthma, COPD, immune problems, age)
3 = "Truth"
3 = "Science"
3 = Being Nice
3 = Social Pressure (including a 65+ woman: *"I don't want to be criticized"*)
2 = Anti-Trump
1 = Obama

RARELY/NEVER WEAR A MASK
# of Responses = Reasons:
4 = Health reasons (can't breath, anxiety, severe asthma, nightsweats, only when required,)
1 = Falls off
2 = Uncomfortable
4 = Scientific explanation why not necessary
2 = Low risk community
4 = No fear/need/don't believe/it's stupid
1 = I don't care
1 = over it
1 = sick already
1 = Follow Trump (This response appears to have been made by the same person who replied "Trump is a moron" in the Always set)

While political affiliation has been blamed for why people do not want to wear masks, such as in the UVM student's study cited above, the opposite appears to be more prevelant. Politics was brought up three times in the VDH survey responses as a reason for ***always*** wearing a mask. Two mentioned "Trump" as the reason they ***always*** wear a mask, and one mentioned "Obama". Only one response mentioned "Trump" as the reason they ***never*** wear a mask: "I follow president trump (all the way to the grave)". However, this response appears to be in jest, since it arrived at the same time as an anti-Trump comment ("Trump is a moron"), and both responses (pro- and anti-Trump) came from a 55 – 64 year old man in Essex.

The Vermont Mask Survey also found that respondents who supported their use expressed "anti-Trump" sentiments, including the following: "I don't give a damn about Trump and his gullible allies

getting Covid. I DO care about others getting infected and dying thanks to misguided, science-denying idiots who don't wear a mask."

Also, both the Vermont Mask Survey and the VDH survey found that insults were used by those who support the use of masks, calling those who don't "stupid" and "idiot".

"Science/Truth" are common reasons given for supporting mask use, however, it is also given as a reason not to wear a mask. Four of the VDH survey respondents shared accurate scientific explanations for why they do not wear masks often. For example: "The mask is not protection... single layer cloth does not work" and "because they [are] NOT needed unless you are taking care of a covid patient or are sick."

17 responses to the VDH survey noted that the reason they wore a mask was because they were required to, or have to according to the rules. Eight of these specified that the reason they wore a mask was because their employment required it.

The overwhelming majority of comments in the VDH survey explained that they wore a mask ***always*** or ***most of the tim***e in order to show they respect and care about others, with comments such as "common decency" and "symbol of solidarity."

Three comments referred directly to the social pressure to wear a mask:

"**How often to you wear a mask, and why?"**
Always: *"social pressure"* (65+ year old man)
Always: *"to avoid public ridicule/shunning"* (65+ year old woman)
Always: *"Because don't want to be criticized."* (65+ year old woman)

- VDH *Mask Perceptions and Behavior Survey* Respondents

Several VDH survey respondents who have health conditions (asthma, night sweats, anxiety, and breathing problems), described how their conditions were exacerbated by wearing a mask, yet they also report they still wore them "rarely" or "sometimes," implying that exemptions are not being utilized:

"**How often to you wear a mask, and why?"**
Sometimes: *"when it is required. Cant breathe with it always on. Anxiety"* (25-34 year old woman)
Rarely: *"I have severe asthma. Wearing a mask restricts my ability to breathe and triggers asthma attacks."* (45-54 year old woman)

- VDH *Mask Perceptions and Behavior Survey* Respondents

Five participants in the VDH survey noted health conditions (ie. age, asthma, COPD, immune compromised, and pregancy) as reasons why they "always" wear a mask.

It is concerning that the focus of these two research projects is on increasing social pressure on people to wear masks, and neither one addresses or acknowledges the need for caution around their use for people with pre-existing conditions. Meanwhile, there appear to be a number of people, including

elders and people with pre-existing conditions, who are putting their own health at risk in order to “protect others” and avoid social stigma.

DISCUSSION

"I absolutely hate wearing a mask. It is degrading to all, puts a halt to healthy person to person contact and is a huge health risk."

- Survey Respondent

Are Masks Safe?

"The respiratory tract is the most important route by which toxic substances enter the body… One reason is … that it has a much larger surface area than the skin or digestive tract."

- A Guide to Industrial Respiratory Protection (10, p. 18)

There are currently no studies establishing the safety of using masks in the community setting, and little to no guidance around mitigating risks. Over the past year researchers have been raising concerns about their use in various settings and populations. Consideration of these concerns could inform decisions around their use and the protections needed to ensure their safety.

Over the summer of 2020 the University of Vermont Department of Medicine released a study called *Risk Factors for COVID-19: Community Exposure and Mask Wearing*, co-authored by Vermont's Health Commissioner, Dr. Mark Levine. Among other things, this study found that "wearing a facial mask outside of work increased probability of COVID-19 infection."(84)

Increased spread of disease by the use of masks is a common finding in the research. In fact, this was one of the primary concerns about their use in community settings.(24) There are biological mechanisms by which mask use can increase the risk of COVID-19.(96) In a letter titled *Important potential side effects of wearing face masks that we should bear in mind*, the authors explain how masks may actually worsen COVID-19 infections:

"Face masks make breathing more difficult. Moreover, a fraction of carbon dioxide previously exhaled is inhaled at each respiratory cycle. Those phenomena increase breathing frequency and deepness, and they may worsen the burden of Covid-19 if infected people wearing masks spread more contaminated air. This may also worsen the clinical condition of infected people if the enhanced breathing pushes the viral load down into their lungs."(98)

The masks themselves may contain substances that are harmful to us if they touch our mucous membranes, or if we breath them in.(25-p. 22) Besides formaldehyde, other allergens that can cause irritation on the skin and ears have been found in surgical masks.(99)

Last spring the U.S. Food and Drug Administration's Emergency Use Authorization loosened manufacturing rules in order to increase production. Recent research has found evidence of foreign particles and fibers in some of the masks currently in use, and evidence that wearers may be inhaling these particles into their lungs.(100)

In March, 2021 Health Canada recalled masks that were coated with nanoform graphene after they had been distributed to schools, day-cares, transit services, and healthcare workers. This situation came to the attention of health authorities because a citizen complained about symptoms caused by wearing the masks:

"If the concerned citizen who originally made the complaint was experiencing strange symptoms, he/she wasn't alone… Some of the affected workers have since told CTV they noticed discomfort after wearing them repeatedly, including a feeling of 'breathing in cat hair' or getting headaches."(101)

Health Canada recommends people "Consult your health care provider if you have used graphene face masks and have health concerns, such as new or unexplained shortness of breath, discomfort or difficulty breathing."(102)

Health Canada notes in its guidance on nanoparticles: "Although little human data is available on the potential health effects of nanoparticle exposure, existing literature has drawn a causal relationship between nanoparticle exposure and adverse health effects."(103)

In a paper titled *Need for assessing the inhalation of micro(nano)plastic debris shed from masks, respirators, and home-made face coverings during the COVID-19 pandemic,* the authors warn that none of the standards adopted by the FDA regulate the debris that may be inhaled by wearers. "Further, complaints of throat irritation or discomfort in the respiratory tract by children, the elderly, or other sensitive individuals after wearing these may be alerting signs of excessive amounts of respirable debris inhaled from self-made masks and respirators."(66)

Other people may be at risk if mask wearers are unable to operate machinery safely, which has been a concern since the early days of wearing them on the jobsite.(13) As evidence that this problem is now becoming prevalent with their use in community settings, insurance companies have begun to issue warnings to drivers that masks can contribute to accidents. This is because they can cause a driver's glasses to fog up, block vision, and impact breathing, causing loss of consciousness (wearing a mask while driving).(104)

Serious Health Effects of Long-Term Use

Aside from the obvious quality-of-life issues that come with experiencing prolonged discomfort, there are also serious long-term health consequences associated with the difficulties respondents describe in the survey. The physiological reasons for the symptoms, and their long-term consequences, are not yet understood. Following are a few examples of how long-term use can have serious health effects.

We know that chronic stress can have damaging effects on the immune system.(105) Mask use in the community setting appears to be increasing everyday stress levels. In a survey of 1,000 adults across the U.S. in October, 2020: "Nearly a quarter of (24%) Americans say that feeling a heightened sense of alert best describes how they feel when they are out shopping for groceries **while** wearing a mask."(82)

Headaches are a symptom of an underlying problem, however they can also cause damage in and of themselves. The Mayo Clinic lists possible complications that can develop as a result of daily headaches: "If you have chronic daily headaches, you're also more likely to have depression, anxiety, sleep disturbances, and other psychological and physical problems."(106)

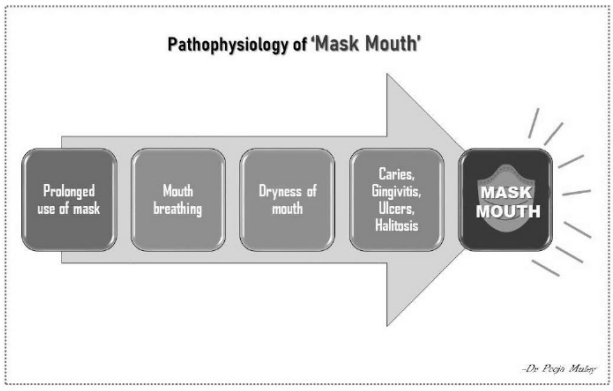
N95's restrict breathing by about 37%.(14). Restricted breathing has been linked to permanent damage to the body. For example, studies of those with conditions such as COPD and asthma, which also restrict breathing by about a third, show that structural damage in the lungs and changes in immune reactions are among the long-term effects.(107)

An article by Baruch Vainshelboim, of the Cardiology Division at Stanford University, published in 2020 and titled *Facemasks in the Covid-19 era: A health hypothesis*, is a consolidation of the existing evidence linking these conditions to severe health consequences:

> "*It is well established that acute significant deficit in O2 (hypercapnia) even for a few minutes can be severely harmful and lethal, while chronic hypoxemia and hypercapnia cause health deterioration, exacerbation of existing conditions, morbidity and ultimately mortality."*(75-p. 2)

Another researcher suggests a new term for the effects of long-term mask use: *Mask-Induced Exhaustion Syndrome*. "MIES is a condition described as the psychological and physical deterioration as well as multiple symptoms... because of their consistent, recurrent and uniform presentation from different disciplines… Extended mask-wearing by the general population could lead to relevant effects and consequences in many medical fields."(108)

Mask Mouth:



MASK MOUTH DIAGRAM by Dr. Pooja Muley (109)

"Mask Mouth" is a new term that describes the negative effects wearing masks has on dental health. Some estimates are that about 50% of dental patients are exhibiting symptoms, such as inflammation and bad breath, and that it could be causing gum disease, which can eventually lead to strokes and heart attacks.(110)

As early as August, 2020 Dr. Pooja Muley published an article explaining that mask mouth is caused by prolonged use of the mask, which causes mouth breathing. Mouth breathing dries out the mouth, leading to cavities, gingivitis, ulcers, and bad breath. This condition can be prevented by staying hydrated and taking frequent breaks, and Dr. Pooja concludes: "So it is the need of the hour to act fast and save the population from the long-term effects of 'Mask Mouth'!"(109)

Pneumonia has been associated with poor dental health. In 2020 a review of the health records of over 100,000 participants found that "regardless of age and comorbidities, oral health status and oral hygiene behaviors were associated with pneumonia", and that this finding is in line with previous research connecting dental health with hospitalizations and morbidity due to pneumonia.(111)

A 2008 study co-authored by CDC director Dr. Anthony Fauci concluded that bacterial pneumonia caused the majority deaths in the 1918 – 1919 "Spanish" flu epidemic. The high death count from the "Spanish Flu" epidemic was likely due in some part to bacterial pneumonia. "The majority of deaths in the 1918–1919 influenza pandemic likely resulted directly from secondary bacterial pneumonia caused by common upper respiratory–tract bacteria."(112)

Environmental Harm

The WHO December Interim Report on masks states that decision makers should consider waste management issues when making mask recommendations.(25, p. 11) There has been growing concern about the pollution caused by masks, as the amount of mask waste ending up in the environment is staggering.(113)

The materials masks are made of also make them more likely to persist and accumulate in the environment. "Ranging in size from 5 mm to microscopic lengths, microplastics, which include microfibers, are being ingested by fish, plankton and other marine life, as well as the creatures on land that consume them (including humans)."(114)

Youth

Previous research about mask use among youth has focused mostly on their ability to tolerate short-term use of respirators as protection against environmental contaminants such as smoke or other pollution.(115-6) There is no research establishing that prolonged use of masks by children is safe, or effective in preventing the spread of viruses.(8) In fact, research continues to emerge confirming that youth are not likely to spread the virus to others, including a study conducted by Vermont's Health Commissioner in 2020, where the authors state: "We found that seeing more children per day does not increase the probability of getting COVID-19."(84)

Schools in Vermont were closed for in-person learning from March 13 through the end of June. Over the summer of 2020 the Vermont Agency of Education(AOE) and the Vermont Department of Health (VDH) issued a document providing guidance for reopening in the fall.(45)

On the subject of masks, the AOE/VDH document suggested that all students and staff should wear them while in the school building. It also advised that students must wear facial coverings during physical education activities.

In the fall of 2020 the World Health Organization (WHO) issued advice for mask use among youth that contradicted much of the advice given to Vermont schools. Based on evidence of the low-risk youth pose, the WHO suggested that masks should only be used by youth in areas with widespread transmission, and even then not by children 5 years old and younger. It also suggested that decisions about mask use be made in consultation with other professionals and parents.(117)

On the issue of physical activities, the WHO warned: "Children should not wear a mask when playing sports or doing physical activities, such as running, jumping or playing on the playground, so that it doesn't compromise their breathing."(117)

Youth have been required to wear masks while playing sports in Vermont since reopening in the fall of 2020. As of the latest guidance (May 18, 2021), youth who play contact sports will still be required to wear a mask: "Consistent with AOE's *Strong and Healthy Year* guidance, athletes participating in school-based sports involving close proximity, moderate or high contact must continue to mask during school-sanctioned events regardless of vaccine status."(118)

In the fall of 2020, a survey in Germany collected over 20,000 surveys parents in two weeks describing the effects of masks on their children. Half of the students in the survey were experiencing headaches and difficulty concentrating, over a third reported drowsiness, and over a quarter of them felt short of breath and dizzy. Are these children exhibiting signs of oxygen deprivation? (The mechanics of this are described in the *Historical Perspective* and *Biology* sections of this paper.) What effect will this have on their developing brains?

Numerous social and emotional effects are also described in the German survey. The authors conclude by expressing concern that there is no previous research on the safety of the materials, or the long-term use of masks on children:

"Based on our data, it can be said that the effects of compulsory masks on the quality of life and presumably also on the health of individual children should not be ignored by politics and society...

"Looking at the symptom spectrum of the complaints, 66.1% of the interviewees show a clear and broadly diversified burden of complaints, both in the physical (rashes, headaches, etc.), as well as in the mental (fears, irritability, etc.) and intellectual (concentration disorders) areas in the children of the interviewees...

"Families are currently free to choose their children's mask type according to the thickness of the material and thus there is still a margin between breathable and multi-layer, rather airtight models, yet the problem remains that parents, regardless of whether or not they themselves approve of the corona protection measures, can overburden their children through ignorance or fear of infection by using masks that are inappropriate for their child. A benefit-risk analysis is therefore called for. However, this is complicated by the fact that the study situation is extremely weak both in terms of benefits and

risks. Both the calculations of a benefit from masks and almost all studies of the risks of masks are based on adults."(6)

Learning to interpret other's non-verbal communication and communicate with others are important skills children need to acquire at certain points in their development, and learning to read facial expressions is a key component in this process.(119) Yet, at the time of this writing, the American College of Obstetricians and Gynecologists recommends that women should "use a face mask or covering when holding your baby, including during feeding."(120)

What are the long-term effects going to be from denying children the opportunity to see faces at key stages of their development? There is growing concern that masks will be detrimental to the development of speech and development.(121)

An article written by Manfred Spitzer titled *Masked education? The benefits and burdens of wearing face masks in schools during the current Corona pandemic* describes relevant research that can help us understand the scope and scale of the long-term damage masks can cause in terms of child development, and is recommended reading for all who are willing to begin addressing the harms.(122)

This author attended school board meetings at two local schools in the fall of 2020 to present this information to our local decision-makers. In both cases she was denied time on the agenda, and the board leaders expressed that, regardless of any concerns, they were going to follow the guidance from the State.

Censorship

"I imagine this is not an uncommon reaction being experienced by many hearing-impaired people, but I do not know the extent to which it is being recognized as a public health issue- which I believe it to be."

- Vermont Mask Survey Respondent

Attempts to bring the data collected in The Vermont Mask Survey to our state decision makers has had no result. In the fall of 2020 The Vermont Mask Survey Fall Report was shared with health departments and media outlets across the state. Aside from two independent newspapers, a couple of online journals and public access channels, and two locally-owned newspapers, there was no response from government or mainstream media.

Front Porch Forum would not allow the author to make a post notifying her neighbors about the results of the survey. VT Digger refused to publish the Fall Report press release, and refunded her money.

It seems that any attempt to acknowledge the known harms caused by wearing masks is censored. As this paper is being written and published, several references cited in it are being retracted, and disclaimer banners are being posted above the articles. While evidence of the harms is continually denied, there is no contradicting evidence proving masks are safe.

Over the 2020-2021winter the author brought the findings to a local select board, two school boards, a food coop board meeting, leaders at three unions, and the Central Vermont Regional Planners. A few of the community leaders were willing to acknowledge the possibility that masks can cause harm. However, the most vocal reactions expressed a belief that people must avoid COVID-19 at all costs, and universal mask use is necessary in order to do so.(123 – 4)

It appears that a fair evaluation of the costs and benefits needs to be conducted before people will be willing to acknowledge and address the harms.

A Cost/Benefit Analysis

"When implementing mask policies for the public, decision-makers should:

- *inform/train people on how to use masks*
- *consider the feasibility of use, supply/access issues (cleaning, storage), waste management, sustainability, social and psychological acceptance (of both wearing and not wearing different types of masks in different contexts)*
- *continue gathering scientific data and evidence on the effectiveness of mask use (including different types of masks) in non-health care settings;*
- *evaluate the impact (positive, neutral or negative) of using masks in the general population (including behavioral and social sciences) through good quality research"*

- WHO December Interim Report, *Mask use in the context of COVID-19* (25-p. 11)

Do the benefits of wearing a mask in the community setting, as a way of preventing COVID-19 illness, outweigh the costs? This is a practical, and necessary question to ask of any health policy. For example, the U.S. Department of Health and Human Services routinely conducts Regulatory Impact Analysis (RIA's) to "help ensure that regulatory actions are justified and necessary to achieve social goals" and "agencies should proceed with the regulation only if they can reasonably determine that its benefits justify the costs."(125, p. 1 & 2)

Researchers have been increasingly calling for a cost/benefit analysis of the measures implemented globally in response to COVID-19:

"Wearing facemasks has been demonstrated to have substantial adverse physiological and psychological effects. These include hypoxia, hypercapnia, shortness of breath, increased acidity and toxicity, activation of fear and stress response, rise in stress hormones, immunosuppression, fatigue, headaches, decline in cognitive performance, predisposition for viral and infectious illnesses, chronic stress, anxiety and depression. Long-term consequences of wearing facemask can cause health deterioration, developing and progression of chronic diseases and premature death. Governments, policy makers and health organizations should utilize proper and scientific evidence-based approach with respect to wearing facemasks…"

- Baruch Vanshelboim, Stanford Cardiology Division (75-p. 5)

"We call on all scientists, public health officials, journalists, and politicians to weigh and consider the collateral damage from government COVID-19 control measures and their negative effect on many short-term and long-term health outcomes. While trying to control COVID-19, all aspects of physical and mental health need to be jointly considered. Other life-threatening diseases are being neglected, and patients with these diseases should receive the same timely and appropriate medical treatment as patients with COVID-19."

- Günter Kampf & Martin Kulldorff, *The Lancet* (126)

On February 6th, 2021 the Ontario Civil Liberties Association published a report which referred to the mask and distancing provisions as "arbitrary and nonsensical" and that considering the harms caused by the measures, "if Ontario was a science-based society, the government would apply the precautionary principle by immediately declaring a moratorium on all transmission-mitigation regulations, until policy-grade studies prove their worth in a rigorous harm-benefit appraisal framework."(127)

While an ongoing cost/benefit analysis is the basis of good public health policy implementation, there appears to be no cost/benefit analysis process in place at the Vermont Department of Health. One year after the COVID-19 Emergency was declared, this author wrote an Open Letter to the Vermont Health Commissioner and the Department of Health encouraging them to share their process of evaluating the harms and benefits of the measures, and to include Vermonters in the discussions.(47) The letter was also shared with health departments and media outlets across the state, including handing hard copies to major news outlets and the Health Commissioner himself at press conferences in April. There has been no response from the government or the main stream media.

Mask Effectiveness

"We know that wearing a mask outside health care facilities offers little, if any, protection from infection. Public health authorities define a significant exposure to Covid-19 as face-to-face contact within 6 feet with a patient with symptomatic Covid-19 that is sustained for at least a few minutes (and some say more than 10 minutes or even 30 minutes). The chance of catching Covid-19 from a passing interaction in a public space is therefore minimal. In many cases, the desire for widespread masking is a reflexive reaction to anxiety over the pandemic."

- Universal Masking in Hospitals in the Covid-19 Era, *The NEW ENGLAND JOURNAL of MEDICINE*, May, 2020 (128)

How much more likely is someone to catch the virus that causes COVID-19, or to pass it on to others, if they don't wear a mask?

We know that face masks are not approved for medical use because they have not been shown to be effective. N95's are only 95% effective at catching virus-sized particles if fit properly and tested. Non-medical masks are only temporarily approved for virus-prevention by the general public under the current FDA Emergency Use Authorization. (See *Defintions* section in the Introduction.)

This summer University of Vermont Department of Medicine released a study called *Risk Factors for COVID-19: Community Exposure and Mask Wearing*, co-authored by Health Commissioner Dr. Mark Levine. Among other things, this study found that mask wearing made no statistically significant difference between those who tested positive and those who did not. It also found that "wearing a facial mask outside of work increased probability of COVID-19 infection." This study confirms that "Further research into the effectiveness of marks and behavioral responses to mask mandates is urgently needed."(84)

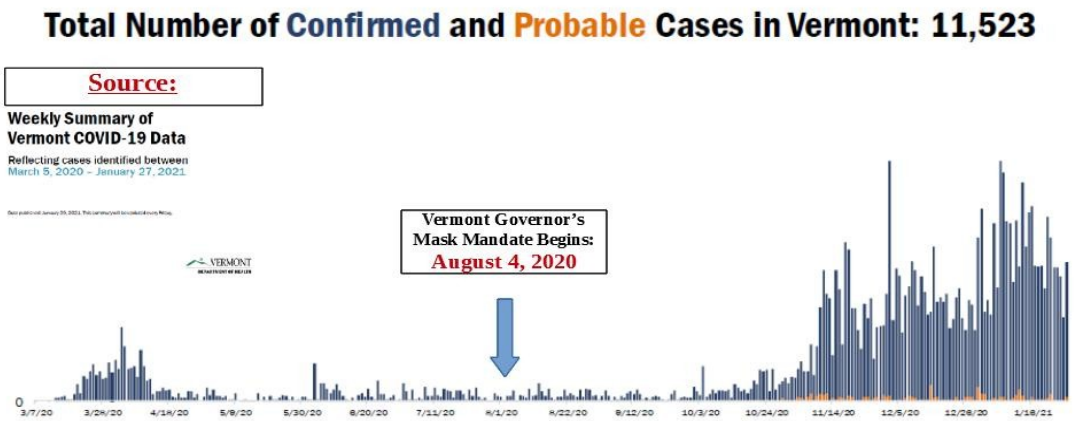
Far from surprising, the UVM study's findings are in line with the expectations. Previous research on the ineffectiveness of face masks in preventing respiratory infections abounds. In 2011 a systematic review of the evidence found that "None of the studies established a conclusive relationship between mask / respirator use and protection against influenza infection."(129)

Due to supply shortages, cloth masks have been the subject of much research to see if they are an effective substitution for FFR's (such as N95's). In 2019 researchers from Nepal examined the fabrics of cloth masks in the laboratory and how they held up under prolonged use and washing. They concluded: "The findings of this study suggest that C[loth] M[asks] are not effective, and that effectiveness deteriorates if used after washing and drying cycles and if used under stretched condition."(130)

New findings confirming the ineffectiveness of face mask use in the general public continues to emerge as researchers examine the effectiveness of the practice in slowing the spread of COVID-19. The first large-scale randomized controlled trial on community use found no statistical difference between mask wearing and no mask wearing. The Danish study, which was conducted in the spring of 2020, included over 3,000 participants.(131)

Mask mandates across the U.S. appear to have had no impact at all on the natural slope of infection rates, as demonstrated in research released this fall by Rational Ground. The author created graphs which show state infection rates over the past year, and provides an arrow to indicate when the state's mask mandate was enacted. The graphs demonstrate that there was an identical infection trend across states that was not impacted by the mask mandates at all. When states with mandates were compared with states without mandates, the slope of infections was identical, but those without mandates had fewer cases overall.(132)

Below is a chart made by this author using the same method. It demonstrates that the mask mandate in Vermont also had no effect in COVID-19 cases:



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A compilation of the existing research compiled by Marilyn M. Singleton, M.D., J.D. and published by the Association of American Physicians and Surgeons explains why cloth masks are not effective in protecting the wearer (source control) or others (as PPE). After reviewing the data available about the virus itself, Singleton concludes "the chance of catching COVID-19 from a passing interaction in a public space is therefore minimal… Wearing masks (other than n-95's) will not be effective in preventing Covid-19…"(133)

Community Settings

> *"In specific circumstances and settings in which procedures that generate aerosols are performed, airborne transmission of the COVID-19 virus may be possible. The scientific community has been discussing whether the COVID-19 virus, might also spread through aerosols in the absence of aerosol generating procedures (AGPs). This is an area of active research. So far, air sampling in clinical settings where AGPs were not performed, found virus RNA in some studies (13-15) but not in others. (11, 12, 16) However, the presence of viral RNA is not the same as replication- and infection-competent (viable) virus that could be transmissible and capable of sufficient inoculum to initiate invasive infection. "*
>
> - WHO June Interim Report, *Mask use in the context of COVID-19* (1- p. 2)
> (Citations refer to the WHO document)

Existing and emerging evidence continues to confirm that, though particles of the virus that causes COVID-19 can be found in the air, it has never been considered an "airborne" disease. As the CDC describes it, "...were SARS-CoV-2 spread primarily through airborne transmission like measles, experts would expect to have observed considerably more rapid infection in early 2020…"(134)

The *Reproduction Number* (***R***0) is a term used to describe how contagious a communicable disease is. Viruses that can be transmitted through the air, such as measles and chicken pox, have an ***R***0 greater than 10. This means that a person who is infected is able to infect about 10 other people. The flu typically has an ***R***0 of around 1.3. (135) The ***R***0 for the virus that causes COVID-19 (SARS-CoV-2) is between 2 and 2.5, nowhere near as contagious as airborne viruses, and almost twice as contagious as the common flu. (136)

Even if there were enough virus particles in the air to infect another person, only N95's have a weave fine enough to block them, and then only 95% of the time if fitted and tested properly.(35-5)

The evidence also continues to confirm that, like most viruses, SARS-CoV-2 is not likely to spread through casual contact with ***asymptomatic*** carriers (people who do not have symptoms).(1-p. 3)

A recently published large-scale study involving testing of nearly 10 million people in China found that "[t]here were no positive tests amongst 1,174 close contacts of asymptomatic cases." The study confirms that "asymptomatic positive cases detected in this study were unlikely to be infectious."(137)

As a systematic review and meta-analysis published in the *Official Journal of the Association of Medical Microbiology and Infectious Disease Canada* concludes:

"Though the rate of asymptomatic COVID-19 cases has received considerable attention, we could find only nine studies that provided an adequate sample frame and follow-up to ascertain a valid estimate of the proportion of asymptomatic cases…. Only four of the nine studies provided any valid data on transmission rates from asymptomatic cases, all suggesting lower rates of transmission than from symptomatic cases."(138-p. 230-31)

Quality Science

*"At the present time, the widespread use of masks by healthy people in the community setting is not yet supported by **high quality** or **direct scientific evidence** and there are potential benefits and harms to consider."*
- WHO June Interim Report on Masks (1-p. 6)

*"At present there is only **limited and inconsistent** scientific evidence to support the effectiveness of masking of healthy people in the community to prevent infection with respiratory viruses, including SARS-CoV-2."*
- WHO December Interim Report on Masks (25-p. 8)

"Science" is a method on ongoing inquiry that continually tests a hypothesis. "Data" is evidence. Real world evidence is the only way to confirm a scientific theory. The results must be repeatable, with various co-factors eliminated in order to understand if, in fact, "A" caused "B" to occur.

Before coming to conclusions, we need to look at and weigh the evidence. This is the scientific method, and it is what scientists do. Citizens are encouraged to do their own research. We must examine the evidence for ourselves and evaluate whether the data supports the conclusions.

In order to evaluate the evidence, we must consider its ***quality***, ***source***, and ***relevance***.

Can models created by mathematicians accurately assess health risks? Are studies of healthy workers in health care settings relevant to the general population? Does the evidence of aerosolized particles in a laboratory prove that enough of it exists in the real world to cause infection? Are blood-oxygen levels an idicator of oxygen deficiency at a cellular level? Will this author gain financially, socially, or politically from their findings?

The Vermont Mask Survey is evidence-based. The author has gathered examples of the best data there is available from official sources, respected publications, and experts in the field, including randomized controlled trials (RCT's), systemic reviews, meta-analysis, and real-world research, with results that are repeatable and varified over decades of research. Every conclusion in this document is supported by references from reliable sources. If articles by journalists were cited, it was only after validating and supporting their statements.

What evidence exists demonstrating that there ***may*** be **benefits** of wearing masks in community settings to prevent COVID-19?

The Centers for Disease Control (CDC) provided 45 references in its Scientific Brief titled *Community Use of Cloth Masks to Control the Spread of SARS-CoV-2"* (updated November, 2020). The references are presented as evidence that mask use in community settings ***may*** reduce the spread of COVID-19. None are conclusive, and most mention the fact that more research is needed to determine if there is a benefit.(139)

These references are the best evidence that the CDC has, and is presented in order to defend its decision to recommend masks in community settings. (This list of references has been growing since the first publication of this Scientific Brief in the spring of 2020.) A review of the references will reveal that none of them are high quality, direct, or consistent evidence because they do not provide real-world, repeatable evidence of benefit.

The references themselves note the need for more conclusive evidence. For example, the 39th reference cited states: "The effect of face masks worn in public on the spread of Covid-19 has not been systematically analyzed so far… We simultaneously stress the need for more detailed analyses."(140)

Each of the 45 CDC references is one or more of the following types of study:
(For a color-coded list, go to: https://vtmasksurvey.com/evidence-masks-work/)

Model: Mathematical models are unable to include the countless real-world factors involved. The reliability of the results depends on the reliability of the data being used and the formula being used.

Epidemiological: These review population data, looking for trends to inform a hypothesis. They cannot be conclusive because they do not rule out coincidence. This is known as *correlation does not equal causation.* There are countless factors to consider in the real-world, and studies of other populations find different conclusions. Their results are meaningless in isolation.

Lab Study of Droplets: Does not prove that droplets released by asymptomatic people in community settings are able to cause infection.

Study of **Symptomatic People:** Not relevant to masking people who are asymptomatic.

Mask wearing **in Combination with Other Strategies:** Data collected is based on a combination of strategies (washing hands, distancing, etc…), therefore the effects of masks alone is unclear.

Prolonged Closed Space Contact: These are examples of transmission on a navy ship and airplanes, with confined spaces and limited airflow not relevant to community settings.

-Nijsten, *How Epidemiology Has Contributed to a Better Understanding of Skin Disease* (141)

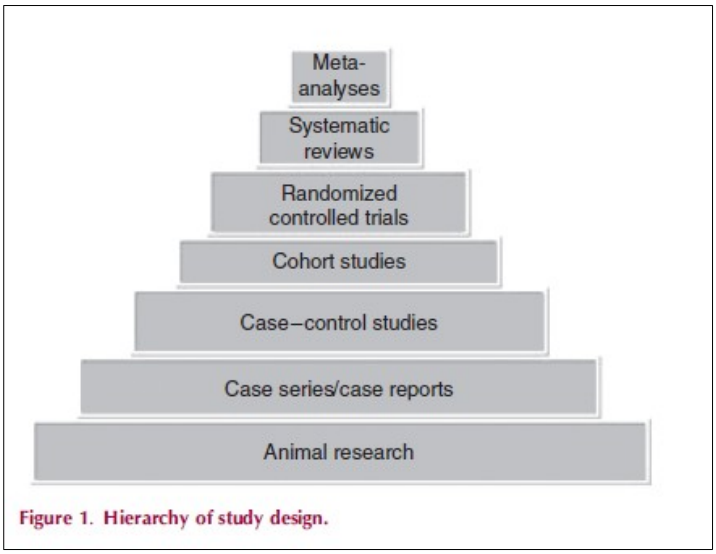

Figure 1. Hierarchy of study design.

A large part of the scientific process is learning to weigh the evidence, and understand that some types of evidence are more reliable than others:

"It is important to be aware that these models can only adjust the observed association for variables in the model (i.e., factors that have been measured in the study) and that there is always residual confounding (i.e., the effect of factors unknown or not included in the analysis)...

"An inability to differentiate definitively between a simple association and a true causal relationship is the intrinsic limitation of ***epidemiology…****"*(141- p. 995)

In an article titled *Why Most Published Research Findings are False* the author explains: "Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true. Moreover, for many current scientific fields, claimed research findings may often be simply accurate measures of the prevailing bias." "Before running an experiment, investigators should consider what they believe the chances are that they are testing a true rather than a non-true relationship."(142- p. 5)

As it is in science, there continues to be a debate. As one rebuttal letter published in the *International Journal of Infectious Diseases* states: "Several systematic reviews and meta-analyses suggest a potential benefit of facemasks and viral respiratory; however, most of them include mostly non-randomized studies, RCTs with serious methodological issues, and studies mainly deriving from the health care setting." The authors conclude: "Due to these divergent results and the lack of high quality context should be issued with caution."(143)

While there are no randomized-control studies (RCT's) demonstrating the effectiveness of masks, there are several proving the opposite. For example, an RCT in 2015 found that mask use increased the rate of influenza like illness (ILI) among health care workers due to the moisture retention, reuse of cloth masks, and poor filtration.(38) Another more recent example is an RCT conducted over three years

with Haji pilgrims. It found that “Facemask use does not prevent clinical or laboratory confirmed viral respiratory infections…”(144)

As clear as the evidence is, researchers seem hesitant to write conclusions which disagree with the CDC’s position, even when their own data shows otherwise. The Danish study cited above is one example.(130) Another is a meta-analysis of the available data titled “Facemask use in community settings to prevent respiratory infection transmission: a rapid review and meta-analysis” published in the *International Journal of Infectious Diseases.* This study recommended the use of face masks, despite also noting the fact that “[c]urrently, no direct evidence is available in humans supporting the recommendation of cloth facemask use to prevent respiratory transmission.”(145)

The data speaks for itself, if people are willing to look at it.

Media Literacy

> *“The next step is full transparency about decision making systems, processes, and knowing who is accountable for what…. Importantly, suppressing science, whether by delaying publication, cherry picking favourable research, or gagging scientists, is a danger to public health, causing deaths by exposing people to unsafe or ineffective interventions and preventing them from benefiting from better ones.”*
>
> - Abbasi, K., Covid-19: politicisation, “corruption,” and suppression of science (146)

If the evidence of the harms of masks is so clear, and the benefits of using them is so unclear, why do so many people believe the opposite?

Corporations such as Youtube are now deciding what constitutes “misinformation”, and are censoring basic information from reliable sources if they conflict with CDC policy, as a physician and economist at Stanford Medical School pointed out this spring in an article titled *Masks for Children, Muzzles for COVID-19 News.*(147) Are there financial or political reasons for corporate media’s censorship of this information?

As the media provides continual one-sided coverage, it can cause what is known as *The CNN Effect*. As viewers are directed towards humanitarian issues which contribute to the geostrategic goals of the producers, they are simultaneously left ignorant of other, larger humanitarian emergencies because they receive little to no coverage at all.(148)

This one-sided coverage of masks as a protective talisman, after the intensity of the lock-downs and isolation imposed to address COVID-19, seems to have caused an intense emotional attachment to them in some people. For some, any discussion of evidence to the contrary causes such an emotional reaction that reasoning becomes impossible, evidenced by the strong responses this survey received, including attempts to thwart it altogether. (See *Results Set 2 & 3, Bias, Censorhip,* and *Political and Social Pressure* for examples.*)*

Just as with smoking tobacco 100 years ago, media-driven social pressure can influence people to develop habits which can continue to cause harm for decades to come. Like cigarettes, masks have become a fashion, a public symbol of membership in a certain group.(7) Just as with smoking, people are willing to ignore the obvious, including their own physical symptoms, such as difficulty breathing and throat pain, in order to be part of the group. If truly followed, the scientific process can eventually bring the truth to light. In the meantime, however, the damage is being done. Despite wide-spread acknowledgement of the harms of tobacco, it is still the leading cause of preventable death, killing an estimated 6 million people a year, plus an additional 600,000 due to second-hand smoke. (149)

Just as with smoking tobacco, if the media continues to deny the existence of harms caused by masks, it will be possible for people to continue to justify their use.

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CONCLUSION

"First, Do No Harm."

The Vermont Mask Survey (VMS) has gathered real-world evidence of the harm people in our state are experiencing as a result of wearing masks. Though a small sample, the results provide evidence of all the expected harms, across a wide variety of community settings. It provides evidence that the people harmed the most are those the mask measures were intended to protect, such as the elderly, those with pre-existing conditions, and "essential workers."

The harms described by survey respondents are well documented in existing and ongoing high-quality research. Respondents describe precisely the types experiences we would expect based on the mechanics of biology and the importance of proper respiratory function. Workplace protections exist in order to prevent and address these harms. Throughout the past year, experts from well-established orgnanizations in the fields of medicine and research have continued to warn of the dangers of their continued use. Yet there has been an ongoing denial of these facts and strong bias against their consideration by the main-stream media, government officials, and community members who have become attached to their use. This Final Report provides evidence to explain and address all of these issues.

Since March, 2020 employees, customers, patients, students, and the general public have been encouraged by state mandates, OSHA requirements, fines and disciplinary measures, media messages, and social pressures to wear masks at work, in schools, medical facilities, while exercising, and in most community settings in Vermont.

The Vermont Mask Survey appears to be the only attempt in the state so far to assess the health implications of the current use of this medical intervention.

Officials have failed to instruct the public on proper mask use, do not advise employers on how to provide supervision, fail to encourage exemptions for those with pre-existing conditions, are not attending to supply issues, and appear to be solely interested in achieving compliance. Attempts to discuss the harms associated with the use of masks with these officials has been largely ignored. As a result, people are continuing to wear masks despite experiencing difficulties in order to protect others, keep their jobs, and avoid criticism.

Are the harms caused by masks being ignored so that they can continue to be used to coerce people into getting vaccinated, as they have allegedly been used in health care settings?(33) Or to punish those who do not submit to a growing list of medical interventions, such as testing, vaccinations, booster shots, contact tracing, lock-downs, and so on?

At the time of this writing (May 15, 2021), the Governor of Vermont updated his Executive Order and is now mandating the continued use of facial coverings only by people who are "unvaccinated." (150)

Public officials are accountable for their decisions. Those who implement public health policies are required to conduct a fair, transparent, risk assessment and ongoing cost/benefit analysis of their actions, taking into account the social, physical, and mental harm they are causing. The constituents most affected should be included in making decisions that directly impact their health. This is how public health policy is conducted, and the people of Vermont deserve humane treatment.

The potential of long-term mental, physical, and social health consequences of using masks is a valid concern, demonstrated clearly in the research. It is crucial that we fully assess the effectiveness and safety of using masks in community settings so that we can prevent and mitigate the harms.

The results of The Vermont Mask Survey demonstrate that more research and awareness is needed so that conditions can be improved, the suffering ended, and the healing can begin- immediately. Perhaps this report can to serve as a reference guide to support and inspire those who would like to assist in this process, whether they are decision-makers, bystanders, or on the front lines.

May we work together to address the harms and improve the health of our Vermont communities.

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CONFLICT OF INTEREST: There are no potential conflicts of interest.

The *Vermont Mask Survey Final Report* and other resources are available on the website: vtmasksurvey.com

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