A Rapidly Changing View of Covid-19

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In my experiences as a hospice doctor for the past 15 years, I have seen up close how fundamental the fear of death is, and how it can take over people's decision making in sometimes unhealthy ways. I have also seen how people can recover from acute illnesses when they have good caregiving, even if they already have advanced underlying health conditions. Unfortunately, despite increasing evidence that the covid-19 virus is much weaker than originally thought, the fear of its lethality has remained largely unchanged. While many people have died, and there have been many heartbreaking and tragic outcomes, the exaggerated fears, combined with current social isolation policies based on these fears, have made these outcomes worse in terms of morbidity, mortality, and especially with increased suffering in the people who do have severe symptoms. These isolating human reactions and the policies based in them undermine people's immune systems, disrupt healthcare, and prevent quality caregiving. If the research reviewed in this paper was considered more thoroughly, the reduced risks of covid-19 would be better understood, and the anxiety level would be greatly reduced. This would allow interventions to support people's own healing systems, including improved health care delivery, improved caregiving and more social support, which would help quality of life and also increase quantity of life, substantially increasing the survival rate for covid-19.

This paper will review eleven research studies showing that the actual death rate from covid-19 is at least several orders of magnitude lower than the official, earlier estimates. These studies consistently find that many times more people test positive for covid-19 than believed possible, that a high percentage of these cases have minimal symptoms, and they are only discovered by research studies which test large numbers of relatively healthy people. Death rates varied from 1 in 1700 in an early study in Italy, to one in 200 in New York, and the CDC fatality rate was eventually listed at 1 in 250 on their website. However, these rates would be much lower if several other factors were considered including deaths in severely understaffed and sometimes abandoned long term care facilities, so the CDC estimates provided in more optimistic scenarios 1 and 2 are much more likely, with a rate of 1 in 500 (CDC Covid-19 Pandemic Planning Scenarios, 2020, table 1). This nursing home crisis is one of the reasons for the extreme age variation in mortality, and if caregiving had been supported and increased in quality, instead of being severely disrupted, it is likely that more than half of the deaths in elderly and could have been prevented. Children and adolescents have been remarkably spared in the epidemic, with only about 20 deaths in children and adolescents in the first 6 months of the pandemic worldwide, compared to about 360,000 deaths in adults. Adults under age 50 are listed by the CDC as having a fatality rate of only 1 in 2000 in their "best estimate" and 1 in 5000 in scenarios 1 and 2. Adults between 50 and 65 had an estimated risk of 1 in 500, and only 1 in 1000 in scenarios 1 and 2 (CDC Covid-19 Pandemic Planning Scenarios, 2020, Table 1). Just as in older adults, the risk is much lower for people with no underlying illness, and about

half of the people who have died lived in long term care facilities where social isolation and care disruption due to fear of the virus were the most severe. Influenza affects young people much more than covid-19, and in the US alone about 200 children and adolescents died from influenza last year, about ten times more than the total number of deaths worldwide during the first 6 months of covid-19 (Halperin, 2020a&b). After discussing this age disparity in more detail, including the health benefits of reopening schools, there will be a brief discussion of how false positive and false negative tests tend to over count severe illness, and under count mild illness, which skews death rates from covid-19 to appear higher than they actually are. Reporting of deaths is another source of bias, because when covid-19 is diagnosed it is listed as a cause of death, even in people who had a life expectancy of only a few weeks before they were tested for covid-19, unlike other infectious illnesses. A large number of covid-19 deaths are presumed cases where no testing was done, and although these are included in death counts, an uncertain percentage of them would have tested negative for covid-19. Finally, a review of several prior infectious illnesses will be provided, including some relatively recent ones such as the swine flu and zika, as well as some older ones such as leprosy and a false epidemic in Nazi Germany that saved an entire Jewish town. These will illustrate how deeply ingrained and resistant to new information the human fear of infectious illnesses can be.

Social isolation policies to contain the virus have significant harms, especially to people diagnosed with covid-19, and many countries had success with milder policies in place.

The lower estimated fatality rates raise questions about the wisdom of current severe social distancing policies, which were introduced in an effort to protect people, but which have many obvious negative effects and are now appropriately being removed throughout the world. The negative effect on people diagnosed with covid-19 is rarely discussed, but the total isolation and quarantine can be extremely harmful to them, as well as to people who are only presumed or suspected to have it. Because one of the main goals of their care is to protect other people from them, caring for them is made very difficult and strains caregiving resources, whether in a private home, long term care facility, or a hospital. Their outcomes are worsened in quality of life and in increased risk of death, which in turn exacerbates the fears that were used to justify the isolation. However, not all countries have adopted the same level of social distancing. In Sweden and Iceland, schools and restaurants have remained open throughout the epidemic, and in Denmark schools reopened in mid-April, before any other European country. All three have had milder social restrictions, and a focus on protecting the health of vulnerable populations rather than trying to contain the virus completely with widespread lockdowns and universal school closures. Although many people warned of dire consequences in these countries, they have not happened. In Sweden the impact of covid-19 is better than some European countries and worse than others, so one can claim success or failure depending to whom it is compared. Sweden has had a similar nursing home crisis as other countries, and this is where over half of their deaths occurred, while Iceland avoided this problem, as will be described below.

After reopening schools, covid-19 infection rates continued to decline

Denmark reopened schools for children ages 2 to 12 in mid-April, based on data showing children have mild illnesses and that it is also very rare for them to transmit the virus to others, including adults. Denmark's infection rates continued to drop after reopening, so they reopened them for all ages about one month later. The drop in rates continued for both children and adults. They did apply mild social distancing with smaller class sizes, more space between desks, and used outdoor classes when possible, but they did not recommend wearing masks for teachers or children. They specifically allowed children to play normally, with no 6 foot distance, but in smaller groups than usual (Government of Denmark, 2020a&b; Will, 2020). Finland opened schools a few weeks later, and they had similar results, with no increase in covid-19 rates, and also did not recommend wearing masks in schools (Government of Finland, 2020). There had been much anxiety about restarting schools, and some infectious disease experts expressed grave concerns. However, after two months of careful data collection they had no negative effects, and just as in Denmark case rates continued to fall. An article May 29th discussed the success of reopening in Denmark and Finland: "'You cannot see any negative effects from the reopening of schools,' Peter Andersen, doctor of infectious disease epidemiology and prevention at the Danish Serum Institute said. In Finland, a top official announced similar findings on Wednesday, saying nothing so far suggested the coronavirus had spread faster since schools reopened in mid-May" (Mortensen & Skydsgaard, 2020). Schools around the world have had similar results as they have reopened, with initial anxiety followed by increased confidence. In some cases there have even been temporary school closings due to some positive covid-19 cases, but when it became clear that other schools did not have any issues, and the country's overall rates were not affected, they reopened (Halperin 2020a; van Druijten, 2020; Will, 2020: Zweig, 2020).

Deaths in children from covid-19 are extremely rare, while other causes of childhood mortality in developed countries such as injury related deaths are much more common. Calls by experts to open schools full time in September would reduce these other more common risks and help children's overall health, as explained in a report by administrators and clinicians from the Toronto Hospital for Sick Children.

In the United States each year about 10,000 children and adolescents die from injury related deaths, compared to total deaths worldwide from covid-19 of about 20 as of June 11th (Cunningham, 2018; Halperin, 2020a&b). Children and adolescents are at increased risk for these other much more common causes of death when they have excessive amounts of free time, with no school, work, or other activities. Injury related deaths include motor vehicle accidents, firearm injuries, suicides, drownings, choking, and drug and alcohol related injuries. Restarting

schools and other activities will not only help their mental and physical health, but also reduce many of these risks. Social connections are also major factors in staying mentally healthy. These issues, as well as the positive experiences after reopening schools in other countries, are some of the reasons that the Hospital for Sick Children in Toronto issued a statement June 17th urging full time restart of schools in September with only mild social distancing recommendations that can be adapted as needed to allow all students to attend. They recommended allowing closer than 6 foot contact and only optional mask wearing for students and staff, stating: "In general, masks should not be required for school staff if physical distancing is possible and is practiced appropriately. This is important as facial expression is an important part of communication which children should not be deprived of" (Hospital for Sick Children Advisory Group, 2020). They pointed out that there limited evidence of efficacy and a possibility of harm, including increased risk of infection from improperly discarded masks as well as from itching, touching, and rubbing the face while wearing them. They instead recommended regular hand washing which has more robust evidence in its favor. Similarly, infectious disease specialists from Harvard questioned mask wearing outside of healthcare facilities, including inside public buildings and especially outdoors, in an article on May 21st in the New England Journal of Medicine, stating: "We know that wearing a mask outside health care facilities offers little, if any, protection from infection" and that to transmit the virus, one needs "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." (Klompas et al., 2020). The CDC's website also states that in order to have a risk of exposure, one needs to be "within 6 feet of someone who has COVID-19 for at least 15 minutes" including in healthcare settings, making it extremely unlikely to contract from passing someone in a hallway, store aisle, or other space, no matter how close you come to them (CDC Quarantine Guidelines, 2020). Iceland's health authorities did not recommend mask wearing at all outside of healthcare facilities, and it has had one of the best outcomes in the world. Iceland's schools were kept open throughout the pandemic, and they had a total of only ten deaths, all in adults, as of June 1st. They resumed all normal youth activities on May 6th and have had much less societal stress. Their example deserves closer attention (Fund & Hay, 2020; Government of Iceland, 2020; Sullum 2020a).

Iceland's success: Using quality research results to guide policy, and to reduce unrealistic fears of covid-19.

Although Iceland is an extremely small country, making it easier for them to manage their health care, they also had a proactive stance based on research, unlike the vast majority of other countries. In Iceland a very large study was done starting right after their first cases were diagnosed in March which showed dramatically lower death rates and lower infectivity than prevailing beliefs, especially in children. This is a primary reason they kept schools open, and

the study they performed is one of the studies to be reviewed below. At that time they only had four deaths from covid-19 in all of Iceland, and the study indicated that there were at least 3000 positive cases of covid-19, which made it obvious to the people of Iceland that the illness was not as deadly as was previously claimed (Gudbjartsson et al., 2020). Although in other countries there have been concerns about an undercount of deaths due to lack of testing, in Iceland this was not an issue because they had one of the most comprehensive testing programs of any country in the world, including the ability to test nearly everyone who was ill, their close contacts, and a relatively high percentage of randomly selected healthy people with no illness (Sullum, 2020a). Another concern commonly expressed is that false negative tests result in undercounting deaths, which underestimates death rates. However, this ignores the fact that negative results, including false negatives, are more likely in people with mild or no symptoms, which actually causes an undercount of mild cases, and therefore a falsely elevated death rate, something which will be addressed in more detail later in this paper.

The Iceland study results were made widely known to Iceland's population, which reduced the fears of the virus, and they had daily remote healthcare visits for people in home quarantine, which also reduced anxiety in patients. These helped prevent many of the stressors that have occurred to health care and long term care systems in other countries. An article by Kolbert (2020) discusses Iceland's home health strategy in detail in an interview with Iceland's Director of Health, Alma Moller. "When new cases started to be diagnosed in a great rush, the backup team, along with doctors whose offices had been shut by the pandemic, counselled people over the phone. 'If you were over seventy, if you had high blood pressure, you got called every day,' Möller told me. 'But, if you were young and healthy, maybe twice a week. And I'm sure that this led to fewer hospital admittances and even to fewer intensive-care admittances.' This, in turn, appears to have cut down on fatalities. Iceland's death rate from COVID-19 is one … of the lowest in the world." Kolbert also interviewed patient who went through home quarantine in Iceland after being diagnosed with covid-19: "Every day, someone on the team of nurses and doctors phoned him. 'They asked me, 'How are you doing? What are your symptoms? Are you getting all the help you need?' he recalled. 'And that was really amazing. It was so comforting, knowing that they were doing this.' Widespread testing of healthy contacts was another strategy in Iceland which demonstrated to the entire population that most people positive for covid-19 had mild or no symptoms. The expanded testing also showed that covid-19 was not spreading rapidly, and that it was not so easily contracted even between members of the same family, despite family members being in close contact and not wearing masks or other protective gear. Although wearing masks in public has become common in many countries, it is not done in Iceland, and universal mask wearing has uncertain effects on preventing viral infections. A thorough summary of Iceland's approach from their Ministry of Health specifically addresses the mask issue: "The Icelandic authorities have not recommended that the public wears any sorts of face masks or cloths, and such practices are extremely rare in Iceland" (Government of Iceland, 2020).

By reducing fears to more realistic levels, better caregiving for people is much easier, whether in private homes, long term care facilities, or hospitals. Many experts have credited Iceland appropriately for their overall approach, but the very low mortality rate, which is the main focus of this paper, has been almost completely ignored. If people in other countries had been aware of the lower fatality and infectivity rates from the beginning of the epidemic, fears would have been lessened, more social contact would have been available for people who are ill, including from family, caregivers, health professionals and facility staff, and outcomes would likely have been significantly improved in all affected countries.

Fear of spreading the illness taxes caregivers and health care systems, making it almost impossible to provide adequate care to people who test positive for covid-19 and for those presumed or suspected to be positive.

One of the quandaries of being human is that we all know we are going to die, and yet we also have a powerful instinct to avoid death, no matter how impossible that goal may be. While this is normally seen in a negative light, it can also be met with other emotions, even humor, as indicated by this quote from the Dalai Lama: "If a person has prepared for death from a long time back, … he will feel that death is merely like changing his clothes" (Dalai Lama, 1991, page 108). Christian faith also recommends contemplation on mortality, as stated in Psalm 90:12, "Learn that you must die, that you may gain a heart of wisdom" (Fabrycky, 2020, page 188). Contemplation of mortality in this way can have healthy effects, and better inform people on how to live best in the present.

Unfortunately, it is people diagnosed with covid-19 who suffer most from the fears of the illness, however exaggerated they may be. In addition to the chilling effect on the person of the diagnosis itself, good care is extremely difficult when quarantines and social isolation have to be maintained, and when a primary goal is to protect other people from the person who is ill. People have a natural instinct to help one another, but when fear of contagion has been activated, this instinct is not allowed expression in the way it would be if the less threatening nature of covid-19 infection was more clearly understood.

Long term care crisis: As soon as covid-19 is diagnosed in a facility they lose much of their staff. In severe cases the facilities are sometimes completely abandoned. This results in a significantly increased number of preventable deaths, and about 50% of all deaths around the world from covid-19 happen to people living in long term care facilities.

Case Example: 80 year old with covid-19 admitted to hospice care

The first covid-19 patient that came to our hospice team was in early April. An 80 year old woman in an assisted living facility had had a febrile illness with shortness of breath, and tested positive, but the family wanted to keep her at home and start hospice care instead of

having her hospitalized. They knew that her moderate dementia made hospitalizations extremely frightening to her, and they also may have realized that a hospitalized person with covid-19 suffers more because of the isolation imposed on them and early intubation which is done partly to protect other hospitalized patients. The assisted living facility was badly understaffed due to staff calling in sick for nonspecific complaints like fatigue and headache, starting shortly after the first of several positive covid-19 tests was announced. The facility's head nurse was feeling extremely stressed, and was trying to keep together the few dedicated staff members like herself who were still coming in to work. Despite my knowledge of my extremely low risk of fatality based on my age and lack of underlying illnesses, I was still quite anxious when her hospice nurse and I went to visit her. Our patient was exhausted, but had not had a fever in several days. Her breathing and cough had both improved, but because of her fatigue, advanced age, and her dementia, she was unable to get a drink from her bedside table. She was dehydrated, and asked immediately for water, which her hospice nurse gave to her. She drank it readily, thanked us heartily, and asked for more. She did not appear at all phased by our masks, visors, double gloves, gowns, hair covers, and booties, and due to her dementia she was blissfully unaware that she had a frightening illness. One of us returned every day to offer fluids, and the facility staff also began to visit her more frequently. Her improvement was very rewarding to see, and she came off isolation two weeks later. Sadly, many covid-19 patients do not get this extra attention, and this pattern is being repeated all over the world, especially in understaffed nursing homes and assisted living facilities.

Another local assisted living facility in our hospice area had multiple staff members quit as soon as the first case of covid-19 was diagnosed there. Fortunately, enough courageous staff remained to take extra shifts to provide adequate care for most residents, but caring for those diagnosed with covid-19 was still very difficult due to the comprehensive contact and droplet precautions required, and they were generally left to fend for themselves. The local health department has helped facilities in our area by developing a comprehensive intervention strategy, designed partly to reassure staff and prevent mass desertions as has happened in many facilities around the world, but the negative impacts on people diagnosed or presumed to have covid-19 are still severe because they are isolated in a separate wing, protected by temporary walls and no one is allowed in or out except specially assigned staff. Virginia delayed releasing mortality for long-term care facilities until June 19th and at that time it was learned that in our region two thirds of covid-19 deaths occurred in long term care facilities (Potter, 2020).

It is difficult to find formal government reports on the problems in nursing homes, but a Canadian army joint task force was called in to assist in the crisis, and wrote a report documenting severe understaffing (Mialkowski, 2020). One facility was described as "severely understaffed", with "Morale and well-being of staff at risk. Many are overworked, seem burned out, and have no time off. Some have not seen their families for weeks." They state bluntly that "The staffing is such that it is impossible to provide care at a pace that is appropriate". They also report psychological and emotional difficulties, "teams report that they have not seen any psychosocial support for these residents who have all of a sudden had their families taken away."

They describe overuse of medications for emotional distress and anxiety such as "narcotics and benzodiazepines to sedate them". When the residents were asked to express their reason for distress, they are described as saying that "they're scared and feel alone like they're in jail." Another facility's staff issues are described more simply, "The current staff to patient ratio at the facility does not allow for more care than the most basic daily requirements. Residents are changed and fed. However there is no ability to provide skin care, repositioning, nail care, or wound care" (Mialkowski, 2020).

Case Examples from investigative journalists: Nursing homes with dozens of deaths, some completely abandoned with residents being relocated by health departments or military personnel.

Many tragic outcomes at long term care facilities throughout the world have been described by investigative journalists, where severe understaffing made it impossible to give adequate care, and in some cases where residents were literally abandoned and the local health department or military was called in to relocate residents to new facilities. Many people might blame facility staff for not being committed enough to their jobs, but this is extremely unrealistic. Very few people would continue to work if they thought they had a significant risk of death, and if they believed they risked infecting friends and family members. Similarly, nursing home administrators and health care departments are sometimes blamed, but they could only have a mild impact. The exaggerated fears are to blame for these tragedies, and until that is reduced to more realistic levels, the abandonment of covid-19 patients will continue to be a normal human response.

Condon et al. (2020) focus on a nursing home in New York which lost a third of its work force, making it nearly impossible to give adequate care, with a typically high death count of 55, even though no one was actually tested for covid-19 and all the diagnoses were "presumed". Presumed cases are also counted as covid-19 deaths, and this adds to the death tally that is focused on by the media and used when computing fatality rates from covid-19, including in all the studies reviewed below. In the article by Condon, seven other elder care facilities are briefly mentioned which each had 40 or more fatalities and were also badly understaffed. Another article in the New York Times by Bilefsky (2020) focused on cases with even more severe crises, starting with a nursing home in Canada where the health department was called in to relocate residents. Thirty-one residents died, but only five of them were confirmed positive for covid-19. The following quote shows the severe situation:

> "They found dehydrated residents lying listless in bed, unfed for days.... 'I'd never seen anything like it in my 32-year nursing career,' said Loredana Mule, a nurse on the team. 'It was horrific — there wasn't enough food to feed people, the stench could've killed a horse.' After she left the home, she said, she collapsed in her car and wept. A skeleton staff of two nurses had been left to care for a residence with nearly 150 beds. The remaining staff had fled amid the outbreak of the coronavirus, leaving patients, some paralyzed or with other chronic illnesses, to fend for themselves" (Bilefsky, 2020).

The same article describes similar examples occurring in several other countries, including the United States and Europe: "The phenomenon has been seen across Europe as well. In Spain, soldiers sent to disinfect nursing homes found people abandoned, or even dead, in their beds" (Bilefsky, 2020).

Another article by Privitera (2020) reported on the crisis in nursing homes in Italy, focusing on one called Don Gnocchi where more than 140 of their 600 residents died. A health care worker from the home provided details of the situation: "On his floor, 26 of the 77 residents have died since March. 'They died abandoned in their beds, many suffered', said Mastragostino.'" Whether the residents who died in these facilities were positive or not for covid-19, they would have had a much higher chance of survival if adequate care could have been given. The assumption that covid-19 was the primary cause of all these deaths is particularly pernicious, because it fuels the fears that led to the abandonment in the first place. The actual fatality rates from covid-19 have been established by population studies, and range between 1 in 1700 and 1 in 200, as will be reviewed below, making the number of deaths in these long term care facilities exceptionally high. If caregivers understood the actual fatality rates, which are many orders of magnitude lower than widely believed, there would be increased confidence in caring for those who are ill. The often repeated death count from covid-19 would also be reduced significantly, partly because such a high percentage of deaths worldwide occur in residents of long term care facilities.

Between 40% and 60% of covid-19 deaths occur in people who live in long term care facilities, usually with no family, clergy, or hired caregivers allowed to assist or visit.

More than a third of all deaths in the US are in people living in long term care facilities, and in many states they account for over half of the deaths (Romo, 2020). This number would be higher if people were counted who lived in a facility before being hospitalized, but these people are usually counted as hospital deaths. This pattern is also common in other industrialized countries where a relatively high percentage of the elderly live in elder care settings. In Britain, for example, between 40 and 50% of deaths have occurred in homes for the elderly, and in Sweden slightly more than 50% (Holt & Butcher, 2020). The article by Privitera (2020) cited a report from the London School of Economics that found that between 42% and 57% of deaths in several European countries occurred in facilities. In most facilities, including most hospitals, families and friends were not allowed to visit at all, regardless of whether their loved one was positive for covid-19. Hired aides, clergy, social workers, and chaplains are also often not allowed inside. While these policies appeared reasonable because of the intense focus on preventing the spread of the virus, they appear highly questionable when the lower death rates are made clear. They also undermine people's health significantly. Family members, clergy, friends, and hired aides assist in caring for people who are ill, as well as offering social support and comfort. These benefits are even more significant when facilities have reduced staff, which is a universal occurrence when covid-19 has been diagnosed, whether by actual testing or simply

presumed. In addition to reducing quality of life, it makes caregiving difficult, and also has a direct negative impact on people's immune systems; social isolation has been found to increase overall mortality in many epidemiological studies (Tan & Wang, 2019).

My personal experience shows that when someone is diagnosed with covid-19, or when they are presumed to have it, the imposed isolation and protective gear make it challenging to give the kind of care needed, even in a fully staffed facility. The residents are much more likely to be sent to the hospital than other residents, even if they are not severely ill, which then puts stress on hospitals due to the same caregiving issues. In hospitals protecting other vulnerable patients is a major concern, and if a person is severely ill with covid-19, they are more quickly put on ventilators than other patients, partly to reduce the risk of transmitting the virus. In addition to reducing the quality of life of the patient, early ventilator use results in longer ICU stays and taxes hospital resources even further. In people's private homes this isolation also has a significant impact and increases the risk of deterioration and hospitalization. Quarantine at home is recommended for 2 weeks, with separate bedrooms, separate bathrooms, and separate dining areas, and food and supplies are supposed to be left at the door. While care is challenging in a private home, usually there are significantly more caregivers per patient than in a facility, and there is also less concern about spreading the illness to other vulnerable populations. The negative effects of these practices will have a stronger impact on vulnerable populations such as the elderly and people with pre-existing illnesses, who make up the vast majority of poor outcomes in all infectious illnesses, including covid-19.

Unfortunately, the fears of contagion, as well as current policies of social isolation, harm those with fragile health the most. They depend most on help from others, including family, friends, neighbors, facility staff, hired caregivers, and health professionals. This reduced care leads to higher mortality, which in turn reinforces the exaggerated fears of covid-19. However, if people were aware that estimated death rates for covid-19 had dropped dramatically, their natural instinct to help one another would be strengthened, and improved outcomes would provide further reinforcement in a more positive direction. Even in cases where the illness proves incurable, people's final days would have less suffering and better quality of life.

Covid-19 spread quietly throughout the world, but most people had no symptoms. When these mild cases are included, the death rate in several studies approaches that of influenza.

Data showing that covid-19 is a much milder illness than initially claimed has been found repeatedly in high quality population based studies, but this data has been covered only minimally and usually its significance is ignored or quickly discarded with poorly informed critiques. The CDC website also eventually listed a much lower case fatality rate, but it is not prominently displayed or discussed, and has been widely ignored (CDC Covid-19 Pandemic Planning Scenarios, 2020, table 1). Cognitive bias is so strong, that when people hear this kind of information, even when provided by established researchers, it is met with an immediate negative reaction. Ignoring the information as not worth reading is the most common reaction,

and when a closer inspection is given it is often with a primary goal of finding any mistakes or flaws so that the entire collection of evidence can be quickly thrown out as "unreliable". Often the people providing the evidence come under personal attacks. This has already happened to some covid-19 researchers, as will be mentioned below, and this paper is also likely to be met with a similar negative reaction by many.

One example of this negative reaction happened to a group of researchers and professors at the Stanford University School of Medicine who predicted that the virus was weaker than was claimed, based on a careful examination of available research, in an opinion piece in the Wall Street Journal (Bendavid & Bhattacharya 2020). They then performed a controlled study, one of several to be reviewed in this paper, whose results confirmed their predictions, finding that the fatality rate for the covid-19 virus was similar to the flu (Bendavid et al, 2020). This is not to say that it is not a health threat, because the flu also has very severe cases and causes many tens of thousands of deaths every year in the United States. Because this study came from established researchers, it was very difficult to ignore, and instead many critics quickly claimed that the newer antibody tests used in the studies were unreliable. One critic stated that the researchers owed an "apology". However, the critics appeared unaware that very similar results had been found in several previous studies that used the covid-19 RNA test, which is considered to be more accurate, also showing similar reductions in fatality rates. Studies were done in Iceland, Italy, Germany, California, New York, Boston, and Miami, as described in more detail below. In addition to finding a reduced risk of death, all of the studies have found that the virus has spread much more widely, with 10 to 85 times more people infected than was previously believed by public health officials. However, within families many times only one person would be positive, suggesting that the virus did not spread so easily and that it had probably been present in the area being studied for a much longer time period than official timelines claimed. This also made the growth curve much flatter than widely believed, with no social distancing measures in place. In these studies, the vast majority of people positive for covid-19 had experienced mild or no symptoms, and they had no idea that they were ever infected. The reduced fatality is highly significant in all age groups, but in younger people with no underlying illnesses, including small children, the risk of death is extraordinarily low. As stated previously, other causes of death in the US such as injuries have caused many times more fatalities in children and young adults during the epidemic, and in the rest of the world childhood mortality has been very high for decades from malnutrition related infections, with about 8000 children dying per day, compared to only about 20 total from covid-19 during the first 6 months of the pandemic (Halperin, 2020a&b; World Hunger Education Service, n.d.).

Although these findings may seem surprising and difficult for many people to accept, this is actually a repeating pattern. Similar events have happened in previous epidemics, which also had dramatic drops in estimated morbidity and mortality as better data was collected. Several sources of bias will be discussed, which lead to inaccurate data in these epidemics, including selection bias, cognitive bias, and confirmation bias. The biased data starts with the very first tests done, which are only done in very sick people under the assumption that the new virus

makes most people very sick, creating a severe selection bias. The tests themselves create a selection bias because they are more likely to be positive, including false positives, in people with severe symptoms, but they are more likely to be negative, including false negatives, in people with mild symptoms, causing undercounts of mild cases. Another bias, known as confirmation bias, causes inflated death counts and inflated fears of contagion. Media reporting focuses on these inflated death counts, as well as stories of contagion and anecdotes with tragic outcomes, with very little attention to the finding of large numbers of asymptomatic and mild cases and the resulting reduced fatality rates, even though these are much more important in predicting future danger from the illness. For example, a death in a young person from covid-19 is a main news feature, and may even be featured around the world, but the much larger number of children and youths who die every day from other causes is ignored. For thousands of years exaggerated fears of infectious illnesses have been present, and a discussion of several examples will be provided including the two most recent ones, swine flu/H1N1 and zika. When evidence is found showing reduced danger from such illnesses, instead of being welcomed, it is usually ignored. When evidence is persistently offered, it is often met with angry rejections and isolation which can ruin people's careers. These reactions can last for many years, even though more and more supportive evidence continues to surface. Although this harms society in general, the worst harm by far is done to people diagnosed with the illness in question.

Eleven studies show widespread prevalence and low lethality of Covid-19

A number of high quality studies have found consistently that covid-19 has spread many times more widely than official numbers state, and that it is also a much milder illness for most people than was initially claimed. These studies have found that about half of the cases are asymptomatic, and most of the rest have only mild symptoms. The vast majority of people who were infected were not even aware they had the illness, and were never tested. This suggests that policies of severe social isolation and quarantines have not been very effective at preventing the spread, and that their costs and health burdens may outweigh their benefits, as is argued by the public health departments in Iceland and Sweden who used milder measures. The newer better controlled data comes from testing more random population samples, such as healthy volunteers, instead of just testing people who are very ill. Random testing reduces selection bias, which regularly skews data during early parts of epidemics. Selection bias is simple to understand: if only very ill people are tested, of course it will appear that all people with positive covid-19 tests are very ill. However, when very large numbers of mild and asymptomatic cases are included in the equation, this dramatically increases the number of cases, and lowers the death rate by a similar ratio. Many recent studies have reported this finding, but the first study was done in February, in the small Italian town of Vo.

Study #1 - Vo, Italy –PCR testing in late February finds vast undercount due to mild and asymptomatic cases, and very low mortality rate

Italy's very first death was recorded in Vo on February 21st, and they decided to test all 3,300 of its residents, using the polymerase chain reaction (PCR) test that looks for RNA thought to be from active viral infections (Lavezzo et al, 2020; McCall, 2020). They were surprised to find that 3% of the town residents were already positive and that about half of these positive cases had no symptoms at all. This was over 100 times the official number which was based on reported cases found by testing only people with moderate to severe symptoms. When extrapolated to the entire province, the death rate was only 0.06%, or about 1 in 1,700 (Bendavid & Bhattacharya, 2020). This seems too low to be believed, because it is so many times lower than the officially estimated death rate for covid-19, and below the case fatality rate usually cited for influenza. However, in the swine flu epidemic of 2009 which will be reviewed later in this paper, the mortality rate eventually was found to be lower by a similar magnitude. Another unexpected finding was that all 234 children they tested were negative, "despite at least 13 of them living together with infected family members" (Lavezzo et al, 2020).

The unexpectedly large number of cases suggests that the infection appeared weeks to months earlier than was widely believed, especially when combined with the reduced infectivity with many people negative for the illness despite living together with positive family members. This would indicate a much "flatter curve" of infectious spread, even without any social distancing or isolation measures. The low death rate is also quite striking, but the press stories at the time completely ignored these factors. They instead focused on the many asymptomatic cases as an increased danger, because they can unknowingly spread the virus, thus using this data to amplify people's fears instead of reassuring them. If antibody tests had been available at that time, they would likely have found an even higher number of mild and asymptomatic cases. Antibody tests identify people who have recovered from infections about 2 weeks or more in the past, and most of these people would be negative on the PCR test that was used, which only looks for active infections. Using both tests would have identified both groups of people, increasing the number of mild cases, and dropping the death rate even further. Antibody testing would be done about 6 weeks later in Robbio, Italy, and then followed by a series of antibody studies in many different countries, all unveiling a similar pattern to what was found in Vo, as will be reviewed below. Critics of the antibody studies appear ignorant of the prior similar results from studies that used the PCR test, including this one in Vo, and the next one to be discussed in the very small country of Iceland.

Study #2 – Iceland –PCR testing in late March finds vast undercount due to mild and asymptomatic cases, and very low mortality rate

In March a large study was started in Iceland, eventually testing more than 9000 healthy volunteers using the PCR test which only looks for active viral infections. By early April results

were reported, and unlike other countries, the results were used successfully to reassure the population about the reduced threat. Iceland was considered by health authorities to be in the very initial phase of the epidemic, having had their first cases much later than other European countries, but they found that about 1% of the people tested were already positive, many times more than was expected. They also found that about half of the people who tested positive reported no symptoms (Gudbjartsson, 2020; Pesce, 2020). When these mild and asymptomatic cases were included in the calculations in Iceland, the estimated fatality rate dropped to about 0.1%, or one in a thousand which is the same rate estimated for influenza (Sullum, 2020a). These findings are extremely similar to what was found in Vo, Italy suggesting that they were fairly accurate. Also, similarly to Vo, if they had also done antibody tests they would have found many positive cases who had covid-19 about two weeks or more in the past, and with these people included, their fatality rate would have been even lower. They found an especially low infection rate in children, stating "none of the 848 children under the age of 10 years tested positive", consistent with prior results in Italy, and also in China, which show extremely low risk for children. This is one reason Iceland decided to keep schools open for all children under 16 (Government of Iceland, 2020; Gudbjartsson, 2020). As stated previously, Iceland has adopted much less stringent social distancing measures, with schools, restaurants, playgrounds, and outdoor recreation areas remaining open, and this was justified in part by the lower mortality figures, with only four deaths at the time of the study, and a total of ten deaths as of June 11th. Iceland authorities focused on widespread testing and also increased the quality of remote home care, with a "highly effective system of remote health care and monitoring of patients very early on. This has had the effect of reducing the number of hospitalizations, and the constant dialogue between hospital staff and ill patients in their homes resulted in more timely interventions and reduced the demand for intensive care treatments" (Government of Iceland, 2020). Iceland's well managed epidemic argues against the strict social distancing rules adopted in most other countries. While some of their improved health outcomes were likely from increased remote health care services, as well as increased testing and tracing, some was also due to this gentler public health approach which placed less stress on individuals who were ill, allowed better caregiving, and resulted in less stress on the rest of their society including their health care system.

Study #3 – Women delivering babies in New York City –PCR testing in late March finds 15% of them positive for covid-19, 78% asymptomatic, and no deaths

The third study to be reviewed, also using the PCR test which only finds active infections, was done in New York City on pregnant women admitted for delivery of their babies (Sutton et al., 2020). After two women tested positive in mid-March, it was decided to test every woman who came in for delivery, and 215 women were tested between March 22nd and April 4th at two local hospitals. At this time it was thought that New York was in the early stages of the epidemic, just as had been believed in Vo and Iceland. They were extremely surprised to find

that 33 of the 215 women tested positive (15%), and that only 7 of the 33 women had any symptoms of covid-19. None of the women were reported to have severe symptoms, and fever is the only specific symptom mentioned. Although it was a much less random sample than prior studies because the only people tested were women delivering babies, it was still an unexpectedly high rate. A large majority, 78%, had no symptoms of covid-19, and the authors report that "the true prevalence of infection may be underreported because of false negative results", which would have increased the number of mild cases even further, especially because false negatives are more likely in people with minimal symptoms. The true prevalence of mild cases was also underreported because no antibody tests were done, just as in Vo and Iceland. The high rate of infection and high rate of asymptomatic infections suggest that covid-19 had been present in New York much longer than was claimed at the time, and also that it is a much weaker virus than widely believed. Although these results were published on April 13 in the New England Journal of Medicine, it was almost completely ignored, and the exaggerated fears of the lethality of the virus remained fully intact.

Study #4 – Combined results in US homeless shelters in April using PCR tests show rates as high as 66%, again with vast majority mild and asymptomatic cases, and no reported deaths

A series of studies were done on homeless populations using PCR tests in April in several US cities. Similar to the above study of pregnant women admitted for delivery, they were in a specific group, and so are not ideal for generalizing to the rest of the population. However, they are still very similar to results found with more random population samples. They again found very mild illnesses, extremely high rates of positive tests, and no documented deaths. Combining data from multiple homeless shelters, Mosites et al (2020) documented a total of 287 positive cases out of 1192 homeless shelter residents, for a positive rate of 24%. However, some shelters had very few positive cases and others had very high rates. The highest rates were in Boston, at 36% and San Francisco, with 66% positive. Homeless people living in shelters have close contact, which protects them from the negative health effects of social isolation, but they also have more underlying health conditions and financial stress. In general, one would expect worse illness and a relatively high fatality rate for people in their life situation, but no deaths were documented, and only a small minority were hospitalized. In Seattle, for example, there were 45 cases, and of these: "Seven residents (20%) were hospitalized; no one has died to date" (Tobolowsky, 2020). One shelter not included in the analysis by Mosites was in Worcester, Massachusetts, where 49 of 114 shelter residents were positive (43%), again with mild illness and no deaths. The physician in charge of the testing, Dr. Erik Garcia, described the mild symptoms: " 'There were some symptoms, but certainly none of the classic symptoms,' he said. 'And most people were complaining of a slight worsening of the chronic cough that they already had.' " (Jolicoeur, 2020). Very similar results were found in Boston, where 146 of 397 residents were positive (36%), again with mild symptoms and no reported deaths. The physician in charge of Boston Health Care for the Homeless, Jim O'Connell, described their patients: "Every one of

these folks were asymptomatic. None of them had a fever, and none of them reported symptoms… this was stunning to us." (Mullins and Jolicoeur, 2020). As with earlier studies that used PCR testing in Iceland, Vo, and New York maternity wards, antibody testing would have provided even more mild cases who had already cleared the illness weeks or even months earlier.

Study #5 – Robbio, Italy in late March –First of several studies using antibody testing which again found vast undercounts of mild cases, and reduced fatality rates very similar to PCR- based studies

The first study using antibody tests was done in Robbio, Italy, in early April. Because Italy was one of the first countries affected by the epidemic, they began using antibody tests first. This would begin a series of high quality studies using antibody tests, all with similar results to the PCR-based studies. The most amazing aspect of these studies, however, is not the results themselves, which are consistent with previous studies, but rather the widespread negative reaction from infectious disease experts, public health officials, and the media, showing how deep the collective cognitive bias had already become. Antibody tests only find people who have already recovered from the illness, usually at least 2 weeks in the past, and do not find people with active infections. In this first antibody study, the mayor of the small town of Robbio wanted to test all 6000 residents of the town, and succeeded in testing over 1000 of them, starting in late March. Italy was already well into its epidemic, and in February, one month before this study, the town of Vo had found a severe undercount, so the high rates of infection were not unexpected, with 11.5% testing positive. However, this was still about 30 times the official number, which people mistakenly believed had been kept low by social isolation policies (Bogan, 2020). If the 11.5% infection rate was extrapolated to the entire population that would have given 6.9 million cases in Italy on the 31st of March, about the time this data was being collected. Italy had 12,400 cumulative deaths recorded at that time, for a death rate of 0.18%, or about one death in 556 cases. This is many times lower than official estimates, but higher than the estimates from data in Vo and Iceland. If they had also done a PCR test looking for active infections, they would have found a number of additional positive cases with mild or no symptoms, lowering their fatality rate even further. In Robbio an even higher rate of asymptomatic cases was found with 70% reporting having never had symptoms of covid-19 (Zorzoli, 2020). The 11.5 % rate of positive cases in this antibody study was more than some results found using PCR tests, and less than others: the combined positive rate in homeless shelters in the US was 24%, New York maternity wards positive rate was 15%, Vo, Italy 3%, and Iceland 1%. Whether using the PCR test or the antibody test, large undercounts were found by including the mild and asymptomatic cases who were missed by targeted testing. Because an antibody test shows prior immunity, not active infection, the people testing positive in Robbio had had the illness an unknown time in the past, and the results again suggest that the virus had appeared in Italy well before what was believed by health authorities.

Study #6 – Heinsburg, Germany –the only study where both PCR and antibody tests were used.

A study was done in Germany in early April, the only one that used both antibody and PCR testing, in the town of Heinsberg which had one of the highest rates of covid-19 in Germany at the time. They tested 919 people between March 30 and April 6th, and found that 15% were positive, about ten times as many cases as expected from official numbers (Jacobs, 2020; University of Bonn, 2020). They found most had mild symptoms, and 22% were completely asymptomatic. This is a lower number of asymptomatic cases than other studies, which found about 50% to 78% asymptomatic. However, in this study they included very mild symptoms such as loss of taste or smell, which is a common symptom of mild illnesses with nasal congestion as well as allergies to pollen which would be common in this area at that time of year. Loss of taste or smell is not usually considered a significant symptom, and this is an example of how mild symptoms can seem more ominous in the context of covid-19. From this data they computed a much lower case fatality rate than expected, 0.37%, or about 1 in 270 cases. This is much higher than studies in Vo, Robbio, and Iceland, but still five times lower than the previous estimate in Germany. Another key aspect of this study, just as in Iceland, was the finding that covid-19 was difficult to transmit from one person to another within a family: "Studies of multi-person households showed that the risk of infecting another person was surprisingly low" (University of Bonn, 2020). These findings of a weaker infection were met with skepticism from public health and infectious disease experts despite being similar to the results from other studies. The negative reactions indicate a lack of awareness of previous research results, which is a repeating pattern. There was an especially negative reaction to the main virologist who headed the study, Hendrick Streeck, who called for entering phase 2 social isolation policies which would have meant reopening schools, restarting professional and amateur sporting events, and opening more businesses. Most of the criticisms expressed simple disbelief in the results, such as the following quote: "Berlin virologist Christian Drosten criticized the presentation of the results. saying 'I can't deduce anything from them.'" (Jacobs, 2020). However, several weeks later Germany did take these steps, cautiously restarting their professional soccer league and gradually reopening schools. As usual the media and infectious disease experts did not attempt to reassure the public, instead re-emphasizing social distancing policies.

Studies #7 and #8 – University affiliated studies in Los Angeles and Santa Clara counties using antibody tests.

Shortly after the German study, in mid-April, two antibody studies were completed in California. The first was in Santa Clara County by the previously mentioned group from Stanford University (Bendavid et al, 2020). The second was in Los Angeles County, conducted by researchers from the University of Southern California (Sullum, 2020b). Two of the authors

of the Santa Clara study had predicted that death rates were likely similar to influenza in an opinion piece in the Wall Street Journal on March 24th, where they explained the problems with selection bias and targeted testing (Bendavid & Bhattacharya 2020). In their study they tested 3330 volunteers for antibodies to the virus, and found a positive rate of about 3%, which was 50 to 85 times higher than the number of confirmed cases, again with most cases being mild or asymptomatic. They computed the death rate for covid-19 based on this data to be between 0.12% (1 in 830) and 0.2% (1 in 500) in Santa Clara County. A few days after this data was reported, the Los Angeles County data came out, with remarkably similar results. The University of Southern California researchers tested 863 volunteers, with a positive rate of about 4%, which was 25 to 55 times higher than the official tally of confirmed cases, and found a fatality rate of between 0.1 (1 in 1000) and 0.2% (1 in 500) (Sullum, 2020b). Although these rates are similar to what was found in previous studies, they were met with harsh critiques, focusing mainly on possible false positives on the antibody tests. However, the critics made no comment about previous studies using PCR based tests which had shown even higher numbers of mild cases and similar low fatality rates, as reviewed above, or about other antibody studies which did not have some of the other issues they raised. One brief summary of some of these complaints by Vogel (2020) showed how personal the attacks can become, in this case regarding the Santa Clara study results: "'I think the authors of the paper owe us all an apology,' wrote Columbia University statistician and political scientist Andrew Gelman in an online commentary. The numbers 'were essentially the product of a statistical error.' " Vogel also obtained comments from professor Bhattacharya of Stanford as well as from other researchers, defending the results, but the tone of the article was set in its title, "Antibody surveys suggesting vast undercount of coronavirus infections may be unreliable" (Vogel, 2020).

Study # 9 – Chelsea Massachusetts – 32% positive on antibody test, half with no symptoms in previous 4 weeks.

Also in mid-April, a group of researchers affiliated with Massachusetts General Hospital tested 200 random healthy people in a city square adjacent to the City Hall in Chelsea, Massachusetts, just outside of Boston, using antibody tests. The positive rate in Chelsea was much higher than expected, with 68 of 200 people testing positive for a rate of 32%. None of the people had symptoms at the time of testing, and half of them had been completely asymptomatic for the previous 4 weeks. The researchers knew they might find a relatively high positive rate because the city was known to have more infections than other areas, but they were shocked that nearly a third of residents were positive, and that of these positive cases only about half had had any symptom of covid-19 in the previous four weeks (Saltzman, 2020). Chelsea has a population of 40,000 and had had 68 deaths, providing a fatality rate of 0.3%, or about one in 333. If PCR tests had also been done, more mild and asymptomatic cases would have been found, lowering the death rate even further. At an infection rate of 32% it is nearly impossible to

claim success of social distancing policies, and also nearly impossible to prevent further spread, no matter what policies are in place.

Study #10 – New York City and New York State – 21% in the city positive on antibody test

New York State was the next area studied, with results reported on April 23rd in a press conference by governor Andrew Cuomo. They also found significantly reduced death rates, although not as low as the prior studies from California, Boston, Italy, Germany, and Iceland. They tested 3000 people with antibody tests, about half of whom lived in New York City, and half in the rest of the state. They found a positive rate of 21% in New York City, 16.7 % on Long Island, 12 % in Westchester and Rockland counties, just north of the city, and 3.6% in the rest of the state (Lewis, 2020). Although this is similar to what would be expected based on previous results, such as the PCR series in New York City on pregnant women which found 15% positive for active infections, this was still considered an unexpectedly high result. Extrapolating these data to all of New York State gave a death rate of 0.5%, or about 1 in 200. This is higher than any of the other studies, in which fatality rates ranged from a low of 0.06% in Vo, or 1 in 1700, to 0.37%, or 1 in 270, in Heinsburg, but still many times lower than previously estimated death rates. Although the reasons for the higher fatality rate in New York City is unclear, it is the most densely populated city in the United States, so it is reasonable to expect more severe illness given the increased social and economic challenges. New York also had large numbers of deaths in long term care facilities, and may have had even higher numbers than other areas because of these issues. Despite these challenges, and despite the extra burden placed on people diagnosed with covid-19 due to enforced social isolation and quarantines, they still found that 99.5% of people recovered completely, including a majority of the elderly and people with pre-existing conditions.

Study #11 – Miami Dade County – 6% positive on antibody test, half with no symptoms in previous 4 weeks.

The day after the New York results were announced, Miami Dade County released results in a press conference on April 24th. They had tested 1400 randomly selected people with the antibody test, and found 6% of residents positive, again with "more than half" of them reporting never having had any symptoms of covid-19 in recent weeks. This was 16 times more than the official number of cases, and gave a fatality rate of about 0.2%, or one in 500, similar to the results from Italy, Iceland, California and Boston (Sullum, 2020d). In all these studies, when the results were announced including that the number of positive cases was larger than believed by many orders of magnitude, public health officials and infectious disease experts used this finding as a reason for maintaining or increasing attempts to contain the virus with enforced social isolation, instead of questioning these policies. In Miami Dade County Mayor Gimenez's's

comments are described by Sullum: " 'There are a lot of asymptomatic cases out there,' Gimenez said, (and) confirming that point highlights the importance of social distancing, he added."

Summary of Research Studies

The studies just described have provided best quality data available, and their findings are remarkably consistent, regardless of whether PCR tests or antibody tests were used. They found 10 to 85 times more people positive for covid-19 infected than the official numbers, and a large majority of cases had mild or no symptoms who were missed by targeted testing. Estimated death rates for the regions studied were lowered because of these severe undercounts to between 0.06 % and 0.2% in five studies, two of which used PCR testing. One study's fatality rate was 0.3% (Chelsea), one 0.37% (Heinsburg), and one 0.5% (New York). Most of these fatality rates are more than the flu which is thought to have a fatality rate of about 0.1%. However, the estimated death rates would have been lower if all the mild cases had been counted by using both PCR and antibody tests in all but one study. The number of mild cases would also be increased, and severe cases reduced, by accounting for false positives and negatives, which will be discussed in more detail below. Finally, the death counts are increased by the isolation precautions designed to prevent spread of the virus, as well as exaggerated fears which caused understaffing in long term care facilities where about half the deaths occur. If adequate care was available for severe cases and those with advanced underlying illnesses, it is reasonable that more than half of those who died would have survived, lowering the estimated disease fatality rate. Even without these adjustments, the fatality rates, including the highest one from New York at 0.5%, which is one death in every 200 cases, were many times lower than official estimates.

One would think that this news of a much weaker virus than previously believed would be welcome news. However, just as in prior epidemics, public health officials and infectious disease experts seemed to ignore the implications of the findings. A common response was to state that because there were so many asymptomatic infections, this meant people were in even more danger, and more severe social distancing and more complete quarantines were necessary. Although implemented in a well-meaning effort to reduce spread of the virus, the negative impact on health and health care delivery from the social distancing policies are almost never mentioned. The reduced fatality rates in these studies are also rarely mentioned, or the fact that the reduced rates are similar to the rates in the yearly influenza epidemic. As stated previously, the flu also has a heavy burden of illness, with many tragic outcomes and many tens of thousands of deaths annually, but measures to prevent its spread are much more moderate. Iceland provides an example of how more modest efforts at restricting spread of the illness can be equally effective, and together with a focus on improving care and resources for vulnerable populations such as residents of elder care facilities and people with underlying illnesses these milder measures would improve outcomes without the negative health impacts.

Most media reports have focused on challenges from critics who ignored very similar findings from other studies, such as those where PCR tests were used. Complaints about false positives and negatives ignore another major issue which will be addressed again later in this paper: adjusting for them would actually lower the mortality rate even further. False positives and true positives are more likely to occur in people with moderate to severe symptoms, especially on the PCR test, because they have higher quantities of RNA from viruses and from their own cells which can react with the test (Irwin, 2001). Similarly, people with mild or no symptoms are more likely to have a false negative or true negative, because they tend to have less RNA, including less viral RNA, to react to the PCR test, and also may have too few antibodies to react to the antibody test.

Antibodies normally protect people against infections, but this is debated in covid-19, running counter to the plan to make a vaccine.

Another claim that amplifies fears of the covid-19 virus is that having antibodies to the virus may not protect people from it, unlike with other well known viruses such as influenza, chicken pox, measles, rubella, mumps, parvovirus B19, coxsackievirus and other coronaviruses. Arguments about lack of protection rely on anecdotes about people who tested positive two separate times for covid-19. However, because it is so rare, with only a few cases being reported, a false positive RNA test result is a more likely explanation. Although this very cautious stance about lack of protection from antibodies is unlikely to be true. if it were it would mean that a vaccine would not be effective, and would nullify the argument that social distancing is needed to wait for a vaccine. It sometimes appears that the fear narrative for covid-19 always finds ways of expressing itself, no matter what the situation. The accepted standard in immunology is that people with antibodies to a virus have long term protection, and that many will have complete immunity for life. This is the basis for all vaccines and mandatory vaccine policies. These types of claims of exaggerated risks from covid-19 appear to be based in a severe cognitive bias, as do the rejections of studies showing that it is a milder illness with much lower fatality rates than originally predicted. Underlying emotionally charged beliefs about the extreme danger of the virus have become firmly set, causing new data to be discarded or ignored as soon as it is presented. Unfortunately, the policies based on these beliefs have a lot of very negative effects on public health, as discussed previously. While almost everyone has experienced them, people diagnosed with covid-19 face the most serious negative effects.

If the death rates from covid-19 had been properly studied starting in the beginning of the epidemic in China by immediately testing a random sample of the population, or if the evidence of milder illness in the early studies in Vo and Iceland had been widely accepted instead of being ignored, there would likely be less social isolation and better overall care for the people most vulnerable to illness, including in hospitals and long term care facilities. A better use of resources, which would lower death rates as well as suffering of those who do not recover, would be to increase health care for the vulnerable populations. Instead the current policies and

exaggerated fears make care much more difficult to provide. Government programs such as Medicare could offer emergency assistance by approving temporary additional emergency funds to improve care for the elderly and for people with pre-existing health conditions, including more remote visits as well as in person visits from health care providers as well as support for health aides and family caregivers. These efforts would combine to lower the fatality rate even further.

Outcomes are much worse for the elderly and people with underlying illnesses, and much lower for children and adults with no pre-existing conditions.

Although it is true that caregivers and health care workers have shown a lot of courage during the covid-19 epidemic, the risk to caregivers with no pre-existing health challenges is actually significantly lower than 1 in 1700 to 1 in 200 range that has been estimated for the overall population. It is well known that older people and people with pre-existing illnesses are much more likely to have poor outcomes with covid-19, just as happens with other illnesses including the yearly flu epidemic, but the level of this difference in covid-19 is not well appreciated. Much of this dramatic difference is due to the increased deaths from lack of healthcare and lack of caregiving, especially in long term care facilities, as discussed earlier in this paper. While these also impact younger and healthier people who are diagnosed, they are more likely to withstand the isolation than people with more fragile health. The knowledge of reduced risk would have helped staff at long term care facilities, as well as staff in hospitals and home caregivers, and would have helped avoid the long term care staffing crises that spread through countries when the first cases of covid-19 were diagnosed. One example of the reduced risk in younger people is that covid-19 has an extremely low risk for children and people under age 20. Small children and babies are normally considered a high risk group in other infectious illnesses, but for the first few months of the covid-19 epidemic there was not a single confirmed death from covid-19 in children under the age of ten, and only a single death in an adolescent (Dong, 2020). Starting in mid-May several cases in children of a severe immune system hyperactivation syndrome similar to Kawasaki syndrome were considered linked to covid-19, and a child died in New York, the first death they had recorded in a child. Kawasaki syndrome can occur in response to any viral infection, so is not specific to covid-19, and although rare, it has been well known for several decades and causes some death every year. Because of the hjyperactivation of the immune system, sometimes called a "cytokine storm", there is also a likelihood of false positives on any RNA test including the one for covid-19. While any child dying is a tragedy, this does not mean that increasing efforts to isolate people is the best solution. Children experience negative health effects from social isolation and from the diagnosis, itself, just as adults do. As stated previously a total of only about two dozen deaths from covid-19 occurred in children and adolescents worldwide in the first 6 months of the pandemic, but over 200 died of influenze in the US alone. In Italy there were only two deaths in minors, out of 30,000 total deaths, and Canada there were no pediatric deaths as of mid-June 2020 (Halperin, 2020; Hospital for Sick Children, 2020; Zweig, 2020).

Children are also much less likely to become infected from covid-19, despite prolonged exposure. As mentioned in the review of the study in Vo, Italy, they found that all 234 children they tested were negative, despite at least 13 of them living together with family members who tested positive (Lavezzo, 2020). In the Iceland study of healthy volunteers none of the over 800 children under the age of 10 tested positive, and they kept schools open for all children under 16 throughout the epidemic with no deaths in anyone under the age of twenty as of June 1st (Government of Iceland, 2020; Gudbjartsson, 2020). While no one wants children to become ill or die for any reason, there are many causes of morbidity and mortality in children that are dramatically worse than covid-19 which could benefit from increased resources. One explanation for milder illness in young children with covid-19 is that they receive much less social isolation than adults because their parents are allowed to stay with them and help care for them. Many of the elderly and people with underlying illnesses already suffered from social isolation before covid-19 public health policies took effect, and if in a facility visitors were no longer allowed, severely exacerbating the negative effects of social isolation from covid-19.

In addition to children having mild symptoms, middle aged people with no health problems also rarely have severe symptoms from covid-19, and have very low death rates. One Italian study reviewed 3,200 deaths in Italy, and found that 99.2% of fatalities from covid-19 had at least one underlying health condition, and 75% had two or more, leaving an extremely small number of fatalities in people with no underlying illnesses, and they had no deaths in people under 20 (Italian Institute of health, 2020). Studies in China showed five-fold higher mortality in people with high blood pressure, diabetes, heart problems or breathing problems, and about a ten-fold higher mortality for people over 80 (Cuffe, 2020). Even in these high risk groups, the majority of people recovered. Media agencies give much attention to any death in a young person who dies from covid-19, but there are thousands of deaths per day in young people from other causes that are completely ignored. Although some people diagnosed with covid-19 do have their lives tragically cut short, most people with poor outcomes already had underlying illnesses which made them prone to catching opportunistic infections. In some cases people had very short life expectancy, where it was clear that covid-19 did not have a significant impact on the course of the illness, but it still gets reported to health departments and their death is counted as a death from covid-19.

Death counts are inflated by incorrectly crediting covid-19 as a primary cause of death

When documenting the cause of death on a death certificate, the primary cause is usually an advanced underlying illness such as cancer, heart disease, lung disease, or dementia. The final few days of life are often marked by an acute infection, and if the cause of the infection is known, such as aspiration pneumonia or influenza, it may be noted as a secondary cause of death. Many times the infection would be minor and easily treated in a healthy person, but in a person with an advanced illness it can result in rapid deterioration and death, even when the person is given appropriate medical care. In these cases the infection is recognized as an

opportunistic infection, and it is not usually even recorded on the death certificate as a secondary cause. Bacteria and viruses are abundant in, on and around the human body at all times, no matter how many antibiotics, antibacterial gels, and other measures are used. Natural human flora includes trillions of bacteria and viruses which do not cause disease. Bacteria aid the human digestive system, and actually promote ideal health (Lynch, 2016; Virgin, 2014). However, with covid-19 almost all deaths with a positive covid-19 test will be reported to the health department, and counted as being caused by covid-19. This type of confirmation bias creates an inaccurate record, blaming covid-19 for deaths that would have occurred at about the same time even if covid-19 had not been present. Two case examples from my hospice program can illustrate this point. A 90 year old man was admitted to inpatient hospice with metastatic pancreatic and biliary cancer, already very close to end of life, but who also carried a diagnosis of covid-19. His overall condition had been deteriorating rapidly before covid-19 was diagnosed, with an emergency hospitalization and then a nursing home placement due to his overall decline. At the nursing home he was not improving, then developed signs of an infectious illness, and was sent back to the hospital where a covid-19 test was positive. At this point hospice inpatient care was recommended. His underlying cause of death was clearly his pancreatic and biliary cancer, but when he died the health department was notified of a covid-19 related death. A similar case occurred with a man with an advanced untreatable brain tumor which had already caused right sided paralysis before covid-19 was diagnosed. Unfortunately, being diagnosed with covid-19 also makes a person's final days more difficult, because contact from family members is not allowed due to fear of transmission of the virus, and social isolation takes away quality of life in people's final days.

The issue of inflated death statistics can be tested by looking at total deaths to see if the total is going up in a specified region. However, the large numbers of fatalities in long term care facilities, where 40 to 60 percent of deaths occur, need special attention because of the staffing and caregiving problems described previously. This understaffing will increase risk of death for everyone in a facility, whether they are a confirmed case of covid-19, a presumed case of covid-19, or a person with a health challenges completely unrelated to covid-19. This is obviously true where understaffing was so severe it led to abandonment, as described previously, and where most of the deaths could likely have been prevented (Bilefsky, 2020; Privitera, 2020). Suicides and drug and alcohol related deaths are not directly caused by the virus, but they are also often increased during times of increased societal fears, social isolation, and related economic recessions. On a positive note, motor vehicle accidents have hopefully been reduced during the lockdown, and this is by far the largest cause of death in young people in the United States, which is one of the many health challenges being ignored due to the constant focus on covid-19. This leads to a poor distribution of health care resources with excess attention to the deaths and health care issues thought to be caused by covid-19.

Focusing on covid-19 deaths counts spreads fear, but ignores more common causes of death

There have been many excess deaths from covid-19, even after adjusting for the large number of deaths that could have been prevented if adequate care had been available. However, even the unadjusted number of deaths is actually low when compared to other causes of death. About 8000 people die from other causes every day in the United States, for a total of about 3 million per year. The media focus on covid-19 death counts is often combined with frightening and tragic individual anecdotes, giving more emotional power to the numbers being presented, but by far the main causes of death are noninfectious causes such as heart disease and cancer, which also primarily affect the elderly, just as with infectious illnesses (CDC national vital statistics, n.d.). The primary infectious causes of death in the United States include bacterial pneumonia, at about 50,000 deaths per year (American Thoracic Society, 2020), and influenza, with an estimated fatality of 61,000 for the 2017-2018 flu season and daily deaths often exceeding 1000 per day during the peak months of December, January, and February (CDC Disease Burden of Influenza; Mettler, 2020). As stated previously, the number one cause of death for young people in the United States is injuries which total about 10,000 per year. These occur from many preventable sources including motor vehicle accidents, firearm injuries, drowning, and alcohol and drug related deaths (CDC Global Road Safety 2020, Cunningham, 2018). Economic hardship itself causes a wide variety of health problems, and the most tragic preventable cause of death worldwide, especially for children, is malnutrition, which is by far the primary cause of child death globally. As stated previously, about 8000 children under age five die each day from malnutrition related illnesses, mainly in developing nations (World Hunger Education Service, n.d.). In children with malnutrition, an opportunistic infection is also often a contributory cause of death, just as in adults with underlying health conditions, but the best way to help malnutrition is with economic opportunities, business development, and social programs. These have been successful in reducing the number of malnutrition related deaths, which have dropped significantly in the past few decades. In the United States economic and social factors also have a heavy impact on health, with a reduction of life expectancy similar to that of major illnesses such as heart disease and cancer (Galea et al, 2011).

Influenza vs covid-19 –similar illnesses with similar burdens of disease

Comparison to the flu is especially instructive, because both are caused by viruses, and because the symptoms of covid-19 can be very similar to the flu. The flu is sometimes a severe and life threatening illness, with a high concentration in the three months from December to February, and often over a thousand deaths per day (CDC Disease Burden of Influenza, 2020). Mettler (2020) wrote an excellent summary of their similarities: "The known symptoms for influenza and covid-19 are nearly identical: fever, cough, body aches, fatigue and at times vomiting and diarrhea. Both illnesses can manifest in mild or severe ways or even cause death". A major difference is the level of fear and stigma from covid-19, which results in social isolation from health care policies as well as personal avoidance. Another significant difference between covid-19 and the flu is that more people infected with covid-19 have no symptoms, about 50%,

as reviewed above, compared to an estimated 20% with the flu. Although some experts argue that the flu is less of a threat because there is a vaccine for the flu, the flu vaccine has limited efficacy, and many years its effect is not statistically significant, even in high risk populations (Jefferson 2007). In Europe, only high risk groups get the flu vaccine, and the majority of the population is not even offered the vaccine (National Health Service, 2020). Similarly, antiviral medicines for the flu have limited efficacy, and most people with the flu do not receive them.

Covid-19 is not easily transmitted and case studies show that it usually requires prolonged close contact

There is concern that covid-19 will affect a much higher percentage of the population than the flu, because people do not have immunity. However, several carefully followed early case histories suggest that most people exposed to covid-19 do not become infected, and that most people's immune systems succeed in preventing infection despite multiple contacts. One such case was written up in a medical journal. The case in question, called "the first case of person-to-person transmission in the US" by the authors, was presented in detail in the Lancet (Ghinai 2020). A woman, whom the authors called Patient 1, tested positive, and so did her husband, called patient 2, who was thought to have become infected after "prolonged, unprotected exposure while Patient 1 was symptomatic". However, none of the other 347 contacts the researchers followed were diagnosed with covid-19, including 75 of them that developed some symptoms and were tested using the covid-19 PCR test. Another example of limited transmission involves the NBA's first positive case, Rudy Gobert of the Utah Jazz. After his positive test, 58 of his contacts were tested with the PCR test. All his 14 teammates were tested with whom he had extremely close contact, practicing together many hours per day, traveling together, eating together, and sharing a locker room. Only one of his 14 teammates tested positive, and the rest of the 58 contacts tested negative (Dubin 2020). Children have even less likelihood of getting the illness, even when living with family members who tested positive on the PCR test, as described above (Gudbjartsson et al, 2020; Lavezzo, 2020). A final example comes from China, where a young woman with congenital heart diease tested positive for covid-19 on February 11th after 3 weeks in the hospital for treatment of her heart failure. She had no symptoms of covid-19, and her clinical team decided to examine the risk of someone with no symptoms infecting other people. In the end they tested a total of 455 people she had contact with, including family, hospital staff, and others, but none of them tested positive (Gao et al., 2020).

This difficulty in transmitting the virus suggests that most people's immune systems can prevent covid-19 infection completely, which is reinforced by the finding that a large majority of people who test positive have mild or no symptoms. Another poorly examined aspect of covid-19 that may explain exaggerated beliefs in infectivity is false positive test results, which can occur on both of the tests used to diagnose it, a problem that is well known but poorly understood, and extremely difficult to quantify.

False positive test results are more likely in people with moderate to severe symptoms, causing an over-count of severe cases and deaths, but false negative results are more likely in people with mild or no symptoms, worsening the undercount of mild cases.

The issue of false positives and false negatives is another confounding factor that amplifies the fear of these epidemics, leading to exaggerated fears of contagion and also over counting severe cases. One issue commonly ignored in these discussions is that false positives are more likely to occur in people who are have more severe symptoms, not in mild or asymptomatic cases, so they will cause over counts of very ill people and incorrectly count them as covid-19 cases. Conversely, false negatives are more common in people with mild or no symptoms so the same test will tend to under count mild cases. People with fewer symptoms are expected to have less viral RNA and less antibodies in their body to react to the tests. When someone has moderate to severe symptoms from a viral infection, more viral RNA is available and is more likely to be detected by the PCR test, giving a higher true positive rate, and after the illness is over they are more likely to have a lot of antibodies to react to the antibody test. However, even when a different infection is the cause, RNA from the person's own cells is much more plentiful when severe symptoms are present due to rapid cell turnover and increased production of highly active immune system cells, so the person's own RNA can cross react and create a false positive result. Similarly, RNA from the bacteria or virus causing the illness will also be present in higher quantities when moderate to severe symptoms are present. This means that if both false negatives and false positives are included in calculations, the actual number of mild cases will be increased, and the number of severe cases will be reduced, further lowering the fatality rate.

       False positives are more likely to occur when a person's body is in any inflammatory state, not only during an acute infectious illness. During active autoimmune conditions and allergic reactions the body has greatly expanded production of antibodies, RNA and DNA, increasing the chance of a cross reaction, just as occurs from a severe infectious illness. This increased production and risk for false positives also occurs in inflammatory syndromes such as the children's immune system hyperactivation linked to covid-19, similar to Kawasaki's syndrome. The tendency to false positives occurs in antibody tests and also in PCR/RNA assays, but may be more likely with the PCR test. A previous paper by this author documented high false positive rates in the PCR assays used in HIV to determine a person's viral load. A thorough review of studies of false positive viral loads showed that they "occur commonly in 3% to 10% of people who have no risk factors for HIV and who test negative on HIV antibody tests" (Irwin, 2001, Page 1). Ironically, when these tests are used to diagnose HIV infection, the antibody test is relied upon, and the PCR test is not considered prone to false positives, which is the reverse of the current stance with covid-19.

False positive test results create a false image of infectivity

Many studies reviewed previously showed that the virus is more difficult to transmit than is widely believed, and false positives can play a major confounding role in this issue. It is very challenging to know for sure how often tests give false positives and false negatives, especially when the illness has such an incredible variety of presentations and when about half of the cases have no symptoms at all. Viral isolation is also extremely difficult, and test makers have to use cultures that contain many cellular contents, not just viral particles, when creating their tests. This problem is worse when a test is created rapidly, which is what occurs when a new health threat is believed to be occurring, such as with covid-19, zika, and swine flu. In a very detailed discussion of the RNA test written by Crowe (2020), he sums up the problem, "Even a small false positive rate is critically important. A 99% accurate test would produce 100,000 false positives in a city of 10 million, like Wuhan. And if the number of positives in sampling is around 4%..., then 1 out of 4 positives would be false" (Page 7).

When someone is diagnosed with covid-19 and has had no known contact with anyone who was infected, the assumption is made that they must have caught it from a fleeting contact, such as viral particles that stayed active for many hours or days, perhaps on shopping carts, on door handles, or simply floating in the air. Similar to the media focus on death stories, stories of extreme infectivity are covered in detail and readily accepted by mainstream infectious disease experts who place great trust in the tests. If a false positive is present, however, this will propagate exaggerated fears of contagion, and given the evidence that transmission requires extended contact, a false positive test is a more likely explanation for many of these cases. With multiple studies showing that about 50% of people are asymptomatic, extensive close contact with asymptomatic people such as family members is another more likely cause than a fleeting contact with viruses floating in the air or on surfaces in public spaces. Most significantly, if the data showing that covid-19 is a much milder illness was presented clearly, the concern about viral particles staying active on surfaces and in the air would naturally be greatly reduced, regardless of how infectious it actually is. Another benefit of reduced fear would be healthier immune systems, and most people's immune systems actually appear to be quite good at resisting covid-19.

Severe societal and psychological impacts on people diagnosed with covid-19 weaken their healing response

Negative psychological and social impacts are much more severe for covid-19 than for any other infectious illness, impacting a person's own healing system. In addition to the fear itself, which suppresses the immune system, there is more severe social isolation which also has direct negative effects on immunity and is an independent risk factor for increased all-cause mortality (Marsland et al., 2002; Tan & Wang, 2019). As described previously, this social isolation makes caregiving difficult in every setting, including private homes, long term care facilities and hospitals, sometimes making adequate care for an ill resident almost impossible to provide. While it is reasonable to try to prevent infections from spreading to vulnerable

populations, standard contact precautions are the only measures applied to people with other infectious illnesses, and family members are not normally barred from assisting in their care. People are much more comfortable spending extra time assisting them, if needed, including family members, health professionals, and facility staff. If the death rate from covid-19 is comparable to the flu, as the studies reviewed show, some extra precautions would still be reasonable, but the isolation and psychological impacts would be greatly reduced. While the current policies are rooted in a well- meaning effort to protect people, they are heavily reliant on the estimated death rates which were falsely elevated by severe selection bias. The deaths rates are also elevated from preventable deaths caused by lack of care and social isolation. Unfortunately, public health officials, infectious disease experts, and the general public have a cognitive bias that prevents the findings from newer research to be accepted, no matter how many consistent studies appear. This also happened in many prior epidemics including recent ones from the past few decades, as well as older ones from past centuries.

Previous Epidemics and exaggerated fears of infection, an integral part of human history: Scurvy, Leprosy, Psychogenic Illness, Nazi Germany, Swine Flu, and Zika

Exaggerated fear of epidemics and infectious diseases is not a new phenomenon, and has been happening for thousands of years. Sometimes there is an infectious cause which is not as dangerous as believed, such as with leprosy, swine flu and zika, which will be discussed below. Sometimes no biological cause of any kind can be found, and the symptoms are thought to be psychosomatic. Other times a cause is found, but it is noninfectious, which is what happened with scurvy.

Scurvy
Scurvy is now known to be caused by a deficiency of vitamin C, but for over a hundred years it was thought to be an infectious illness, and sailors stricken with it were quarantined, which took further tolls on their health. In one case some extremely ill sailors were left marooned on a tropical island, and their shipmates were surprised to find them healthy and thriving when they came by the island several months later. After a careful clinical trial, the Scottish naval physician, James Lind, published a book in 1753 outlining a cure which included fresh fruits and vegetables. Sadly, his work was rejected, and despite his continued efforts it took 40 years before the British Navy finally adopted his findings (Duesberg 1996).

Leprosy
Leprosy, also known as Hansen's disease, is infectious, but it is now known that it is extremely difficult to transmit, and that it much more easily affects people with fragile underlying health. Even after antibiotics were developed that cure the illness, some regions of the world continued with severe stigma against sufferers and forced isolation in leprosy facilities. It was so feared in the Middle Ages that people were quarantined for life in asylums, along with

people who suffered from other skin diseases, and people with mental illness. Although conditions in some asylums were quite humane, the level of social isolation was severe. They were completely removed from society and suffered socially, economically, and physically from their confinement, making their illness progress more rapidly. Although some level of contact precautions was reasonable, it actually takes at least several months of close contact to pass it from one person to another. An example of how much exposure it might take to contract leprosy comes from Father Damien, also known as Saint Damien of Molokai, the patron saint of Hawaii. He volunteered to go to a leper colony in Hawaii in 1873 as their temporary priest, and decided to stay and live among them. He helped them build homes, hospitals, roads and chapels, and ministered to the sick. After 11 years of constant close contact he developed leprosy, himself, and died five years later, in 1889. It is not even certain that he died from leprosy, because his primary symptom was peripheral neuropathy, which is caused by many conditions that were poorly understood at that time, including diabetes. Antibiotics were found in the 1980's that could treat leprosy effectively, but despite these findings some countries continued mandatory quarantines for many years. Japanese society in particular had difficulty abandoning the fear of infection from leprosy, and harsh laws of forced sterilization and forced confinement were not repealed until 1996. However, it took about another twenty years, with continued education efforts and several lawsuits, before the stigma and discrimination was finally reversed. In June 2019, a Japanese court ordered the government to pay $3.4 million in damages to the relatives of former leprosy patients because of the extended social and psychological harm caused by severed family ties, long-lasting prejudice, and social stigma (Hosoda, 2010; Ciomal, 2020).

Psychogenic Epidemics

Sirois (1974) wrote a thorough summary of dozens of episodes of "epidemic hysteria", thought to be psychological in nature. In early episodes the infection was believed to be spread by demonic forces, such as with the dancing manias in the 1800's where crowds would "dance and sing in a disorganized manner" (Page 10). In the 1900's toxins or microbes were more likely to be blamed, but no biological cause could be found and the symptoms did not match a biological cause. Sirois concluded that in times of social stress and rapid technological change, such spreading fears were more likely to occur. Hefez (1985) wrote a very detailed summary of a case of "mysterious gas poisoning" stemming from fears of a gas leak at a school during a time of high social stress. Hundreds of young people became ill, but no gas leak could be found and the symptoms did not resemble gas poisoning. Over 900 people were affected before outside experts convinced the community that there was no gas leak, and the epidemic finally resolved. More recently, Jones (2004) wrote an article summarizing this phenomenon, which he called "Mass psychogenic illness". These events show how difficult it can be to change underlying beliefs about contagious illnesses, and how nonspecific symptoms such as fatigue and malaise spread when these fears are present. This is similar to what happens with contacts and caregivers of people diagnosed with covid-19, and given the mild nature of the large majority of covid-19 cases, these mild symptoms are impossible to distinguish from an actual covid-19 infection. However, it is viral epidemics such as swine flu and zika that mirror covid-19 more closely, with

initial selection bias followed by dramatic drops in morbidity and mortality as better data was collected.

Nazi Germany and the "epidemic" that saved a Jewish town

Although many people think that the horrors of Nazi Germany were driven by anger and hatred, actually the main underlying emotion was fear. The Nazis had adopted unrealistic exaggerated fears that their "Aryan race" would cease to exist due to genetic spread from "biologically threatening genes". This paranoid belief stemmed in large part from American eugenicist Madison Grant who wrote an influential book that strongly influenced Hitler and which was used by the Nazis to justify their most sinister programs. The Holocaust Encyclopedia describes how this fear drove their policies: "Echoing ongoing eugenic fears, the Nazis trumpeted population expert's warnings of 'national death' and aimed to reverse the trend" (US Holocaust Museum. n.d.). They first passed laws banning unions between the "hereditarily healthy" and persons deemed "genetically unfit", and then passed a law requiring forced sterilization of over 400,000 Germans who had one of several conditions they believed hereditary, including several types of mental illness and even chronic alcoholism. These events happened before they began the mass expulsion and mass killing of Jews and other people who were deemed to be a genetic threat, as well as political dissidents and Germans who acted against the regime. This exaggerated fear of genetic spread resembles the exaggerated fears of infection described above, and was used to justify increasingly harsh removals of human rights, something that is mirrored in the way normal rights have been removed due to fear of covid-19, described in chilling detail by Corbett (2020). However, this fear of infection was also used in a positive way against the Nazis to protect over 8000 Polish Jews from being sent to the death camps.

Two young Polish physicians, Eugene Lazowski and Stanisław Matulewicz, devised a plan to convince the Nazis that the village where they worked had an out of control epidemic of typhus. They sent repeated samples of blood to German labs which they had doctored to test positive on typhus antibody tests. Because of Nazi fears that the illness would spread to German soldiers and civilians, the primarily Jewish town was left alone. After the war, Dr Lazowski stated "I was not able to fight with a gun or a sword, but I found a way to scare the Germans" (Kreston, 2016). Fortunately the town's population knew of the ruse, and were able to keep their social contacts and society working smoothly, unlike more recent epidemics such as covid-19, swine flu, and zika.
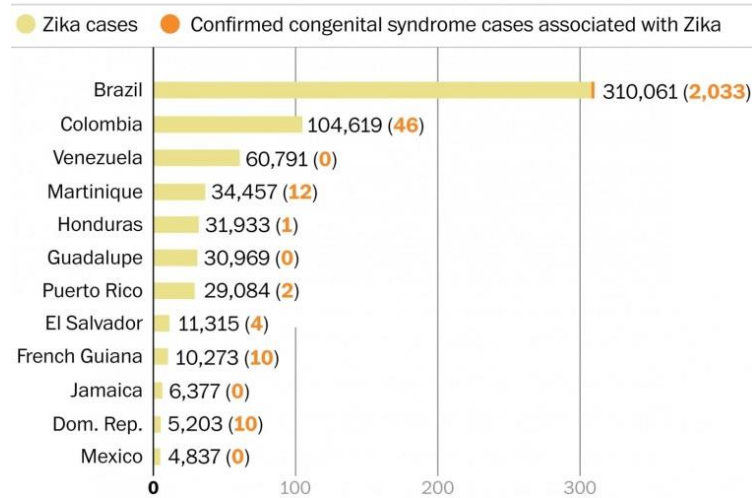
Swine flu/H1N1

In the swine flu epidemic of 2009 selection bias was also quite severe, and estimated fatality rates were off by many orders of magnitude. Initial claims of high death rates created a wave of fear and intense media focus, but death rates were quickly scaled back in the first few months as better data became available, just as has happened with covid-19. The early prediction for the death rate was 1%, based on testing of only very ill people. A 1% fatality is about ten times more deadly than the regular flu, which has an estimated death rate of about

0.1%. However, in 2013, several years later, a large study found that it had spread far wider than believed, and the death rate was "probably less than 0.02%", a reduction by at least a factor of 50 from the original 1% rate (Kelland, 2013; Lane, 2020). This reduced rate was not reported until after the epidemic had faded from public awareness, and was almost completely ignored. This 50 fold reduction in case fatality rate is similar to the reduction found for covid-19 in the studies reviewed previously.

Zika

The zika epidemic also had severe selection bias, and probable confirmation bias due to over-reporting in the initial months in Brazil in 2015. It was initially claimed to cause high rates of a severe deformity in newborns called microcephaly, an abnormally small head size. However, when it spread to neighboring countries no increased numbers of microcephaly were found over what would be expected in a normal population (New Doubts on Zika 2016, Phillips 2016). In addition to population based studies, a high quality prospective study in Colombia followed 12,000 pregnant women who had tested positive for zika, but there were no increased birth defects when the babies were born (Bar-Yam 2016). It is unclear what caused the high rates in northeast Brazil, but one cause was over reporting, likely due to the state of high anxiety and fear in that area (Carless 2016). There may have been other causes, but zika was an unlikely suspect. Some experts immediately admitted that there must have been other explanations, but in general the reduced risk was ignored or explained away, saying that it was too early to make conclusions. Researchers began immediately to focus on non-specific problems that might appear later in life, and partly because of this dramatic change in diagnostic criteria, zika infection is still claimed to cause relatively high rates of problems in newborns. Phillips (2016) describes the failure to find birth defects in other countries when zika spread out of Brazil: "The virus has infected at least 650,000 people in Latin America and the Caribbean, including tens of thousands of expectant mothers. But to the great bewilderment of scientists, the epidemic has not produced the wave of fetal deformities so widely feared when the images of misshapen infants first emerged from Brazil". Phillips provided the table below, which shows that some countries had zero birth defects, despite following tens of thousands of pregnant women who tested positive for zika.

Zika cases in the Western Hemisphere

● Zika cases   ● Confirmed congenital syndrome cases associated with Zika

Country	
Brazil	310,061 (2,033)
Colombia	104,619 (46)
Venezuela	60,791 (0)
Martinique	34,457 (12)
Honduras	31,933 (1)
Guadalupe	30,969 (0)
Puerto Rico	29,084 (2)
El Salvador	11,315 (4)
French Guiana	10,273 (10)
Jamaica	6,377 (0)
Dom. Rep.	5,203 (10)
Mexico	4,837 (0)

Note: Data as of Oct. 20

Source: Pan American Health Organization   THE WASHINGTON POST

    In addition to swine flu, zika, and covid-19, there have been many other examples where new viruses and bacteria have generated fears and predictions of the possibility of massive worldwide deaths, all of which have proved greatly exaggerated. These include avian influenza (aka "the bird flu"), SMON virus (later found to be a medication adverse effect), West Nile virus, Ebola virus, and the human immunodeficiency virus (HIV). It was predicted that HIV would spread rapidly, killing millions in the US, and dramatically reducing the populations of many countries in Africa where infections rates were between 20 and 40%. However, after about ten years it became clear that the populations of all of the affected African countries continued to grow steadily, and predicted death rates in Europe and the United States were dramatically off base. People diagnosed HIV positive did not die as predicted, and it also quickly became clear that it is extremely difficult to transmit HIV from one person to another (Boily et al, 2009, Duesberg, 1996, Population of Congo 2018).

    These exaggerated claims of public health risk have negative impacts on populations for many years to come, both economically and psychologically. Tourism drops, emigration increases, and existing public health challenges worsen. Credit for the reduced death rates may be improperly given to quarantine efforts, or to medical treatments, ignoring the fact that the virus in question was weaker than originally thought. Sometimes there are claims that new, more nonspecific problems are associated with the virus, as happened with zika. However, the primary reaction is to ignore the issue, and the exaggerated claims continue to be believed for many years by the general public, as well as most medical and health professionals, even after they have been disproven.

Final thoughts: Quality and Quantity

In hospice and palliative care a false choice is often presented: choose care that emphasizes quality of life, or care that aims to prolong life. However, usually improving quality will help improve quantity, which is also simply common sense. Many people have died and suffered from covid-19, but this suffering could be greatly reduced by the knowledge that the vast majority of people diagnosed with covid-19 have mild or no symptoms and that death rates are many times lower than originally claimed. Fears of covid-19 cause increases in deaths, especially in long term care facilities where understaffing combined with quarantines often make good care impossible to provide. The fear also results in deaths being presumed to be from covid-19 with corresponding increases in death counts. Thus, the fear itself is a major factor in increasing mortality and morbidity, and one of the main efforts of public health policy would be to provide accurate data based on research studies, something woefully lacking in the public health measures across the world. While more people would likely survive covid-19 if this information was presented clearly, even those who do not survive would have more compassionate care and suffer less. Humans have deep seated instincts to protect and care for one another, and they also have very strong self-healing systems. Bolstering these, instead of undermining them, would be a welcome change in the defense against covid-19.

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Note – on July 10 the site was updates and their table was replaxced without age based estimates, so the table is provided here:

Parameter	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5: Current Best Estimate
R_0 Source: Preliminary COVID-19 estimates, ASPR and CDC	2	2	3	3	2.5
Symptomatic Case Fatality Ratio, stratified by age in years Source: Preliminary COVID-19 estimates, CDC	0-49: 0.0002	0-49: 0.0002	0-49: 0.001	0-49: 0.001	0-49: 0.0005
	50-64: 0.001	50-64: 0.001	50-64: 0.006	50-64: 0.006	50-64: 0.002
	65+: 0.006	65+: 0.006	65+: 0.032	65+: 0.032	65+: 0.013
	Overall: 0.002	Overall: 0.002	Overall: 0.010	Overall: 0.010	Overall: 0.004

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