The Perceived Deservingness of COVID-19 Health Care: A Conjoint Experiment on Priority Access to Intensive Care and a Vaccine

Tim Reeskens, Associate Professor of Sociology, Tilburg University

t.reeskens@tilburguniversity.edu

Femke Roosma, Assistant Professor of Sociology, Tilburg University

f.roosma@tilburguniversity.edu

Evelien Wanders, Master Student 'Health, Wellbeing and Society', Tilburg University

e.a.wanders@tilburguniversity.edu

Abstract:

Amidst the COVID-19 pandemic, governments, supported by health experts and ethicists, released guidelines about which groups should receive priority access to both (intensive) care and vaccines as resources are limited. To achieve political legitimacy, support from the general public is important, as deservingness theory informs us that not all groups are equally perceived as deserving of assistance. Relying on a probability-based sample representative of the Dutch population (N = 1,601), participants were offered two choice-based conjoint experiments that measured what deservingness criteria matter most in respectively priority access to intensive care, and priority access to a COVID-19 vaccine. The results foremost show that noncompliance with government measures aimed at preventing the spread of the coronavirus impedes perceived deservingness. By contrast, being employed in the 'crucial' sector (i.e. health care and to a lesser extent education), leads to a higher perceived priority. Having an unhealthy BMI leads to less support for priority access to intensive care and vaccines. Age shows mixed patterns: public opinion would give less priority to elderly patients for intensive care. These results indicate that, *control* and *reciprocity* over *need* are important criteria to determine people's deservingness of COVID-19 health care. We discuss our findings in light of ongoing ethical discussions.

Acknowledgment:

This research was supported by a COVID-19 fast-track grant from the Netherlands Organization for Scientific Research (NWO). The authors would like to thank Loek Halman, Ruud Luijkx, Quita Muis, Inge Sieben, and Leen Vandecasteele for their helpful contributions in discussions on the design of the experiment, Giovanni Borghesan for providing the post-stratification weights, as well as Miquelle Marchand and her team at CentERdata for feedback on the conjoint experiment and the smooth implementation of the design.

1. Background

From the onset of the COVID-19 pandemic, it appeared that not all are created equal. Some are more likely to develop adverse medical consequences from COVID-19 causal agent SARS-CoV-2, with higher mortality rates among the elderly and people with underlying health conditions, including hypertension and diabetes (Zhou et al., 2020; Jordan, Adab & Cheng, 2020). To cope with an unprecedented influx of COVID-19 patients in hospitals and more particularly intensive care units (ICU), several medical associations released ethical guidance in case doctors are required to put in place systems of triage (BMA, 2020; NVIC, 2020). With the outlook of the availability of COVID-19 vaccines, similar ethical debates are taking place, feeding policy making in the allocation of vaccines, as it is clear that the production of the vaccine will not allow all to be vaccinated in the early stages of their release (National Academy of Sciences, Engineering, and the Medicine, 2020).

Although these ethical considerations are important by itself, public opinion should not be left out of the discussion about priority access to care. Insights from public opinion are necessary, as studies show that public policy requires support by the public to work efficient and effectively (Brooks & Manza, 2007; Rothstein, 1998). Put differently, governments that puts such ethical consideration into law need to align to the popular will. In this paper, we therefore ask public opinion who should get priority (a) over ICU care, and (b) in COVID-19 vaccination. Distinguishing between both can be insightful, because access to ICU represent curative health care, while vaccination reflects preventive care, implying that different priorities could be made.

At the theoretical level, debates about “who should get what and why” align to deservingness theory (van Oorschot, 2000; van Oorschot et al., 2017), which has identified five criteria, namely *control* over social risks, *attitude* towards received support, *reciprocity* to contributors, *identification* with beneficiary, and *need* for benefits. Empirical research has shown that not all groups are perceived as equally deserving of government support (van Oorschot, 2006). To give but one example, in perceptions of the allocation of unemployment benefits, it is shown that those who are responsible over their precarious situation are frequently penalized with reduced solidarity over welfare benefits (Reeskens & van der Meer, 2018). While such findings stimulate theoretical debates about which groups the general public would perceive as more deserving of curative and preventive COVID-19 health care, no research has so far surveyed public opinion.¹

In our study, we measure the perceived deservingness of IC treatment and a COVID-19 vaccine by implementing a choice-based conjoint experiment among a sample representative of the Dutch population. In our study, we confronted respondents of the Dutch LISS Panel (CentERdata, 2020), a population-based internet survey, with two situations. In one situation, participants were confronted with the scarcity over ICU beds; in the other situation, participants were introduced to limited COVID-19 vaccine production capacity. In both situations, panel participants were asked which of two fictitious person should be given priority access. Per situation, the two fictitious people were presented with randomized attributes on four conditions that went beyond medical risk factors: (a) age, (b) weight, (c)

¹ Few studies have engaged with the perceived deservingness of health care (Jensen & Petersen, 2017; Van der Aa, et al., 2017), showing that *need* is an important criterion to be considered of care. In this manuscript, we use the COVID-19 pandemic to leverage (a) the extent to which deservingness goes beyond need, as need is kept constant in our study, (b) whether public opinion prioritizes different groups in case of preventive and curative care by looking at perceived priority access of respectively a COVID-19 vaccine, and IC treatment.

obeying corona policy measures, and (d) occupation (before retirement). In our empirical study, *need* of health care is largely kept constant, because previous research has shown that need of support strongly influences perceived deservingness of health care. As we explained, during present pandemic, situations have arisen where cases equally in need of care require making difficult decision.

We focus on the Netherlands, not only because of the availability of high-quality survey data, but also by the specificity of the Dutch case. With its self-proclaimed ‘intelligent lockdown’, that took place from mid-March to June 1, the Dutch government addressed Dutch culture, with an emphasis on individual responsibility, producing higher institutional trust (Reeskens et al., 2020). The eased coronavirus measures were tightened again on October 14, following an increase in COVID-19 infections and hospitalizations, as displayed in Figure 1. On this date, bars and restaurants, for instance, needed to close again. Further, governmental measures to contain spread of the coronavirus as well as debates over COVID-19 vaccination received public scrutiny from ‘anti-lockdown’ action groups like ‘Virus Truth’ (*‘Viruswaarheid’*; originally ‘Virus Madness’ or *‘Viruswaanzin’*). This public scrutiny over corona-related policy measures requires detailed insights into public preferences from a sample representative of the Dutch population.

Figure 1. Hospitalizations Due to COVID-19 in the Netherlands, February 27–November 15, 2020

Note: Data, obtained from the National Institute of Public Health and the Environment (RIVM, 2020), represent the daily hospitalizations due to COVID-19 infection.

2. Data and Methods

To study public preferences towards which groups should be given priority on ICU and the early release of a COVID-19 vaccine, we implemented a unique experiment. Ahead of the study, ethical approval was asked and granted by the Ethical Review Board of the School of Social and Behavioral Sciences of Tilburg

University. For present study, which was integrated in a continuous monitoring of values change and stability amidst the COVID-19 pandemic (see Reekens et al., 2020), 1,601 members of the LISS Panel that participated in our earlier data collection were invited to participate. Of those invited, 1,461 respondents (91.3 percent) completed our survey. The data collection took place from 5 to 27 October 2020, which was at the onset of the second wave of the COVID-19 pandemic in the Netherlands, and ahead of the press release on November 10, 2020 that the Pfizer/BioNTech vaccine would reach a 90 percent effectivity. To correct for the Dutch population's distribution with regard to sex, age, education, and region, post-stratification weights are applied.

2.1. Two Conjoint Experiments

We opted for a choice-based conjoint design (for a recent application in social science research, see Hainmueller & Hopkins, 2014). Panel participants were confronted with the difficult position doctors and policymakers are facing these days, namely which groups should receive priority access to the ICU and a COVID-19 vaccine. Following a short introduction, respondents were offered a table that showed two distinct profiles of, in random order, people in need of an ICU bed and a vaccine. As Hainmueller and Hopkins (2014) explain, a forced-choice experiment has the advantage that respondents need to make trade-offs. In our case, this reduces the possibility that more general egalitarian values influence the preferences. In addition, the inclusion of several conditions per vignette allows for disentangling the relative importance of the theoretically relevant conditions.

The conjoint experiment about priority access to the ICU was preceded with the following introduction:

Early in the coronavirus crisis, the government and experts were concerned that the intensive care unit would be overwhelmed with COVID-19 patients. Although it has not yet happened [in the Netherlands] that the intensive care unit could no longer cope with the inflow of COVID-19 patients, considerations are made which patients should be given priority over ICU beds. Below you can find two descriptions of COVID-19 patients whose doctors estimate the probability of survival equally. Which of the two do you think should be given priority?

The conjoint experiment about priority for a COVID-19 vaccination was preceded with this introduction:

Currently, the pharmaceutical industry is working hard developing a vaccine against COVID-19. Since the production of the vaccine on such a large scale takes time, it most likely will not be readily available to everyone. Below you will find two descriptions of persons who would like to be vaccinated. If the vaccine is not available to everyone, who do you think should be given priority in vaccination?"

To exclude carryover effects (i.e. decisions over one experiment influencing the decision in the other), respondents were randomly presented with first the IC (49.9 percent) or the vaccine (50.1 percent) experiment.

It is evident that both experiments confronted participants with tough moral choices. Note that in the introduction of priority access to the ICU it is explicitly mentioned that doctors estimate the probability of survival equally for the two cases. In other words, both patients are in the same need of care and have the same medical chances of survival. At the end of the LISS Panel surveys, when participants are traditionally asked (by means of open question) if they have remarks on the survey, 49 respondents

made use of that opportunity to articulate their concerns about the choice-based conjoint experiment. Participants found it hard to decide upon the health outcomes of others, which articulated clearly by one participant's statement "I found it very difficult to make a choice: actually I'd rather not do this. I hope never to be in a position to actually make this choice."

2.2. The Attributes

In our experiment, we focus on criteria that not only align to distinct deservingness criteria (cf. van Oorschot, 2000), but were further frequently discussed in public debates on ICU triage, and priority access to a COVID-19 vaccine. The criteria we test are age (aligns to *need*), BMI (a mix of *control* and *need*), obeying COVID-19 measures (a mix of *control* and *attitude*), and occupation (before retirement) (the criterion of *reciprocity*). For age, we differentiated between people of 27, 52 and 77 years old. For weight, we contrasted people with a healthy weight (BMI = 22) and people with an unhealthy weight (BMI = 31). For obeying the government measures to contain the spread of the coronavirus crisis, our operationalization hinted about disrespecting negative travel advice.² Here, we distinguish between people who went on holiday to Barcelona in spite of a negative travel advice, and people who canceled a holiday to Barcelona after a negative travel advice was given. Lastly, also the professional situation (before retirement) is considered, distinguishing between being a nurse, a teacher, an administrative assistant, the unemployed. The professional situation characteristic explicitly mentions "before retirement" in case the oldest attribute (77 years old) was offered, as by law it is prohibited to practice salaried work after the age of 67.

Table 1. Experimental Design

Characteristics	Person A:	Person B
Age	<ul style="list-style-type: none"> • 27 years old • 52 years old • 77 years old 	<ul style="list-style-type: none"> • 27 years old • 52 years old • 77 years old
Weight	<ul style="list-style-type: none"> • Healthy weight (BMI = 22) • Unhealthy weight (BMI = 31) 	<ul style="list-style-type: none"> • Healthy weight (BMI = 22) • Unhealthy weight (BMI = 31)
Compliance with COVID-19 measures	<ul style="list-style-type: none"> • Went on holiday to Barcelona in spite of a negative travel advice • Canceled a holiday to Barcelona when a negative travel advice was given 	<ul style="list-style-type: none"> • Went on holiday to Barcelona in spite of a negative travel advice • Canceled a holiday to Barcelona when a negative travel advice was given
Occupation (before retirement)	<ul style="list-style-type: none"> • Nurse • Teacher • Administrative assistant • Unemployed 	<ul style="list-style-type: none"> • Nurse • Teacher • Administrative assistant • Unemployed

For both experiments, we wanted to exclude the possibility that medical need of the ICU patient of vaccine claimant would affect response behavior. We therefore prime the exclusion of medical histories

² At the time of surveying, there was no nation-wide mask mandate in the Netherlands, which could have made an excellent candidate to measure compliance with coronavirus measures.

by explicitly mentioning in the curative IC vignette that both persons have an equal chance on survival. This explicates that age by itself is not necessarily a proxy for medical vulnerability. Hence, aside of BMI as an implicit risk factor, explicit medical risk factors (such as an existing hearth condition) are therefore not considered as part of both experiments.

Respondents were offered the descriptions of two randomized people (per vignette experiment) as presented in Table 1. All attributes were randomly assigned to the respondents, leading to the possibility of 48 different combinations ($3 \times 2 \times 2 \times 4$). In case of an identical description, in joint discussion with CentERdata, it was decided that the respondent would be offered a different occupation.

2.3. Methodology

For this paper, we follow a trimmed-down procedure³ described by Hainmueller, Hopkins and Yamamoto (2013), by recoding the preferred person offered in our experiments to a binary outcome with 0 if the person is not selected, and 1 if the person is selected. This outcome is being crossed with the various attributes that characterize the fictitious persons that are in need of ICU or ask for COVID-19 vaccination. Chisquare and phi-coefficients are presented as measures for attribute significance. For the ease of interpretation, odds ratios are calculated to further evaluate the preferred priority of people with some attributes over others.

3. Findings

3.1. Access to ICU Treatment

As Figure 2 shows, the most differentiation can be found for following the coronavirus measures as imposed by the government (chisq = 218.846; df = 1; $p < 0.001$; phi = 0.303). 65 percent of the respondents who received the description of a patient who cancelled his/her trip would grant him/her priority on an IC bed, while this was only 35 percent among those respondents who received the description of a patient that went to Barcelona in spite of a negative travel advice. Put differently, the odds of receiving priority access is 3.5 higher if a person is compliant with the rules.

The second most important factor is occupation (chisq = 105.140; df = 3; $p = 0.807$; phi = 0.210), with a clear hierarchy that follows employment in 'crucial' sectors. 61 percent of the respondents who were shown the description of a nurse would grant them access to the ICU while priority gradually drops to 34 percent among those respondents who were shown an unemployed patient. In odds ratios, this means that a nurse is three times more likely to be given priority access, by the Dutch, to the intensive care compared to an unemployed COVID-19 patient (all other conditions equal).

Third in line of attribute relevance is the patient's age (chisq = 27.170; df = 2; $p < 0.001$; phi = 0.107). In situations where the chance of survival after IC treatment is considered equal, the Dutch would give priority access to ICU to the youngest patients. About 55 percent of the respondents who received the description of a young patient, would give them access to IC treatment, while 43 percent of those that

³ Their analytical strategy mentions the use of *average marginal component effects* (AMCEs). In future studies, which will include respondent characteristics to explain preferred priorities, these AMCEs will be used. For an easier interpretation of the results of present study, we proceed with proportions.

received the description of an old patient would give him/her priority access to the IC. The odds of being granted access to the IC is 1.7 higher if you are young (27 years old) than if you are old (77 years old).

Lastly, also BMI is relevant for perceived priority over an ICU bed ($\text{chisq} = 17.823$; $\text{df} = 1$; $p < 0.001$; $\phi = -0.086$). Of those respondents who were shown a patient with an obese BMI (31), 46 percent would grant them access to the ICU. However, 55 percent of the respondents who were shown a COVID-19 patient with a healthy BMI (22) would give them priority access. Turned into odds, a patient with a normal BMI is 1.4 times more likely to be perceived of priority access to the ICU compared to an obese COVID-19 patient.

3.2. Access to a Vaccine

Alike receiving priority access for an ICU bed, compliance with the coronavirus measures as imposed by the government is the strongest factor that determines preferences for priority access to a COVID-19 vaccine to those who want ($\text{chisq} = 182.814$; $\text{df} = 1$; $p < 0.001$; $\phi = 0.277$). 65 percent of the respondents that received a 'canceled the trip' description would give this person priority access to the vaccine, while 63 percent of those that received the 'traveled'-description would put this person at the end of the line. Put differently, Dutch public opinion perceives those who follow the rules imposed by the government as 3.12 times more deserving to have priority access to a COVID-19 vaccine.

Occupation (before retirement) shows parallel findings ($\text{chisq} = 83.399$; $\text{df} = 3$; $p < 0.001$; $\phi = 0.187$), too, with nurses and teachers being given more priority over a rapid vaccine release compared to the unemployed. Almost 60 percent of those that received a 'nurse' or 'teacher' vignette would give these occupations priorities, while this is reduced to approx. 35 percent in the case an unemployed claimant is shown. Nurses are 2.5 more likely to be perceived of a COVID-19 vaccine compared to the unemployed.

BMI also shows parallel results ($\text{chisq} = 15.933$; $\text{df} = 1$; $p < 0.001$; $\phi = -0.082$), with 55 percent of the respondents who received a description of a person with a healthy weight (BMI = 22) would put this person in front of the line for a vaccine, while this is only 45 percent among respondents who received a description of a person with an unhealthy BMI (31). The odds of being perceived as more deserving of a COVID-19 vaccine are therefore almost 40 percent higher if you have a healthy weight.

The main disparities with priority access over ICU beds are first of all age ($\text{chisq} = 22.095$; $\text{df} = 2$; $p < 0.001$; $\phi = 0.096$). Dutch respondents distinguish based on age, however, it are particularly those in the active part population that are given priority access to a vaccine; 57 percent of the respondents that received a description of a vaccine claimant of 52 years old, would put them in front of the line. This is lower (approx. 46.5 percent) in case of a description of a young (27 years old) or old (77 years old) claimant. There is no difference in the priority of young (27 years old) vaccine claimants over older claimants (77 years old).

Figure 2. Preferred Priorities on an ICU Bed and a COVID-19 Vaccine

Note: Post-stratification weights are applied.

4. Conclusion

While governments have consulted and are relying on health experts and medical ethicists in political decisions about IC triage and about which groups should be prioritized over others in the early release of a COVID-19 vaccine, insights from public opinion have largely remained on the sideline of such debates. This is surprising and might have political consequences because public policy depends upon the support of the public. If certain ethical guidelines are implemented that are orthogonal to demands from public opinion, governments might face a public backlash and lose public legitimacy, ultimately jeopardizing the effectiveness of measures to contain the spread of the coronavirus crisis. While studies have engaged with the perceived deservingness of welfare provision, this is the first of its kind applied to the context of the COVID-19 pandemic, distinguishing between both preventive and curative treatments of the virus.

Our study confirms research into welfare deservingness: *control* over one's own risk and *reciprocity* massively influence the perceived deservingness of both preventive and curative COVID-19 health care. Noncompliance with the coronavirus measures (i.e. *control* over contracting the coronavirus) yields less perceived deservingness in terms of priority over ICU beds and for the early release of vaccine. Although one might reverse the causality in case of the vaccine (i.e. people who don't want to have priority access to the vaccine are those who are also less likely to obey the rules), this logic clearly doesn't apply for priority access to the ICU, cancelling out this line of reasoning. Also occupation matters, as employment in 'crucial' sectors that are able to reciprocate to vulnerable people are perceived of more support, making that public opinion prioritize support with health care workers, and to a lesser extent teachers.

A high BMI mixes the criteria of *control* and *need*. Here, we see that the obese are put at the end of the line for both the IC (in the case of equal chances on survival) and the vaccine. Our interpretation that BMI is considered more as *control* (over social risks) and less in terms of medical *need* becomes clear that age, which is equally associated with medical need in case of the coronavirus, yields different outcomes in our study. It further needs to be emphasized that our vignette triggered that both ICU claimants are judged to have an equal chance of survival.

Indeed, one factor frequently discussed in case of COVID-19 health care, namely age is less in line with the expectations. Less priority to IC given to the oldest groups (considering that both patients have an equal chance of survival), which is considered to be more in medical *need*. By contrast, the active population is being given priority access to a vaccine. These findings challenge widespread notions present in public debates and show that younger and active persons would be given priority if differences in need are canceled out.

From a political perspective, the results give also support for the measures that are being undertaken or overthought. Employment in 'crucial' sectors, like health care, is being considered as an ethical guideline for priority access to health care amidst the COVID-19 pandemic, and is also endorsed by public opinion. The most important discrepancy lies in the 'subjective' factor of compliance with the coronavirus measures. Yet, it is basically impossible to design ethical standards based on this criterion, as there is no register that documents how compliant people have been with coronavirus measures. More open to further reflection are age and BMI, which show patterns opposing to ethical recommendations. Nevertheless, polarization over these two topics is less prominent and do first and foremost reveal insights over welfare deservingness in specific, and Dutch culture more generally.

The study also leaves some openings to future research. For instance, the fact that the elderly are given less priority over an ICU bed might be very context specific, as the Dutch have a particular orientation towards the end of life (Cohen et al., 2014). Second, it should also be studied how some criteria interact. E.g., if you are employed in health care but do not obey the rules, are you given more priority because you're employed in a 'crucial' sector and therefore vital for the care over other patients, or will you alternatively be penalized because not setting the example to others? Third, unexplored in this brief overview is whether the priorities displayed are invariant across all parts of the population, or whether respondent characteristics (e.g. age, health, political ideology, to name but a few) yield different response behavior.

References

- BMA (2020). *COVID-19 – Ethical Issues. A Guidance Note*. British Medical Association.
<https://www.bma.org.uk/media/2226/bma-covid-19-ethics-guidance.pdf>
- CentERdata (2020). *LISS Panel Data Archive, Database*. <https://www.lissdata.nl>
- Cohen, J., Van Landeghem, P., Carpentier, N., & Deliens, L. (2014). Public Acceptance of Euthanasia in Europe: A Survey Study in 47 Countries. *International Journal of Public Health*, 59, pp. 143-156.
- Hainmueller, J., & Hopkins, D. J. (2015). The Hidden American Immigration Consensus: A Conjoint Analysis of Attitudes toward Immigrants. *American Journal of Political Science*, 59(3), pp. 529-548.
- Hainmueller, J., Hopkins, D. J., & Yamamoto, T. (2014). Causal Inference in Conjoint Analysis: Understanding Multidimensional Choices via Stated Preference Experiments. *Political Analysis*, 22(1), pp. 1-30.
- Jensen, C., & Petersen, M. B. (2017). The Deservingness Heuristic and the Politics of Health Care. *American Journal of Political Science*, 61(1), pp. 68-83.
- Jordan, R. E., Adab, P., Cheng, K. K. (2020). Covid-19: Risk Factors for Severe Disease and Death. *BMJ*, 368, m1198.
- National Academy of Sciences, Engineering, and the Medicine (2020). *Framework for Equitable Allocation of COVID-19 Vaccine*. Washington, DC: The National Academy Press.
- NVIC (2020). *Draaiboek Pandemie Deel 1 (versie 2.0)*. Dutch Association of Intensive Care.
<https://nvic.nl/covid-19>
- Reeskens, T., & van der Meer, T. (2018). The Inevitable Deservingness Gap: A Study into the Insurmountable Immigrant Penalty in Perceived Welfare Deservingness. *Journal of European Social Policy*, 29(2), pp. 166-181.
- Reeskens, T., Muis, Q., Sieben, I., Vandecasteele, L., Luijkx, R., & Halman, L. (2020). Stability or Change of Public Opinion and Values During the Coronavirus Crisis? Exploring Dutch Longitudinal Panel Data. *European Societies*, accepted for publication.
- Rothstein, B. (1998). *Just Institutions Matter: The Moral and Political Logic of the Universal Welfare State*. Cambridge, Cambridge University Press
- RIVM (2020, November 17). *Ontwikkeling COVID-19 in grafieken*. National Institute for Public Health and the Environment. <https://www.rivm.nl/coronavirus-covid-19/grafieken>
- Van der Aa, M., Hilgsmann, M., Paulus, A., & Evers, S. (2017). Healthcare Deservingness Opinions of the General Public and Policymakers Compared: A Discrete Choice Experiment. In: W. van Oorschot, F. Roosma, B. Meuleman, and T. Reeskens (eds.), *The Social Legitimacy of Targeted Welfare: Attitudes to Welfare Deservingness* (pp. 241-260). Cheltenham, Edward Elgar.
- Van Oorschot, W. (2000). Who Should Get What, and Why? On Deservingness Criteria and the Conditionality of Solidarity among the Public. *Policy & Politics*, 28(1), pp. 33-49.

Van Oorschot, W. (2006). Making the Difference in Social Europe: Deservingness Perceptions among Citizens of European Welfare States. *Journal of European Social Policy*, 16(1), pp. 23-42.

Van Oorschot, W., Roosma, F., Meuleman, B., Reeskens, T. (2017). *The Social Legitimacy of Targeted Welfare: Attitudes to Welfare Deservingness*. Cheltenham: Edward Elgar.

Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y. Liu, Z., et al. (2020). Clinical Course and Risk Factors for Mortality of Adult Inpatients with COVID-19 in Wuhan, China: A Retrospective Cohort Study. *The Lancet*, 395(10229), pp. 1054-1062.