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FACTS ON BENEFITS AND HARMS OF COVID POLICIES

Death Risk from COVID-19 – Overall, by Age, and Compared to the Flu.

CONCLUSIONS

- **Overall Infection Fatality Rate (IFR) for COVID, which is percentage of people infected who die, was 0.46% in the spring wave. That should be viewed as an upper estimate; it may have been half that in the spring wave, and is almost certainly at least a little less in the second wave occurring in the fall-winter 2020-2021.**
- **The IFR varies greatly by age. It is less than 0.01% for age <25, about 9% for age 85 and over.**
- **Overall, the IFR is about 3.5 times higher for COVID than ordinary influenza.**
- **COVID is actually much less deadly than ordinary influenza for children under age 18.**
- **For the year 2020, COVID will produce about 6 times more deaths than a typical flu year of recent years.**
- **2020 will be the deadliest year for influenza and pneumonia deaths since the 1918-1919 "Spanish flu" but only about 2 times more than the typical number of flu deaths per million population of 1950-1970.**
- **The 1918-1919 flu produced at least 6 times as many deaths relative to population as COVID and killed the young at as high or a higher rate than it killed the old, so it produced at least 20x the person-years of life lost relative to population compared to COVID. COVID is much closer in its damage to an ordinary flu year than to the 1918-1919 flu.**

Your risk of death from COVID

You may want to know what your chances are of dying from COVID if you contract it. I do not think the government or media have done a very good job of answering that question, so I will try to answer it here.

To answer that question, first we want to know the infection fatality rate—deaths/infected persons. For that, we need to know, in addition to how many people have died of COVID, how many people have been infected. Anand et al. (2) from a survey of plasma samples from over 20,000 randomly selected dialysis patients nationwide collected in early July 2020, found that 8.0% of the samples were positive for antibodies against SARS-CoV-2, the virus that causes COVID-19. After correcting for the age, demographics, and zip codes of the patients to the age,

demographics, and zip codes of the entire U.S. population, they calculated that 9.3% of the U.S. population was infected by early July. Since it takes about 10 days to develop antibodies after exposure to the virus, that corresponds to the infection rate on about July 1. And since it takes about 2 weeks on average after infection for a person to die of COVID if they are going to die, to calculate the Infection Fatality Rate (IFR), or the percentage of infected people who die, I used the COVID deaths as of July 15, which was 140,775. The infection fatality rate (IFR) based on those numbers was 0.46% for the U.S. in the spring wave of COVID up to July 15.

But that is the overall rate. The actual risk of dying is much higher for the elderly and much lower for children and higher for sick people and lower for healthy people. What you probably want to know is what is your personal risk is, or the risk of your loved ones, given your age. Based on the age distribution of COVID deaths reported by the Centers for Disease Control (CDC) as of December 12, 2020, and based on the percentage of persons of different ages infected reported by Anand I calculate the following age-specific infection fatality rates for COVID, defined as the percentage of infected people who die. (Appendix 1 shows how I calculated these numbers and the sources.)

Table 1

Age	COVID infection fatality rate, %	overall fatality rate for the age (chance of dying from all causes), %	COVID infection fatality rate / overall fatality rate	% chance of having died from COVID in 2020 up to Dec. 12.
0 to 4	0.0013%	0.148%	0.01	0.000%
5 to 14	0.0006%	0.014%	0.04	0.000%
15 to 24	0.0056%	0.106%	0.05	0.001%
25 to 34	0.022%	0.184%	0.12	0.004%
35 to 44	0.064%	0.249%	0.26	0.012%
45 to 54	0.178%	0.489%	0.36	0.033%
55 to 64	0.421%	0.977%	0.43	0.079%
65 to 74	1.150%	1.796%	0.64	0.188%
75 to 84	3.031%	4.487%	0.68	0.471%
85 and over	9.076%	14.300%	0.63	1.320%
Overall	0.46%	1.020%	0.451	0.084%

It is interesting that even in the age 85+ group, about 90% of the infected persons survive COVID.

In fact these numbers for the case fatality rate should be viewed as an upper estimate for the spring wave. Jay Bhattacharya of Stanford writes that the median case fatality rate from seroprevalence surveys around the world is 0.2% (7). Moreover, there is reason to believe the seroprevalence tests are underestimating the number of people who have been infected by

missing people who had mild or asymptomatic disease because they produce low levels of IgG antibodies, the type being tested, and those levels may fade over time (4,5). (See Appendix 2.) Also, the estimate of 0.46% is based on Anand's study of dialysis patients (2), and that is a sick group of people that you would expect would to take more precautions than normal to try to prevent being infected, so it is a group I would expect to have a lower seroprevalence than the population as a whole.

So the true case fatality rate in the spring wave may be half the 0.46% I have estimated. In that case, each of the age-specific case fatality rates should be cut in half. And in the fall wave, it seems certain that the case fatality rate is lower than it was in the spring wave. It is lower because: (1) We have new treatments and have learned which treatments work, and (2) the virus has mutated to a form that is more contagious but less deadly. Evidence that the case fatality rate is going down is that the percentage of hospitalized COVID patients who die is going down. For Minnesota I calculate from the state health department numbers 36.3% of hospitalized COVID patients before July 15 died, and since then it has been 21.9%. Also 3.9% of laboratory-confirmed cases died by July 15 versus 0.93% since then. So in the fall and winter wave I think it is likely that the case fatality rate is about 0.23% or half of the 0.46% I used for the spring wave, and your chance of dying now if you are infected is probably about half of the number in Table 1.

The 4th column is the percentage of people of each age who actually have died of COVID in 2020 up to about December 12, according to the CDC.

The 3rd column I think is a useful way to think about your COVID risk. It is the ratio of your risk of dying from COVID *if you are infected* to your risk of dying from any cause this year or in 2019 before COVID hit. We all have an intuitive sense of how likely we are to die in the coming year (although we probably don't think about it much and probably underestimate the possibility). For age 65 and up, their risk of dying from COVID if they are infected is about 65% of what their risk of dying was this year if COVID had not happened. For persons under age 25, their risk of dying from COVID if they are infected is negligible – 5% or less of their risk of dying from all causes – and most people under age 25 do not spend a lot of time worrying about their risk of dying this year from any other cause. For adults aged 25 to 64, their risk of dying from COVID if they are infected is between 12 and 43% of their risk of dying from any cause. So if you are age 65 and up, you should be almost as worried about dying of COVID if you are infected as you were of dying this year before COVID hit. If you are less than 65, you should be less worried about dying from COVID, even if you are infected, than you were about dying this year before COVID hit. And if you are a child or adult under age 25, you really should not be worried about dying of COVID at all.

Comparison to Influenza

How do COVID deaths compare to flu deaths, and how does the infection fatality rate for COVID compare to the infection fatality rate of the flu or influenza?

I think the best way to answer that is just to look at raw deaths. In the U.S. we had 59,120 deaths in 2018 due to "influenza or pneumonia" according to the CDC, which in most years is about the 8th leading cause of death. That was a pretty normal year for the past decade. According to Worldometer, as of December 19 we have had 318,522 COVID deaths in the U.S. So by that measure it would be about 6 times worse than a normal year for flu deaths. But flu deaths normally occur during one flu season across two calendar years, and COVID has spanned two flu seasons, one in the spring and one going on now in the fall and winter. We had 140,775 COVID deaths as of July 15. If you consider that to be one flu season, it was about 2.5 times worse than a usual flu season. In the fall and winter, we will probably add perhaps as many as 300,000 more COVID deaths, so it will be 5 times worse than a usual flu season.

From that measure, it is fair to say COVID is about 5 or 6 times deadlier than the ordinary mix of upper respiratory tract infections. That 6x figure represents a combination both of how contagious it is and how lethal it is once a person is infected by the virus. COVID is 1.5x to 3.5x more lethal (by IFR or percent of infected people who die, as calculated above) and therefore to achieve 6x higher deaths must be 1.5x to 4x more contagious than influenza. That makes sense because other strains of coronavirus cause the common cold, and the common cold infects about 50% of the population in a given year, while influenza infects 10-15% typically. The evidence suggests that SARS-CoV-2, the virus that causes COVID is no more or less contagious than coronaviruses or other viruses that cause the common cold but is 1.5x to 4x more contagious than influenza.

Let's look just at lethality compared to influenza – how lethal the virus is among infected people. The most recent complete data from the CDC for influenza is "Estimated influenza illnesses, medical visits, hospitalizations, and deaths in the United States – 2017-2018 influenza season." (www.cdc.gov/flu/about/burden/2017-2018.htm). It estimates 61,099 deaths and 44,802,629 symptomatic illnesses. That is a 0.136% infection fatality rate. I have calculated the COVID infection fatality rate as 0.46% or 3.4-fold higher than influenza. The CDC report breaks down illnesses and deaths by age, allowing me to calculate the following numbers by age.

Table 2

Age	COVID IFR %	Influenza IFR %	COVID IFR/Influenza IFR
0 to 4	0.0016	0.0031	0.52
5 to 17	0.0000	0.0070	0.00
18 to 49	0.0243	0.0194	1.25
50 to 64	0.2062	0.0510	4.04
65 +	3.0198	0.8561	3.53
All ages	0.46%	0.136%	3.38

In Table 2 I used Minnesota numbers to calculate the COVID IFR because Minnesota has finer age breakdowns that allow more precise comparison to the age breakdowns used for influenza.

One interesting finding here is that COVID is much less deadly than influenza for children. Of course, influenza is not very deadly for children either, but COVID almost never causes death in children. The same result would be the case if I had used U.S. numbers. Also interesting to find that among 18 to 49 year-olds, COVID and ordinary influenza are about equally deadly in terms of infection fatality rate.

1918 Flu and other flu seasons

How does COVID compare to the 1918-1919 "Spanish" flu and to other flu seasons of the past? Here is a table of deaths in the U.S. per million population calculated from CDC statistics.

Table 3.

	Deaths per million population
COVID in 2020	962
COVID spring 2020 (up to July 15)	429
COVID fall-winter 2020-2021 flu season	~900
Influenza	
2018	149
2015	152
2010	151
2000	237
1990	368
1980	314
1970	417
1960	537
1950	481
1968	500
1957-58 flu season	674
1918-1919 Spanish flu	6,555

Influenza and pneumonia deaths per capita in the U.S. have gone down quite a bit just since 1990. In the 1950s and 60s, influenza deaths were usually about 500 per million population, which is half of the current COVID epidemic.

COVID is also often compared to the 1918-1919 Spanish flu. It should not be. The Spanish flu killed about 6 times as many people relative to the population, and equally importantly killed the young at perhaps a higher rate than it killed the old. So on top of the 6x greater deaths, the lost life expectancy per death was probably at least 4x greater. Altogether, it

should be considered more than 20 times worse in terms of lost person-years of life lost per capita than COVID. COVID is much closer in its death toll to ordinary influenza than it is to the 1918 flu.

Commentary

You may or may not find these numbers to be a high risk of COVID death for yourself or others. If you are under age 50, you certainly should not for yourself. Children are at a far lower risk of dying from COVID than of ordinary influenza, and are at less than 0.001% chance of dying from COVID. Adults younger than 50 are at about the same risk of dying from COVID as from ordinary influenza and have less than a 0.04% chance of dying from COVID this year.

Likely you find all of those numbers to be lower than you thought they were. But the experts knew from the very beginning of this outbreak, before it had really reached the U.S., that the infection fatality rate was certainly less than 1% and probably less than 0.5%. That was not well conveyed to the public and has still not been well conveyed to the public.

I am pretty sure you have never seen a story in the media that said that children are at much less risk of dying from COVID than they are from the flu. Or that young and early middle aged adults are at about the same risk of dying from COVID as of dying from ordinary influenza.

Although the case fatality rate of 9% for persons 85 and older is 3 to 4 times that of influenza, most people are probably under the impression that infection with COVID is almost a death sentence for the elderly and that at least 1/3 of the 85 and overs infected die. That is not correct. About 9% do.

Total COVID deaths are about 6 times ordinary influenza deaths in a year. Some might think that is high, and the media, health officials, and most politicians seem to think it is self-evident that if you have 6x the normal number of flu deaths you must shut down schools and businesses even at the cost of causing 16% unemployment, doubling suicides, and throwing 19% of the population into clinical depression. It is not self-evident to me. The way I think about it is, How worried were you on January 1, 2020, that you would die of the flu this year? Multiply that number by 6 and that is how worried you should be of dying from COVID. For me, I had zero worry I would die from the flu this year. Six times zero is still zero.

While COVID has produced 6 times the number of recent influenza deaths in a year, it is only twice the number in an ordinary year as recently as the 1960s before we had widespread use of the flu vaccine. We did not think in the 1960s that our biggest problem was influenza deaths.

These numbers have not been well conveyed to the public.

The key question for the public is "What is my chance of dying of COVID if I am infected?," shortly followed by "What is my child's chance and what is the chance of the elderly in our society?" That is what we needed to know and be told in order to make our own informed decisions about how seriously to take this and what precautions to take and what precautions it makes sense for society as a whole to take. The CDC and state health officials, the media and politicians have never informed us of that. They acted as if the infection fatality rate were the number of deaths divided by the number of verifiable symptomatic infections. But most people

never bother to get tested, because most people have mild symptoms, and we had a shortage of tests until recently. So that greatly overstated the lethality of the virus, giving numbers like 7%, when the actual infection fatality rate is 0.46%. They have also allowed a misunderstanding to persist that everyone is at high risk of dying from this disease, when the reality is that anyone under age 50 is at very low risk of dying even if the they are infected, and is at the same, or for children much less, risk of dying as they are of ordinary influenza. Even for people 85 and over, they are at about a 9% risk of dying if infected, or a 91% chance of surviving COVID if infected, which I do not think is so terrible considering they are at a 15% chance of dying from all causes and an 85% chance of surviving one more year. And of course, like all of us, they are at a 100% chance of dying, period.

I feel the CDC and health officials, the media, and politicians have failed us. They should not have allowed these misunderstandings to persist. They should have tried to calm us, not to make us more afraid.

Appendix 1.

I calculated the numbers in Table 1 from the information in the table below.

Age	Number of COVID fatalities	Percent of COVID fatalities	population millions	percent of population	COVID infection percentage	COVID case fatality rate, %	overall fatality rate for the age, %	CFR/OFR	% chance of dying from COVID in 2020
0 to 4	48	0.017391	19.6	5.97	9.8	0.0013	0.148	0.009	0.0002
5 to 14	47	0.017029	40.99	12.49	9.8	0.0006	0.014	0.043	0.0001
15 to 24	458	0.165942	42.69	13.01	9.8	0.0056	0.106	0.053	0.0011
25 to 34	1969	0.713406	45.93	13.99	9.8	0.0223	0.184	0.121	0.0043
35 to 44	5101	1.848188	41.65	12.69	9.8	0.064	0.249	0.255	0.0122
45 to 54	13580	4.92029	40.88	12.45	9.5	0.178	0.489	0.364	0.0332
55 to 64	33378	12.09348	42.44	12.93	9.5	0.421	0.977	0.431	0.0786
65 to 74	59056	21.3971	31.49	9.59	8.3	1.150	1.796	0.640	0.1875
75 to 84	75165	27.2337	15.97	4.87	7.9	3.031	4.487	0.675	0.4707
85 and over	87259	31.61558	6.61	2.01	7.4	9.076	14.300	0.635	1.3201
Total	276061		328.25		9.3		0.84%		0.084%

Number of COVID fatalities was from (1) for 2017. Percent of COVID fatalities is the is the number in a given age group as a percentage of the 276,061 total. Population in each age group is from statistica.com. The COVID infection percentage is the percentage of each age group infected from the data of (2), as of early July, 2020. The COVID case fatality % is calculated as: (percentage of COVID deaths/percentage of the population)*(the average infection percentage of 9.3/the infection percentage of the given age group)*0.46%, where 0.46% is the overall COVID case fatality rate I have calculated from (2). The 0.46% case fatality rate was calculated from number of deaths as of July 15, 2020 divided by number infected, which was calculated from 9.3% overall seropositivity as of early July times 328 million population of U.S. The overall fatality rate for each age group is from (3).

Appendix 2:

Others have found that antibody tests underestimate seroprevalence, and confirming that one article that reported conducting seroprevalence surveys in various jurisdictions in the U.S. on three occasions found that in most places the seroprevalence went down over time (5). That can only happen if antibody titers are decreasing over time so that a person tests positive at one point and negative later, even though they have been infected (4). If that is the case, it means many people who are infected are not raising IgG antibodies or their IgG antibody levels fade over time. Also, it was reported that many people with mild infections test negative by the IgG antibody tests but are raising T cells against COVID. That confirms much other evidence that a T cell response is more effective in controlling COVID than an antibody response. Immune response broadly comes in two types – cellular, meaning T cells, or humoral, meaning antibodies. T cells are the cells depleted in AIDS. We know that T cells and a cellular immune response are generally more effective in controlling viral infections than an antibody response, and evidence suggests that is true also of controlling COVID. So the people who mount the best immune response to COVID and therefore have mild or no symptoms, are those who produce T cells and not antibodies, and are therefore likely to test negative for prior infection with SARS-CoV-2 by antibody tests even though they have been infected and even though they have long-lasting immunity.

References

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