IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON
IN AND FOR THE COUNTY OF THURSTON

DEPARTMENT OF LABOR & INDUSTRIES FOR THE STATE OF WASHINGTON, Plaintiff/Petitioner NAT D FOWLER and MARY M FOWLER, dba FARMBOY DRIVE IN, Defendant/Respondent	No. 20-2-02460-34 DEFENDANT'S RESPONSE TO PRELIMINARY INJUNCTION AND MOTION TO DISMISS CASE AND VACATE RESTRAINING ORDER ON CONSTITUTIONAL GROUNDS

MOTION TO DISMISS CASE AND VACATE RESTRAINING ORDER ON CONSTITUTIONAL GROUNDS

EVIDENTIARY HEARING REQUESTED

Defendant Nat D Fowler and Mary M Fowler dba Farmboy Drive In (Farmboy) hereby moves this Court for an order dismissing this case in its entirety and vacating the Court's Temporary Restraining Order, on constitutional grounds described below.

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THE RESTRAINING ORDER VIOLATES NUMEROUS CONSTITUTIONAL PROTECTIONS

Even though agencies such as the Department of Labor and Industries ("L & I") have broad authority when they act under public health powers, they exceed this authority if they "violate[s] any direct or positive mandate of the constitution." *Campbell v. State*, 12 Wn.2d 459, 465, 122 P.2d 458 (1942) (quoting *Shea v. Olson*, 185 Wash. 143, 153, 53 P.2d 615 (1936). Additionally, a regulator must exercise its police power in a reasonable manner. See *Weyerhaeuser v. Pierce County*, 124 Wn.2d 26, 40 (1994). In this case, the Restraining Order violates the **contract**, **property**, **liberty**, **due process**, **takings**, **just compensation**, **privileges and immunities**, **equal protection**, **peaceable assembly** and **petition clauses of the United States Constitution**, and their associated Washington State Constitutional equivalents as well as Art. I, Section 12 of the Washington Constitution.

The "right to hold specific private employment" is a fundamental right of Washington citizenship. *Plumbers Steamfitters Union Local 598 v. Wash. Pub. Power Supply Sys.*, 44 Wn. App. 906, 915, 724 P.2d 1030 (1986). Washingtonians have "[t]he right to hold specific private employment free from *unreasonable governmental interference. . . .*" *Duranceau v. City of Tacoma*, 27 Wn. App. 777, 780, 620 P.2d 533 (1980).

The right to work, buy and sell and hold private employment free from unreasonable governmental interference has been recognized as fundamental on numerous occasions. *See Greene v. McElroy*, 360 U.S. 474, 492 (1959) ("[R]ight to hold specific private employment and to follow a chosen profession free from unreasonable governmental interference comes within the `liberty' and `property' concepts of the Fifth Amendment."); *New State Ice Co. v.*

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Liebmann, 285 U.S. 262, 278 (1932) ("[N]othing is more clearly settled than that it is beyond the power of a state, `under the guise of protecting the public, arbitrarily [to] interfere with private business or prohibit lawful occupations or impose unreasonable and unnecessary restrictions upon them.'" (quoting *Jay Burns Baking Co. v. Bryan*, 264 U.S. 504, 513 (1924))); *Truax v. Raich*, 239 U.S. 33, 41 (1915) ("[T]he right to work for a living in the common occupations of the community is of the very essence of the personal freedom and opportunity that it was the purpose of the Amendment to secure."); *Dent v. West Virginia*, 129 U.S. 114, 121 (1889) ("It is undoubtedly the right of every citizen of the United States to follow any lawful calling, business, or profession he may choose, subject only to such restrictions as are imposed upon all persons of like age, sex and condition.").

Washington case law recognizing these economic rights as fundamental rights is even stronger than federal case law. *See, e.g., State v. Carey*, 4 Wash. 424, 30 P. 729 (1892) (applying art. I, § 12 to the medical profession); *In re Habeas Corpus of Camp*, 38 Wash. 393 (applying art. I, § 12 to fruit and vegetable peddlers); *City of Spokane v. Macho*, 51 Wash. 322, 98 P. 755 (1909) (applying art. I, § 12 to employment agencies); *Dencker*, 58 Wash. 501 (applying art. I, § 12 to retail sales); *State v. W.W. Robinson Co.*, 84 Wash. 246, 146 P. 628 (1915) (applying art. I, § 12 to cereal and flour mills).

In Washington, "The right to hold specific private employment and follow a chosen profession free from *unreasonable governmental interference is a fundamental right* which comes within the liberty and property concepts of the Fifth Amendment." *Plumbers Steamfitters Union Local 598 v. Washington Pub. Power Supply Sys.*, 44 Wn. App. 906, 915, 724 P.2d 1030 (1986) (underline emphasis added).

Indeed the framers of the 1889 Washington Constitution drafted the constitution

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with the purpose of protecting "personal, political, and economic rights from both the government and corporations, and they strove to place strict limitations on the powers of both." Robert F. Utter, *Freedom and Diversity in a Federal System: Perspectives on State Constitutions and the Washington Declaration of Rights*, 7 U. PUGET SOUND L. REV. 491, 519 (1984).

Not only does Farm Boy and its workers have a right to work and be employed; Farm Boy has property rights to produce and sell its products. "Property in a thing consists not merely in its ownership and possession, but in the unrestricted right of use, enjoyment and disposal." *Manufactured Housing Communities of Washington v. State*, 142 Wn.2d 347, 364, 13 P.3d 183 (2000), in which we stated that (Emphasis and internal quotation marks omitted) (quoting *Ackerman v. Port of Seattle*, 55 Wn.2d 400, 409, 348 P.2d 664 (1960)).

THE DEPARTMENT'S SCIENTIFIC ASSERTIONS ARE INACCURATE

Farmboy (and its staff and customers') fundamental constitutional rights cannot be disregarded based on L & I's bald assertions that people "will be exposed to the risk of contracting COVID-19." According to CDC, COVID-19 poses a mortality risk similar to flu in all age groups. (https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html). Studies by Wake Forest University, Stanford University, Oxford University and others have established that COVID-19 has a survival rate exceeding 99.7% for those infected. In any case, contact tracing data in New York has found that restaurants are a source for just 1.4% of COVID-19 transmissions. (Being locked and held inside residences is the source for over half of all transmissions.) (https://ny.eater.com/2020/12/11/22169841/restaurants-and-bars-coronavirus-spread-data-new-york). *See Homes Unlimited, Inc. v. City of Seattle*, 90 Wn.2d 154, 158, 579 P.2d 1331 (1978) (stating the valid exercise of police powers "requires that they

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be *reasonably necessary* to protect the public health, . . . and that they be *substantially related* to the legitimate ends sought" (emphasis added)).

The Swiss Policy Research website provides links to many of these academic studies. (https://swprs.org/studies-on-covid-19-lethality/). For those under 70, COVID-19 poses a death rate of around 4/100ths of 1%. See the Ioannidis study linked at the site above.

But even if COVID-19 were as dangerous as L & I claims, the threat it poses cannot sweep away fundamental constitutional rights forged over centuries.

Due process principles require reasonable notice and opportunity to be heard before governmental deprivation of a significant property interest. E.g., *North Georgia Finishing, Inc. v. Di-Chem, Inc.*, 419 U.S. 601, 605-606 (1975); *Goss v. Lopez*, 419 U.S. 565, 572-576 (1975); *Board of Regents v. Roth*, 408 U.S. 564, 576-577 (1972); *Boddie v. Connecticut*, 401 U.S. 371, 379 (1971); *Sniadach v. Family Finance Corp*, 395 U.S. 337, 339 (1969); *Skelly v. State Personnel Bd.*, 15 Cal. 3d 194, 206-207, 124 Cal. Rptr. 14, 539 P.2d 774 (1975); *Beaudreau v. Superior Court*, 14 Cal. 3d 448, 458, 121 Cal. Rptr. 585, 535 P.2d 713 (1975); *Randone v. Appellate Department,* 5 Cal. 3d 536, 541, 96 Cal. Rptr. 709, 488 P.2d 13 (1971).

Farmboy objects to every material finding in the temporary restraining order. We object to the assertion that L & I has authority to control or prohibit indoor dining at Washington restaurants (as no source of law whatsoever authorizes such a thing). We object to the idea that "there is a substantial probability that death or serious physical harm could result to employee immediately or before the imminence of such danger can be eliminated . . ." We object to the finding that "immediate and irreparable injury, loss, or damage will result" if Farmboy continues indoor dining.

Farmboy asks for an evidentiary hearing to contest each of these assertions.

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THE TEMPORARY RESTRAINING ORDER VIOLATES EQUAL PROTECTION

The Temporary Restraining Order also violates Equal Protection principles. Farmboy is prohibited from offering indoor dining even as there is indoor dining and consumption of food at local hospitals cafeterias, local airport, bus and train depot cafeterias and food vending, and indoor consumption of food at deli counters of local large supermarkets and retailers such as Walmart and Target. The government cannot issue monopoly privileges to some businesses while ordering other business to close and fail. *Charles River Bridge v. Warren Bridge* (1837) (holding no business is entitled to a monopoly—even where such businesses were the first licensee or held business licenses without market competition for years).

According to the *Wall Street Journal*, such differences between how 'mom and pop' businesses (like Farm Boy) have been regulated compared with large multinational corporations has caused major destruction to America's small businesses. "Yelp 's Local Economic Impact Report found that, from March 1 through Aug. 31, nearly 100,000 businesses listed on Yelp had closed permanently due to the pandemic, an average of more than 500 a day." "Lockdowns Starve Mom and Pop," Wall Street Journal, Jan. 4, 2021 (https://www.wsj.com/articles/lockdowns-starve-mom-and-pop-11609802683) (accessed 1/5/2021):

> Consider restaurants, America's second-largest source of private employment. According to the National Restaurant Association, 110,000 have permanently closed and more than 500,000 are "in an unprecedented economic decline." In November alone, the Bureau of Labor Statistics reported, restaurants and bars lost 17,400 jobs as new state lockdowns took effect.
>
> But while national brands lose in lockdown-happy states, many are able to compensate with revenue from their locations in places with minimal restrictions.

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> National chains that are known for delivery are actually seeing sales improve. Domino's third-quarter U.S. sales were up 17.5%; Papa John's were up 24%. Quick service chains with drive-through lanes are also benefiting: McDonald's third-quarter U.S. sales rose 4.6%, while Wendy's were up 7.9%.

Id.

Economic protectionism which results in protecting a discrete interest group from economic competition is subject to a virtually per se rule of invalidity. See *City of Philadelphia v. New Jersey*, 437 U.S. 617, 624 (1978). Where an economic benefit or privilege is granted to a small and select group, as it is here, the classification must be based on "real and substantial differences bearing a natural, reasonable, and just relation to the subject matter of the act in respect to which the classification is made." State *ex rel. Bacich v. Huse*, 187 Wash. 75, 84, 59 P.2d 1101 (1936), overruled on other grounds by *Puget Sound Gillnetters Ass'n v. Moos*, 92 Wn.2d 939, 948, 603 P.2d 819 (1999). Furthermore, regulatory action that favors select enterprises, to the disadvantage of competitors, is invalid unless the regulator can demonstrate that it has no other means to advance a legitimate local interest. *CA Carbone v. Town of Clarkstown*, 511 U.S. 383, 392 (1994). Thus, regulations restraining a common right, such as the pursuit of business without unreasonable governmental interference, are not allowable on the grounds of mere desire, expediency, or convenience. *Ragan v. City of Seattle*, 58 Wn.2d 779, 780, 364 P.2d 916 (1961).

The Washington Constitution was drafted with the purpose of prohibiting State agencies such as L & I from giving special privileges to certain businesses while denying the rights of others. See Lebbeus J. Knapp, *Origin of the Constitution of the State of Washington*, WASH. HIST. Q. 227, 228 (1913) (stating Washington's constitution "fully and explicitly"

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restricts the legislative "power to grant any person or class of persons any exclusive political honors or privileges").

Nor can government enforcements be so arbitrary that they leave some businesses with heftier fines or punishments or conditions than others (as L & I is presently doing in the State of Washington). In *Village of Willowbrook v. Olech*, 528 U.S. 562 (2000) the Supreme Court struck down a requirement that one business must provide a thirty-three-foot easement to the government while requiring different-sized easements from others.

See also In re Habeas Corpus of Camp, 38 Wash. 393, 397, 80 P. 547 (1905) where the State Supreme Court struck down an ordinance prohibiting the peddling of produce within Spokane's city limits excepting farmers selling their own produce, on article I, section 12 grounds. The City had sought to ban small-scale produce sales as a nuisance, but the Court found the city had the power to regulate produce peddling as a nuisance, but the ordinance violated article I, section 12 because "[o]ne class [was] permitted to indulge in the nuisance [while] others [were] unconditionally prohibited." *Id.*

In *City of Seattle v. Dencker*, 58 Wash. 501, 510, 108 P. 1086 (1910), the State Supreme Court struck down an ordinance taxing vending machines but not in-person sales on article I, section 12 grounds because "[t]he tendency of this kind of an income is to foster monopolies, for a monopoly exists when the manufacture and sale of any commodity is restrained to one or a certain number." The court concluded, "[i]f this ordinance can be sustained, . . . the constitutional guaranty [of article I, section 12 becomes a dead letter." *Id.* at 510-11. Note that in this case, the approach of L & I are nearly precisely opposite—with vending machines privileged over restaurants like Farm Boy—but the constitutional violation is identical.

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Id.

In Farmboy's case, national-chain food retailers such as Walmart's indoor deli, Target's indoor deli, Costco, airport cafeterias and others operate profitably with the approval of Labor and Industries while Farmboy is fined for providing very similar (if not the same) prepared food products.

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CONCLUSION

For all the above reasons, Farmboy requests this Court to dismiss this case on grounds that it violates fundamental constitutional rights as described above. Farmboy also requests that the Temporary Restraining Order be immediately vacated. Farmboy also requests and evidentiary hearing in order to confront the witnesses and false claims made by L & I.

DATED this 11 day of Jan, 2021

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COVID-19 Pandemic Planning Scenarios

Updated Sept. 10, 2020 Print

Summary of Recent Changes

Updates as of September 10

As of September 10, 2020

- The Infection Fatality Ratio parameter has been updated to include age-specific estimates
- The parameter for Number of Days from Symptom Onset to Seeking Outpatient Care—which was based on influenza care seeking data—has been replaced with the Median Number of Days from Symptom Onset to SARS-CoV-2 Test among SARS-CoV-2 Positive Patients
- A new parameter for the likelihood of an infection being reported has been added: The Ratio of Estimated Infections to Reported Case Counts

CDC and the Office of the Assistant Secretary for Preparedness and Response (ASPR) have developed five COVID-19 Pandemic Planning Scenarios that are designed to help inform decisions by public health officials who use mathematical modeling, and by mathematical modelers throughout the federal government. Models developed using the data provided in the planning scenario tables can help evaluate the potential effects of different community mitigation strategies (e.g., social distancing). The planning scenarios may also be useful to hospital administrators in assessing resource needs and can be used in conjunction with the COVID-19Surge Tool.

Each scenario is based on a set of numerical values for biological and epidemiological characteristics of COVID-19 illness, which is caused by the SARS-CoV-2 virus. These values—called *parameter values*—can be used in models to estimate the possible effects of COVID-19 in U.S. states and localities. This document was first posted on May 20, 2020, with the understanding that the parameter values in each scenario would be updated and augmented over time, as we learn more about the epidemiology of COVID-19. The September 10 update is based on data received by CDC through August 8, 2020.

In this update, age-specific estimates of Infection Fatality Ratios have been updated, one parameter measuring healthcare usage has been replaced with the median number of days from symptom onset to positive SARS-CoV-2 test, and a new parameter has been included: Ratio of Estimated Infections to Reported Case Counts, which is based on recent serological data from a commercial laboratory survey in the U.S.[1]

New data on COVID-19 are available daily, yet information about the biological aspects of SARS-CoV-2 and epidemiological characteristics of COVID-19 remain limited, and uncertainty remains around nearly all parameter values. For example, current estimates of infection-fatality ratios do not account for time-varying changes in hospital capacity (e.g., in bed capacity, ventilator capacity, or workforce capacity) or for differences in case ascertainment in congregate and community settings or in rates of underlying health conditions that may contribute to a higher frequency of severe illness in those settings. A nursing home, for example, may have a high incidence of infection (due to close contacts among many individuals) and severe disease (due to a high rate of underlying conditions) that does not reflect the frequency or severity of disease in the broader population of older adults. In addition, the practices for testing nursing home residents for SARS-CoV-2 upon identification of a positive resident may be different than testing practices for contacts of confirmed cases in the community. Observed parameter values may also change over time (e.g., the percentage of transmission occurring prior to symptom onset will be influenced by how quickly and effectively both symptomatic people and the contacts of known cases are quarantined).

The parameters in the scenarios:

- Are estimates intended to support public health preparedness and planning.
- Are not predictions of the expected effects of COVID-19.
- Do not reflect the impact of any behavioral changes, social distancing, or other interventions.

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- Are estimates intended to support public health preparedness and planning.
- Are not predictions of the expected effects of COVID-19.
- Do not reflect the impact of any behavioral changes, social distancing, or other interventions.

The five COVID-19 Pandemic Planning Scenarios (Box 1) represent a range of possible parameters for COVID-19 in the United States. All parameter values are based on current COVID-19 surveillance data and scientific knowledge.

- Scenarios 1 through 4 are based on parameter values that represent the lower and upper bounds of disease severity and viral transmissibility (moderate to very high severity and transmissibility). The parameter values used in these scenarios are likely to change as we obtain additional data about the upper and lower bounds of disease severity and the transmissibility of SARS-CoV-2, the virus that causes COVID-19.
- Scenario 5 represents a current best estimate about viral transmission and disease severity in the United States, with the same caveat: the parameter values will change as more data become available.

Parameter values that vary among the Pandemic Planning Scenarios are listed in Table 1, while parameter values common to all five scenarios are listed in Table 2. Definitions of the parameters are provided below, and the source of each parameter value is indicated in the Tables.

Parameter values that vary across the five COVID-19 Pandemic Planning Scenarios (Table 1) include measures of viral transmissibility, disease severity, and pre-symptomatic and asymptomatic disease transmission. Age-stratified estimates are provided, where sufficient data are available.

Viral Transmissibility

- **Basic reproduction number (R_0):** The average number of people that one person with SARS-CoV-2 is likely to infect in a population without any immunity (from previous infection) or any interventions. R_0 is an estimate of how transmissible a pathogen is in a population. R_0 estimates vary across populations and are a function of the duration of contagiousness, the likelihood of infection per contact between a susceptible person and an infectious person, and the contact rate.[2]

Disease Severity

- **Infection Fatality Ratio (IFR):** The number of individuals who die of the disease among all infected individuals (symptomatic and asymptomatic). This parameter is not necessarily equivalent to the number of reported deaths per reported case because many cases and deaths are never confirmed to be COVID-19, and there is a lag in time between when people are infected and when they die. This parameter also reflects the existing standard of care, which may vary by location and may be affected by the introduction of new therapeutics.

Pre-symptomatic and Asymptomatic Contribution to Disease Transmission

A **pre-symptomatic case** of COVID-19 is an individual infected with SARS-CoV-2, who has not exhibited symptoms at the time of testing, but who later exhibits symptoms during the course of the infection. An **asymptomatic case** is an individual infected with SARS-CoV-2, who does not exhibit symptoms during the course of infection. Parameter values that measure the pre-symptomatic and asymptomatic contribution to disease transmission include:

- **Percentage of infections that are asymptomatic:** The percentage of persons who are infected with SARS-CoV-2 but never show symptoms of disease. Asymptomatic cases are challenging to identify because individuals do not know they are infected unless they are tested over the course of their infection, which is typically only done systematically as a part of a scientific study.
- **Infectiousness of asymptomatic individuals relative to symptomatic individuals:** The contribution to transmission of SARS-CoV-2 from asymptomatic individuals compared to the contribution to transmission of SARS-CoV-2 from symptomatic individuals. For example, a parameter value of 50% means that an asymptomatic individual is half as infectious as a symptomatic individual, whereas a parameter value of 100% means that an asymptomatic individual is just as likely to transmit infection as a symptomatic individual.
- **Percentage of transmission occurring prior to symptom onset:** Among symptomatic cases, the percentage of new cases of COVID-19 due to transmission from a person with COVID-19 who infects others before exhibiting symptoms (pre-symptomatic).

Parameter values that do not vary across the five Pandemic Planning Scenarios (Table 2) are:

- **Level of pre-existing immunity to COVID-19 in the community:** The percentage of the U.S. population that had existing immunity to COVID-19 prior to the start of the pandemic beginning in 2019.

- **Ratio of estimated infections to reported case counts:** The estimated number of infections divided by the number of reported cases. The level of case detection likely varies by the age distribution of cases, location, and over time.
- **Time from exposure to symptom onset:** The number of days from the time a person has contact with an infected person that results in COVID-19 infection and the first appearance of symptoms.
- **Time from symptom onset in an individual and symptom onset of a second person infected by that individual:** The number of days from the time a person becomes symptomatic and when the person who they infect becomes symptomatic.

Additional parameter values common to the five COVID-19 Pandemic Planning Scenarios are these ten measures of healthcare usage:

- Median number of days from symptom onset to SARS-CoV-2 test among SARS-CoV-2 positive patients
- Median number of days from symptom onset to hospitalization
- Median number of days of hospitalization among those not admitted to the ICU
- Median number of days of hospitalization among those admitted to the ICU
- Percentage of patients admitted to the ICU among those hospitalized
- Percentage of patients on mechanical ventilation among those hospitalized (includes both non-ICU and ICU admissions)
- Percentage of patients who die among those hospitalized (includes both non-ICU and ICU admissions)
- Median number of days on mechanical ventilation
- Median number of days from symptom onset to death
- Median number of days from death to reporting of that death

These healthcare-related parameters (Table 2) are included to assist in assessment of resource needs as the pandemic progresses.

Box 1 Description of the Five COVID-19 Pandemic Planning Scenarios

For each Pandemic Planning Scenario:

- Parameter value for **viral transmissibility** is the Basic Reproduction Number (R_0)
- Parameter value for **disease severity** is the Infection Fatality Ratio (IFR)
- Parameter values for the **pre-symptomatic and asymptomatic contribution** to disease transmission are:
  - Percentage of transmission occurring prior to symptom onset (from pre-symptomatic individuals)
  - Percentage of infections that are asymptomatic
  - Infectiousness of asymptomatic individuals relative to symptomatic individuals

For Pandemic Scenarios 1-4:

- These scenarios are based on parameter values that represent the lower and upper bounds of disease severity and viral transmissibility (moderate to very high severity and transmissibility). The parameter values used in these scenarios are likely to change as we obtain additional data about the upper and lower bounds of disease severity and viral transmissibility of COVID-19.

For Pandemic Scenario 5:

- This scenario represents a current best estimate about viral transmission and disease severity in the United States, with the same caveat: that the parameter values will change as more data become available.

Scenario 1:

- Lower-bound values for virus transmissibility and disease severity
- Lower percentage of transmission prior to onset of symptoms

- Lower percentage of infections that never have symptoms and lower contribution of those cases to transmission

Scenario 2:

- Lower-bound values for virus transmissibility and disease severity
- Higher percentage of transmission prior to onset of symptoms
- Higher percentage of infections that never have symptoms and higher contribution of those cases to transmission

Scenario 3:

- Upper-bound values for virus transmissibility and disease severity
- Lower percentage of transmission prior to onset of symptoms
- Lower percentage of infections that never have symptoms and lower contribution of those cases to transmission

Scenario 4:

- Upper-bound values for virus transmissibility and disease severity
- Higher percentage of transmission prior to onset of symptoms
- Higher percentage of infections that never have symptoms and higher contribution of those cases to transmission

Scenario 5:

- Parameter values for disease severity, viral transmissibility, and pre-symptomatic and asymptomatic disease transmission that represent the best estimate, based on the latest surveillance data and scientific knowledge. Parameter values are based on data received by CDC through August 8, 2020.

Table 1. Parameter Values that vary among the five COVID-19 Pandemic Planning Scenarios. The scenarios are intended to advance public health preparedness and planning. They are not predictions or estimates of the expected impact of COVID-19. The parameter values in each scenario will be updated and augmented over time, as we learn more about the epidemiology of COVID-19. Additional parameter values might be added in the future (e.g., population density, household transmission, and/or race and ethnicity).

Parameter	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5: Current Best Estimate
R_0*	2.0		4.0		2.5
Infection Fatality Ratio†	0-19 years: 0.00002 20-49 years: 0.00007 50-69 years: 0.0025 70+ years: 0.028		0-19 years: 0.0001 20-49 years: 0.0003 50-69 years: 0.010 70+ years: 0.093		0-19 years: 0.00003 20-49 years: 0.0002 50-69 years: 0.005 70+ years: 0.054
Percent of infections that are asymptomatic§	10%	70%	10%	70%	40%
Infectiousness of asymptomatic individuals relative to symptomatic¶	25%	100%	25%	100%	75%
Percentage of transmission occurring prior to symptom onset**	30%	70%	30%	70%	50%

*The best estimate representative of the point estimates of R_0 from the following sources:
Chinazzi M, Davis JT, Ajelli M, et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. *Science*. 2020;368(6489):395-400; Imai N., Cori, A., Dorigatti, I., Baguelin, M., Donnelly, C. A., Riley, S., Ferguson, N.M. (2020). Report 3: Transmissibility of 2019-nCoV. *Online report*
Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. 2020;382(13):1199-1207
Munayco CV, Tariq A, Rothenberg R, et al. Early transmission dynamics of COVID-19 in a southern hemisphere setting: Lima-Peru: February 29th-March 30th, 2020 [published online ahead of print, 2020 May 12]. *Infect Dis Model*. 2020; 5:338-345
Salje H, Tran Kiem C, Lefrancq N, et al. Estimating the burden of SARS-CoV-2 in France [published online ahead of print, 2020 May 13] [published correction appears in Science. 2020 Jun 26;368(6498):]. *Science*. 2020;eabc3517.
The range of estimates for Scenarios 1-4 represent the upper and lower bound of the widest confidence interval estimates reported in: Li Q, Guan X, Wu P, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. 2020;382(13):1199-1207.
Substantial uncertainty remains around the R_0 estimate. Notably, Sanche S, Lin YT, Xu C, Romero-Severson E, Hengartner N, Ke R. High Contagiousness and Rapid Spread of Severe Acute Respiratory Syndrome Coronavirus 2. *Emerg Infect Dis*. 2020;26(7):1470-1477 (https://dx.doi.org/10.3201/eid2607.200282) estimated a median R_0 value of 5.7 in Wuhan, China. In an analysis of 8 Europe countries and the US, the same group estimated R_0 of between 4.0 and 7.1 in the pre-print manuscript: Ke R., Sanche S., Romero-Severson, & E., Hengartner, N. (2020). Fast spread of COVID-19 in Europe and the US suggests the necessity of early, strong and comprehensive interventions. *medRxiv*.

† These estimates are based on age-specific estimates of infection fatality ratios from Hauser, A., Counotte, M.J., Margossian, C.C., Konstantinoudis, G., Low, N., Althaus, C.L. and Riou, J., 2020. Estimation of SARS-CoV-2 mortality during the early stages of an epidemic: a modeling study in Hubei, China, and six regions in Europe. *PLoS medicine, 17*(7), p.e1003189. Hauser et al. produced estimates of IFR for 10-year age bands from 0 to 80+ year old for 6 regions in Europe. Estimates exclude infection fatality ratios from Hubei, China, because we assumed infection and case ascertainment from the 6 European regions are more likely to reflect ascertainment in the U.S. To obtain the best estimate values, the point estimates of IFR by age were averaged to broader age groups for each of the 6 European regions using weights based on the age distribution of reported cases from COVID-19 Case Surveillance Public Use Data (https://data.cdc.gov/Case-Surveillance/COVID-19-Case-Surveillance-Public-Use-Data/vbim-akqf). The estimates for persons ≥70 years old presented here do not include persons ≥80 years old as IFR estimates from Hauser et al., assumed that 100% of infections among persons ≥80 years old were reported. The consolidated age estimates were then averaged across the 6 European regions. The lower bound estimate is the lowest, non-zero point estimate across the six regions, while the upper bound is the highest point estimate across the six regions.

§ The percent of cases that are asymptomatic, i.e. never experience symptoms, remains uncertain. Longitudinal testing of individuals is required to accurately detect the absence of symptoms for the full period of infectiousness. Current peer-reviewed and preprint studies vary widely in follow-up times for re-testing, or do not include re-testing of cases. Additionally, studies vary in the definition of a symptomatic case, which makes it difficult to make direct comparisons between estimates. Furthermore, the percent of cases that are asymptomatic may vary by age, and the age groups reported in studies vary. Given these limitations, the range of estimates for Scenarios 1-4 is wide. The lower bound estimate approximates the lower 95% confidence interval bound estimated from: Byambasuren, O., Cardona, M., Bell, K., Clark, J., McLaws, M. L., & Glasziou, P. (2020). Estimating the extent of true asymptomatic COVID-19 and its potential for community transmission: systematic review and meta-analysis. *Available at SSRN 3586675*. The upper bound estimate approximates the upper 95% confidence interval bound estimated from: Poletti, P., Tirani, M., Cereda, D., Trentini, F., Guzzetta, G., Sabatino, G., Marziano, V., Castrofino, A., Grosso, F., Del Castillo, G. and Piccarreta, R. (2020). Probability of symptoms and critical disease after SARS-CoV-2 infection. *arXiv preprint arXiv:2006.08471*. The best estimate is the midpoint of this range and aligns with estimates from: Oran DP, Topol EJ. Prevalence of Asymptomatic SARS-CoV-2 Infection: A Narrative Review [published online ahead of print, 2020 Jun 3]. *Ann Intern Med*. 2020; M20-3012.

¶ The current best estimate is based on multiple assumptions. The relative infectiousness of asymptomatic cases to symptomatic cases remains highly uncertain, as asymptomatic cases are difficult to identify, and transmission is difficult to observe and quantify. The estimates for relative infectiousness are assumptions based on studies of viral shedding dynamics. The upper bound of this estimate reflects studies that have shown similar durations and amounts of viral shedding between symptomatic and asymptomatic cases: Lee, S., Kim, T., Lee, E., Lee, C., Kim, H., Rhee, H., Park, S.Y., Son, H.J., Yu, S., Park, J.W. and Choo, E.J., Clinical Course and Molecular Viral Shedding Among Asymptomatic and Symptomatic Patients With SARS-CoV-2 Infection in a Community Treatment Center in the Republic of Korea. *JAMA Internal Medicine*; Zou L, Ruan F, Huang M, et al. SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. *N Engl J Med*. 2020;382(12):1177-1179; and Zhou R, Li F, Chen F, et al. Viral dynamics in asymptomatic patients with COVID-19. *Int J Infect Dis*. 2020; 96:288-290. The lower bound of this estimate reflects data indicating that viral loads are higher in severe cases relative to mild cases (Liu Y, Yan LM, Wan L, et al. Viral dynamics in mild and severe cases of COVID-19. *Lancet Infect Dis*. 2020;20(6):656-657) and data showing that viral loads and shedding durations are higher among symptomatic cases relative to asymptomatic cases (Noh JY, Yoon JG, Seong H, et al. Asymptomatic infection and atypical manifestations of COVID-19: Comparison of viral shedding duration [published online ahead of print, 2020 May 21]. *J Infect*. 2020; S0163-4453(20)30310-8).

** The lower bound of this parameter is approximated from the lower 95% confidence interval bound from: He, X., Lau, E.H., Wu, P., Deng, X., Wang, J., Hao, X., Lau, Y.C., Wong, J.Y., Guan, Y., Tan, X. and Mo, X. (2020). Temporal dynamics in viral shedding and transmissibility of COVID-19. *Nature medicine*, *26*(5), pp.672-675. The upper bound of this parameter is approximated from the higher estimates of individual studies included in: Casey, M., Griffin, J., McAloon, C.G., Byrne, A.W., Madden, J.M., McEvoy, D., Collins, A.B., Hunt, K., Barber, A., Butler, F. and Lane, E.A. (2020). Estimating pre-symptomatic transmission of COVID-19: a secondary analysis using published data. *medRxiv*.The best estimate is the geometric mean of the point estimates from these two studies.

Table 2. Parameter Values Common to the Five COVID-19 Pandemic Planning Scenarios. The parameter values are likely to change as we obtain additional data about disease severity and viral transmissibility of COVID-19.

Parameter values are based on data received by CDC through August 8, 2020, including COVID-19 Case Surveillance Public Use Data (https://data.cdc.gov/Case-Surveillance/COVID-19-Case-Surveillance-Public-Use-Data/vbim-akqf); data from the Hospitalization Surveillance Network (COVID-NET) (through August 1); and data from Data Collation and Integration for Public Health Event Response (*DCIPHER*).

Pre-existing immunity Assumption, ASPR and CDC	No pre-existing immunity before the pandemic began in 2019. It is assumed that all members of the U.S. population were susceptible to infection prior to the pandemic.
Time from exposure to symptom onset*	~6 days (mean)
Time from symptom onset in an individual and symptom onset of a second person infected by that individual†	~6 days (mean)
Mean ratio of estimated infections to reported case counts, Overall (range)§	11 (6, 24)
Parameter Values Related to Healthcare Usage	
Median number of days from symptom onset to SARS-CoV-2 test among SARS-CoV-2 positive patients (interquartile range)¶	Overall: 3 (1, 6) days
Median number of days from symptom onset to hospitalization (interquartile range)**	18-49 years: 6 (3, 10) days 50-64 years: 6 (2, 10) days ≥65 years: 4 (1, 9) days
Median number of days of hospitalization among those not admitted to ICU (interquartile range)††	18-49 years: 3 (2, 5) days 50-64 years: 4 (2, 7) days ≥65 years: 6 (3, 10) days
Median number of days of hospitalization among those admitted to ICU (interquartile range)††,§§	18-49 years: 11 (6, 20) days 50-64 years: 14 (8, 25) days ≥65 years: 12 (6, 20) days

Percent admitted to ICU among those hospitalized[††]	18-49 years: 23.8% 50-64 years: 36.1% ≥65 years: 35.3%
Percent on mechanical ventilation among those hospitalized. Includes both non-ICU and ICU admissions[††]	18-49 years: 12.0% 50-64 years: 22.1% ≥65 years: 21.1%
Percent that die among those hospitalized. Includes both non-ICU and ICU admissions[††]	18-49 years: 2.4% 50-64 years: 10.0% ≥65 years: 26.6%
Median number of days of mechanical ventilation (interquartile range)[**]	Overall: 6 (2, 12) days
Median number of days from symptom onset to death (interquartile range)[**]	18-49 years: 15 (9, 25) days 50-64 years: 17 (10, 26) days ≥65 years: 13 (8, 21) days
Median number of days from death to reporting (interquartile range)[¶¶]	18-49 years: 19 (5, 45) days 50-64 years: 21 (6, 46) days ≥65 years: 19 (5, 44) days

* McAloon, C.G., Collins, A., Hunt, K., Barber, A., Byrne, A., Butler, F., Casey, M., Griffin, J.M., Lane, E., McEvoy, D. and Wall, P. (2020). The incubation period of COVID-19: A rapid systematic review and meta-analysis of observational research. *medRxiv.*

† He, X., Lau, E.H., Wu, P., Deng, X., Wang, J., Hao, X., Lau, Y.C., Wong, J.Y., Guan, Y., Tan, X. and Mo, X. (2020). Temporal dynamics in viral shedding and transmissibility of COVID-19. *Nature medicine, 26*(5), pp.672-675.

§ The point estimate is the geometric mean of the location specific point estimates of the ratio of estimated infections to reported cases, from Havers, F.P., Reed, C., Lim, T., Montgomery, J.M., Klena, J.D., Hall, A.J., Fry, A.M., Cannon, D.L., Chiang, C.F., Gibbons, A. and Krapiunaya, I., 2020. Seroprevalence of antibodies to SARS-CoV-2 in 10 sites in the United States, March 23-May 12, 2020. *JAMA Internal Medicine*. The lower and upper bounds for this parameter estimate are the lowest and highest point estimates of the ratio of estimated infections to reported cases, respectively, from Havers et al., 2020.

¶ Estimates only include symptom onset dates between March 1, 2020 – July 15, 2020. Estimates represent time to obtain SARS-CoV-2 tests among cases who tested positive for SARS-CoV-2. Estimates based on and data from Data Collation and Integration for Public Health Event Response (*DCIPHER*).

** Estimates only include symptom onset dates between March 1, 2020 – July 15, 2020 to ensure cases have had sufficient time to observe the outcome (hospital discharge or death). Data for 17 year olds and under are suppressed due to small sample sizes.

†† Based on data reported to COVID-NET by Aug 1, 2020. Data for 17 year olds and under are suppressed due to small sample sizes. https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html.

§§ Cumulative length of stay for persons admitted to the ICU, inclusive of both ICU and non-ICU days.

¶¶ Estimates only include death dates between March 1, 2020 – July 15, 2020 to ensure sufficient time for reporting. Data for 17 year olds and under are suppressed due to small sample sizes.

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1. Havers, F.P., Reed, C., Lim, T., Montgomery, J.M., Klena, J.D., Hall, A.J., Fry, A.M., Cannon, D.L., Chiang, C.F., Gibbons, A. and Krapiunaya, I., 2020. Seroprevalence of antibodies to SARS-CoV-2 in 10 sites in the United States, March 23-May 12, 2020. *JAMA Internal Medicine*.
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Archive

COVID-19 Pandemic Planning Scenarios – May 20, 2020 [7 pages]

COVID-19 Pandemic Planning Scenarios – July 10, 2020 [9 pages]

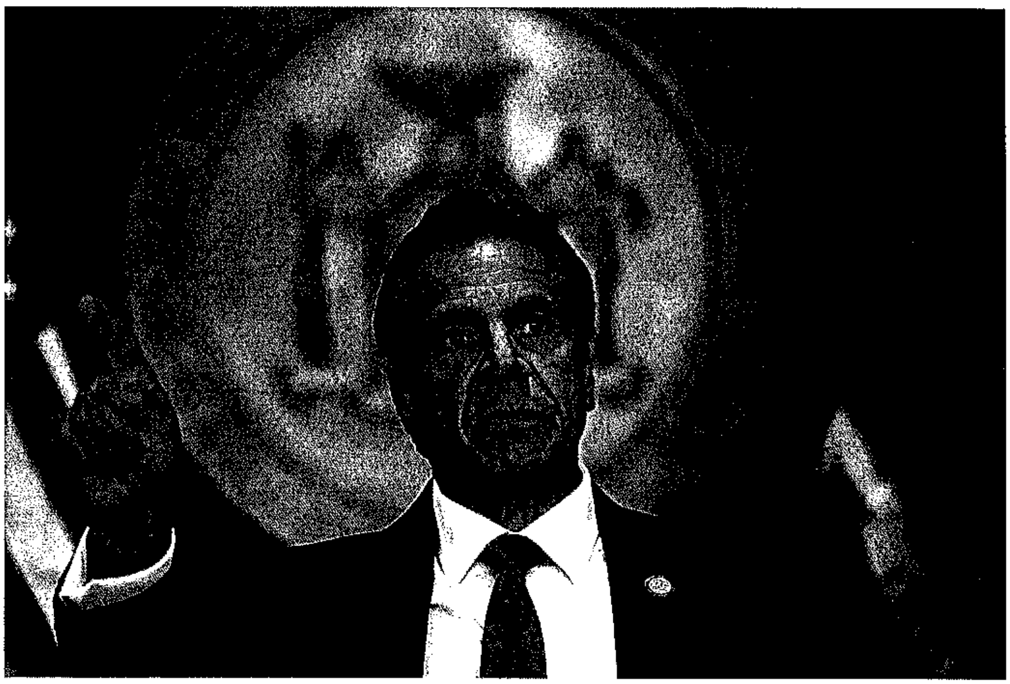
Last Updated Sept. 10, 2020

NEW YORK

Restaurants and Bars Account for 1.4 Percent of COVID-19 Spread in New York

The data was released at the same time that Gov. Andrew Cuomo announced a ban on indoor dining in NYC

by Erika Adams and Tanay Warerkar | Dec 11, 2020, 1:59pm EST



Gov. Andrew Cuomo | Photo by Spencer Platt/Getty Images

Following multiple calls from restaurant industry trade groups demanding more transparency with the state's COVID-19 contact tracing data, Gov. Andrew Cuomo released a detailed breakdown during a press conference on Friday showing how COVID-19 is spreading throughout the state.

Restaurants and bars accounted for 1.43 percent of COVID-19 cases recorded between September through the end of November, according to contact tracing data.

The figure places the industry as the fifth-largest contributor to spreading COVID-19 in the state, following education employees (1.5 percent), higher-education students (2.02 percent), and healthcare delivery (7.81 percent).

The largest contributor to COVID-19 spread in New York, by far, is private household and social gatherings. According to the state, 73.84 percent of COVID-19 cases spread through private gatherings.

The COVID-19 spread data was derived from 46,000 cases recorded in the past three months.

During the same press conference in which the COVID-19 spread data was released, Cuomo also announced that indoor dining was banned in NYC starting on Monday.

Even though restaurants were demonstrably not a large contributor to the uptick in COVID-19 cases in comparison to private gatherings, Cuomo said that banning indoor dining in the city was "one of the few areas where we think we can actually make a difference" in slowing the spread. Earlier this week, the state disclosed that indoor dining was the fastest-growing source of COVID-19 spread in New York.

The full breakdown of COVID-19 spread data is below:

OPINION | COMMENTARY

Lockdowns Starve Mom and Pop

Paying customers are the best stimulus for any small business.

By Andy Puzder
Jan. 4, 2021 6:24 pm ET

The latest lockdowns across the country will be deadly for the small businesses that have endured the pandemic this far. While there are no official numbers yet, business data show significant losses. Yelp 's Local Economic Impact Report found that, from March 1 through Aug. 31, nearly 100,000 businesses listed on Yelp had closed permanently due to the pandemic, an average of more than 500 a day.

In addition to destroying the accomplishments of thousands of American entrepreneurs and the jobs they create, lockdowns are forcing retail to consolidate around large national brands, which are better positioned to survive the pandemic.

Consider restaurants, America's second-largest source of private employment. According to the National Restaurant Association, 110,000 have permanently closed and more than 500,000 are "in an unprecedented economic decline." In November alone, the Bureau of Labor Statistics reported, restaurants and bars lost 17,400 jobs as new state lockdowns took effect.

But while national brands lose in lockdown-happy states, many are able to compensate with revenue from their locations in places with minimal restrictions

Swiss Policy Research

Studies on Covid-19 Lethality

Last updated: December 14, 2020; **First published:** May 12, 2020
Share on: Twitter / Facebook; **Main article**: Facts about Covid-19

Overview

1) Antibody studies ⇓ **2)** Immunological studies ⇓ **3)** Median age of death ⇓ **4)** Hospitalizations ⇓ **5)** Nursing homes ⇓ **6)** Overall mortality ⇓ **7)** Seroprevalence ⇓ **IFR**: Infection fatality rate

1) Antibody studies

The covid-19 infection fatality rate (IFR) depends on demographics (age and risk structure), public policies (e.g. protection of nursing homes), and medical treatment quality.

Covid-19 IFRs are strongly age-dependent, with a steep increase above the age of 70. The median age of covid-related deaths in most Western countries is 80 to 86 years (see section 3 below). In most Western countries, about half of all deaths occurred in nursing homes (see section 5).

In terms of covid-19 IFRs, an important difference exists between places with and without a partial or total collapse of local health and elderly care, and between the early and late pandemic phase.

A. Places without a collapse of health and elderly care

Country	Published	Population	IFR (%)	Source
Global	Oct. 7	51 locations Below 70 years	0.20[3] 0.04[3]	Ioannidis
Japan	Sept. 23	Tokyo <70y	0.01	Hibino
USA	Sept. 2	Indiana	0.26[5]	AIM
Brazil	Sept. 1 Sept. 21	Maranhao Manaus	0.17 0.28	da Silva Buss
Iceland	Sept. 1	General population Below 70 years	0.30 0.10	NEJM
Switzerland	July 14 August 7	Geneva hotspot Zurich area	0.32[1] 0.30[1]	Perez Aguzzi
India	July 31	Delhi Mumbai	0.07[2] 0.12[2]	India
Africa	July 29 August 5	Kenya Malawi	0.01 0.01	Uyoga Grace
Austria	June 25	Ischgl hotspot	0.26	von Laer
Sweden	June 16	Stockholm NNH Stockholm <70y	0.35[6] 0.09	FOHM
Slovenia	May 6	General population	0.16	GSI
Germany	May 4 Nov. 5	Heinsberg hotspot City of Munich	0.36[4] 0.48[8]	Streeck LMU
Iran	May 1	Guilan province	0.12	Shakiba
USA[7]	April 30 April 24	Santa Clara County Miami-Dade County	0.17 0.18	Bendavid Miami

	April 21	Los Angeles County	0.20	Sood
Denmark	April 28	Blood donors (<70y)	0.08	Erikstrup

1) 0.64% and 0.60% including nursing homes; **2)** 0.14% and 0.23% assuming 40% missing fatalities (more); **3)** median values; **4)** the unadjusted IFR is 0.28% (page 9); **5**) general population (excl. nursing homes); **6)** 0.58% including Stockholm nursing homes (about 40% of deaths, see page 23); **7)** These US studies may underestimate the true IFR, as they were done early during a locally accelerating pandemic; **8)** 0.76% including nursing homes (36% of deaths).

Note: The much-cited Meyerowitz-Katz meta-study claiming a global Covid-19 IFR of 0.68% is misleading because it mixes modelling studies and antibody studies, nursing homes and the general population, early and late phase IFRs, and commits several methodological mistakes.

B. Places with a partial or total collapse of health and elderly care

Overview: **1)** Spain ⇓ **2)** Northern Italy ⇓ **3)** New York City ⇓ **4)** England ⇓ **5)** Belgium ⇓

Places with a partial or total collapse of local health and eldery care experienced significantly higher and very strongly age-dependent IFR values, especially during the early phase of the pandemic.

However, IgG antibody tests may underestimate the true prevalence of coronavirus infections and may thus overestimate the IFR by a factor of two to five (see section 2 below).

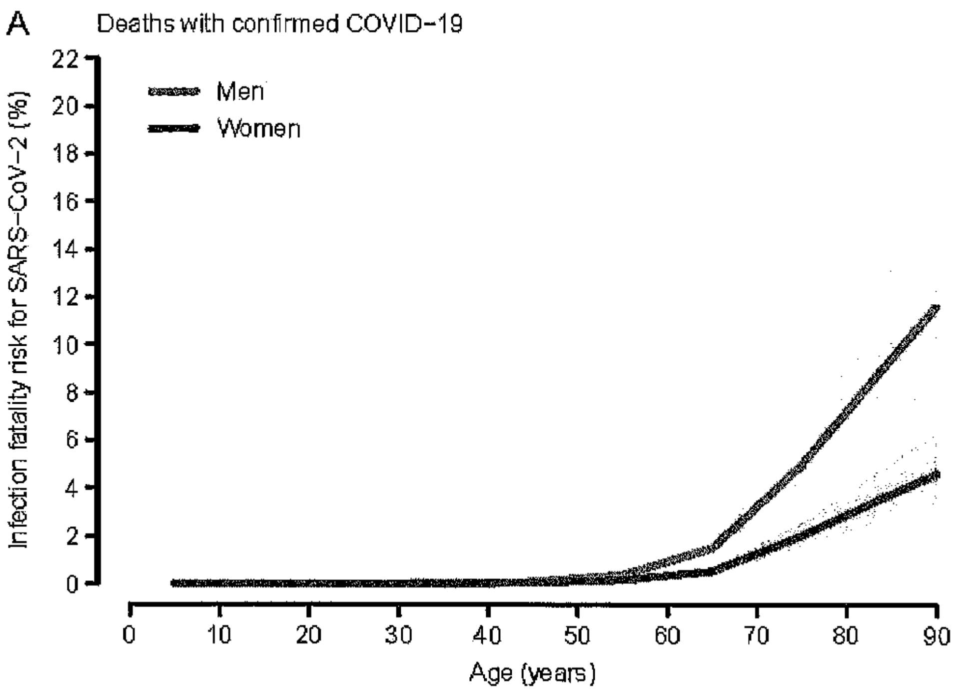
1) Spain

Country	Published	Population	IFR (%)	Source
Spain	August 7	Covid confirmed Excess deaths Below 50 years Below 40 years	0.82 1.07 <0.10 <0.03	Pollan

A Spanish seroprevalence study found an overall IFR between 0.82% (based on confirmed Covid-19 deaths) and 1.07% (based on excess all-cause deaths). The study didn't include nursing homes, which accounted for about 50% of all deaths. The IFR was strongly age-dependent, with values below 0.03% until 40 and below 0.1% until 50 but reaching very high levels above 70 years.

The study found a country-wide IgG antibody seroprevalence of just 4.9% (about 12% in Madrid). However, less than 20% of symptomatic people (3+ symptoms or anosmia) had IgG antibodies. This may indicate that infections were up to five times more widespread than detected by IgG antibody tests (see section 2 below on this topic). If so, Spanish IFR values might drop below 0.5%.

Above 60 years, there was a significant difference in lethality between men and women. This might be due to e.g. genetic reasons, cardiovascular health, or certain habits like smoking.



Spain: IFRs by age group and gender in confirmed cases (Barriuso)

2) Northern Italy

Country	Published	Population	IFR (%)	Source
Northern Italy	August 6	Above 70 years Below 70 years Below 50 years 80+, first phase 80+, second ph.	10.5 0.43 <0.01 30.40 8.10	Poletti

An Italian study considered contacts of confirmed Covid-19 cases in the Lombardy region, which includes hotspots like Bergamo and Cremona, to determine their fatality risk and their comorbidities. They found that the overall IFR was 62% lower in the second phase of the pandemic (after March 16) compared to the first, cataclysmic phase (up to March 15).

This was particularly evident in people above 80, where the IFR dropped from 30% in the early phase to 8% in the later phase (4% for women, 16% for men). Below 50 years, IFRs were near 0%; below 70 years, IFRs were 0.43% (both phases combined). More than 80% of deaths occurred in patients with cardiovascular diseases, which are known to be an important risk factor.

Of note, among Italian people with anosmia (temporary loss of the sense of smell or taste), a very typical Covid symptom, only about 25% were found to have IgG antibodies. This could indicate that coronavirus infections are more widespread, and IFRs lower, than assumed.

Northern Italy: IFRs in early and late pandemic phase (Poletti)

3) New York City

City	Published	Population	IFR (%)	Source
New York City	June 29	Overall	0.70	Stadlbauer
New York City	June 29	Confirmed Probable	1.10 1.45	Yang

25 to 44 y.	0.12
<25 years	0.01

Until May 2020, New York City counted about 20,000 confirmed and probable Covid-19 deaths among its 8.4 million citizens and registered an antibody prevalence of about 20%. Studies estimating the infection fatality rate (IFR) for New York City found values between 0.7% and 1.1% based on confirmed deaths and up to 1.45% based on confirmed and probable deaths.

About 52% of Covid deaths in NYC occurred in the 75+ age group. This value is lower than in Europe, where about 90% of deaths were 70+. In all of New York State, about 6,300 patients were sent from hospitals into nursing homes, which ultimately registered between 6,600 and 13,000 deaths.

As in Italy and other hard-hit places, the IFR for age groups above 65 dropped by about 50% during the course of the pandemic, possibly due to better medical preparedness and treatment strategies.

Assuming that serological IgG antibody tests do not capture the full extent of coronavirus infections (e.g. due to mild cases without IgG antibodies), the overall IFR in New York City might drop to about 0.50% or below, and the actual spread of the coronavirus might be above 50%.

Covid deaths in NYC by age group (Source: NYC.gov)

4) United Kingdom

Country	**Published**	**Population**	**IFR (%)**	**Study**
England	August 21	July 28 (MCT)	0.30	CEBM

		July 28 (ONS)	0.49	
England	August 14	General population	0.90	Ward
		Incl. care homes	1.43	
		45 to 64 years	0.50	
		Below 44 years	0.03	

Until July 2020, England counted about 30,000 Covid deaths in the general population and about 20,000 Covid-related deaths in nursing homes (which had to receive patients). According to the Oxford Centre for Evidence-Based Medicine, the Covid IFR fell by 50% to 80% during the epidemic and reached a value between 0.3% and 0.5% by the end of July.

A study by Imperial College London estimated an IgG antibody seroprevalence of 6% overall and 13% in London by mid-July. However, according to Public Health England, London blood donors had an antibody seroprevalence of 17.5% already in May.

Of note, only about 50% of people with anosmia (temporary loss of the sense of smell or taste), a very typical Covid symptom, had IgG antibodies. Only 35% of people who were suspected to be Covid cases by a doctor, had IgG antibodies. And only 28% of people who self-reported "severe symptoms" had detectable IgG antibodies against SARS-CoV-2.

If some of these people were indeed Covid cases (without detectable antibodies at the time of testing), the overall IFR value in the general population may drop to about 0.50% or below. The overall mortality of 2020 is comparable to the strong flu season of 1999/2000 (see below).

England: Mortality 2020 compared to strong flu wave of 1999/2000 (InProportion)

5) Belgium

Country	Published	Population	IFR (%)	Study
Belgium	June 20	General population Incl. care homes 45 to 64 years Below 44 years	0.43 1.25 0.21 0.02	Molenberghs

Belgium reported one of the highest covid death rates in Europe, in part because it always included confirmed and probable covid deaths. 50% of excess deaths in Belgium occurred in nursing homes. Of these, only about a third were confirmed by a PCR test. It is possible that some of the non-confirmed nursing home deaths were not due to covid, but due to the extreme circumstances.

Due to the high proportion of nursing home deaths, IFRs differ markedly between the general population and the nursing home population. The IFR for the general population is estimated between 0.30% to 0.62%, while the IFR for the nursing home population is estimated between 28% and 45%. For people aged 45 to 64, the IFR is 0.21, and for people aged 25 to 44, the IFR is 0.02%.

Even without age-adjustment, the peak monthly mortality due to Covid in April 2020 was equal to the 1989 seasonal flu wave and lower than the 1951, 1960 and 1970 flu waves (see chart below). The median age of covid deaths in Belgium was about 86 years. However, Belgian antibody seroprevalence until June was only about 7% at the national level and 12% in Brussels.

Belgium: Monthly mortality since 1900 (Bustos Sierra)

2) Immunological studies

Immunological research indicates that serological antibody studies, which measure antibodies in the blood (mostly IgG), may detect only about 50% to 80% of all coronavirus infections, depending on the sensitivity of the assay, the timing of the test, and the population tested.

This is because up to 80% of people develop only mild symptoms or no symptoms if infected, as they neutralize the coronavirus with their mucosal (IgA) or cellular (T-cells) immune system. These people may develop no measurable IgG antibodies or may show them only for a few weeks.

Most global Covid-19 hotspots peaked at about 25% IgG antibody prevalence (e.g. New York City, London, Stockholm, Madrid, Bergamo). Moreover, among people with anosmia (temporary loss of the sense of taste or smell) – a very typical Covid-19 symptom – only about 20% to 50% had detectable IgG antibodies, according to surveys in several countries (see below).

See also: Are we underestimating seroprevalence of SARS-CoV-2? (BMJ, 09/2020)

Country	Published	Focus	Factor	Source
Switzerland	May 23	IgA	5	Study
China	June 16	IgG	6	Study[1]
Sweden	June 29	T-cells	2	Study
Spain	July 6	IgG	5	Study[2]
Germany	July 16	IgG	2	Study
Italy	August 3	IgG	4	Study[2]
Brazil	August 12	IgG	5	Study[2]
UK	August 14	IgG	2	Study[2]

1) Only 16% of likely infected HCW had IgG; 2**)** People with anosmia but without IgG antibodies.

3) Median age of Covid-19 deaths per country

Half of all deaths were below, half were above the median age.

Country	Median age	Source
Australia	82 years	DOH
Austria	82 years	EMS
Belgium	86 years	IBS
Canada	86 years	HCSC
England	82 years	NHS
France	84 years	SPF
Germany	83 years	RKI
Italy	82 years	ISS
Spain	82 years	MDS
Sweden	84 years	FOHM
Switzerland	86 years	BAG
USA	78 years	CDC

Example: Death rate by age group in Massachusetts (mass.gov)

4) Hospitalization rate

Initial estimates based on Chinese data assumed a very high 20% hospitalization rate, which led to the strategy of 'flattening the curve' to avoid overburdening hospitals. However, population-based antibody studies (see above) have since shown that actual hospitalization rates are close to 1%, which is within the range of hospitalization rates for influenza (1 to 2%).

The US CDC found that Covid-19 hospitalization rates for people aged 65 and over are "within ranges of influenza hospitalization rates", with rates slightly higher for people aged 18 to 64 and "much lower" (compared to influenza) for people under 18.

In local hotspots like New York City, the overall hospitalization rate based on antibody studies is about 2.5% (19.9% or 1.7 million people with antibodies and 43,000 hospitalizations by May 2).

The much lower than expected hospitalization rate may explain why most Covid-19 'field hospitals' even in hard-hit countries like the US, the UK and China remained largely empty.

5) Percentage of Covid-19 deaths in care homes

In many countries, deaths in care homes account for 30 to 60% of all additional deaths. In Canada and some US states, care homes account for up to 80% of all "Covid19-related" deaths. In Sweden, deaths in nursing homes plus nursing apartments account for 75% of all deaths.

Care home deaths: absolute numbers (bars, left scale) and percentages (dots, right scale)

Source: Mortality associated with COVID-19 outbreaks in care homes (LTC Covid, May 21, 2020)

Source: The Covid-19 Nursing Home Crisis by The Numbers (Freopp, June 19, 2020)

The following chart shows the very significant difference between IFRs for the entire population (including nursing homes, top row) and for the non-nursing home population (bottom row) at the example of Belgium. IFRs for nursing home patients (ca. 30%) are about 10 times higher than IFRs for people of the same age (75+) outside of nursing homes (ca. 3%).

When calculating and communicating IFRs, it is therefore important to distinguish between nursing homes (which require focused and humane protection) and the general population.

Belgium: IFRs for entire population vs. non-nursing home population (Molenberghs)

6) Overall mortality

In countries like the UK (lockdown) and Sweden (no lockdown), overall mortality since the beginning of the year is in the range of a strong influenza season; in the US, mortality is in the range of the 1957 and 1968 influenza pandemics; in countries like Germany and Austria, overall mortality is in the range of a mild influenza season (but antibody levels are still low).

Global covid deaths and cases vs. global all-cause deaths

US: Monthly age-adjusted mortality since 1900

UK: Mortality 2020 vs. 2000

Sweden: Mortality since 1851

Germany: Mortality 1950-2020

Switzerland: Mortality 1900-2020 (Jan-Nov)

Sources: Global, USA, England, Sweden, Germany, Switzerland

A comparison between the number of coronavirus deaths predicted by the influential model of Imperial College London (no measures or moderate measures) and the actual number of deaths in Sweden indicates that the model significantly overestimated the impact of the epidemic:

Sweden: ICL model predictions versus actual Covid-19 deaths (HTY/FOHM)

7) Antibody seroprevalence per country

Percentage of people with measurable antibodies to the new coronavirus.

Country	Month	Region	Antibodies	Source
Belgium	June	National Brussels	7% 12%	Herzog
Brazil	June June May	Manaus Maranhao Sao Paulo	52% 40% 5%	Buss Silva Tess
Canada	June	National Quebec Ottawa Vancouver	0.7% 2.2% 1.3% 0.6%	BCA
Congo	July	Brazzaville	20%	IJID
Denmark	August	National Copenhagen	2.2% 3.2%	SSI
England	July	National North West London	6% 12% 17%	PHE

France	May	National Paris region Grand-Est	5% 9% 8.5%	SPF
Germany	June April	National Gangelt	<2% 15%	RKI
Hungary	June	National Budapest	0.7% 0.8%	Merkely
Iceland	July	National	0.9%	NEJM
India	July	Delhi Mumbai	24% 33%	NCDC
Iran	July	National Qom Rasht	17.1% 58.5% 72.6%	Lancet
Ireland	August	National Dublin	1.7% 3.1%	HSPC
Italy	July	National Bergamo Lombardy Sicily	2.5% 24% 7.5% 0.3%	ISTAT
Kenya	June	National Nairobi	5.2% 8.3%	Uyoga
Netherlands	July	National South	4% 16%	RIVM
Russia	June	National Moscow Petersburg	14% 20% 5.7%	TMT TMT EUSP
Spain	July	National Madrid	5% 12%	Pollan
Sweden	May Nov.	National Stockholm	5% 31%	FOHM DNSE
Switzerland	July July July Dec.	Zurich Ticino Geneva Geneva	3% 11% 11% 22%	BAG HUG
USA	July July July	National National NYC	5% 9.3% 25%	CDC Anand CDC

August	Chelsea MA	32%	JID
August	Chicago	20%	NWU

National antibody levels per country by September 1, 2020 (O'Driscoll)

See also

- Facts about Covid-19
- On the treatment of Covid-19
- The evidence on face masks

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