

# General Public Preferences for Allocating Scarce Medical Resources During COVID-19\*

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## **Abstract**

COVID-19 has overwhelmed healthcare systems across the globe with an unprecedented surge in the demand for hospitalizations. Consequently, many hospitals are facing precarious conditions due to limited capacity, especially in the provision of ventilators. The governing ethical principles of medical practice delineated in Emanuel et al. (2020) favor prioritizing younger patients, largely because their relatively higher expected life years. We conduct a survey with the general public in the United States to elicit their preferences for the allocation of a limited number of ventilators. The results show that the general public views align with the established ethical principles, which favor younger patients.

**Keywords:** ethics, principles, triage, ventilators.

**JEL Classification:** C91

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The catastrophic consequences of COVID-19 to human health have been felt on a global scale. The virus has already impacted the health of millions and claimed the lives of several hundred thousand people across 215 countries.<sup>1</sup> Even in developed nations, the pandemic has overwhelmed healthcare systems with an unprecedented increase in the demand for hospitalizations. Disruptions in the global supply chain for healthcare equipment, which plays a vital role in the replenishment of health-provision, have consequently left many hospitals in precarious conditions due to limited capacity and urgent needs for medical resources [1, 2, 3]. The most severe shortages have been experienced in the provision of ventilators, which are essential medical equipment for treating coronavirus patients [4]. This situation is exacerbated in developing countries where the public health systems tend to have more limited capacity constraints.<sup>2</sup> Many countries report that medical personnel have been forced to make difficult rationing decisions regarding which patients will be assigned to ventilators or other life-saving equipment [1, 5].<sup>3</sup> The severe shortage of essential resources raises the importance of the ethical considerations for determining the underlying principles and values for the fair allocation of medical treatment during COVID-19 when hospitals have to operate beyond capacity. Historically, these ethical decisions have mainly taken place during extraordinary times of warfare or heavy armed conflicts [6]. The derived lessons from the COVID-19 experience can provide invaluable insights in the event of future pandemics, natural disasters or other phenomena that creates excessive burdens in the healthcare system.

## Principles for fair allocation of scarce medical resources

The vast medical literature regarding the ethics for the fair allocation of scarce medical resources identifies four main governing principles: 1) *Treating patients equally*, 2) *Prioritizing the worst-off*, 3) *Maximizing social benefits*, and 4) *Maximizing individual benefits* [1]. Since the fatality rate of the coronavirus greatly varies across age groups and comorbidities, treating patients equally can only be applied among patients who have similar prognosis [1, 7]. The principle of “Prioritizing the

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<sup>1</sup><https://www.worldometers.info/coronavirus/>

<sup>2</sup><https://www.un.org/development/desa/dpad/publication/un-desa-policy-brief-66-covid-19-and-the-least-developed-countries/>

<sup>3</sup><https://www.hrw.org/news/2020/04/07/rights-risks-older-people-covid-19-response>

worst-off” or the allocation of limited medical resources to the sickest patients can be operationalized when it maximizes the expected post-treatment life-years [1, 8]. In the context of COVID-19, this concept favors younger patients when it helps to contain the virus (assuming that younger patients are more mobile and can widely spread the virus), or the sickest patients if it maximizes survival years after the treatment. The “Maximizing social benefits” principle favors patients who provide direct benefits to communities, such as healthcare workers or research participants.<sup>4</sup> However, determining which patient can provide the highest benefit to society can be extremely difficult, particularly during the course of urgent clinical decisions [1]. Nevertheless, having more expected life years also increases the expected social benefits from the treated patients and favors younger patients. In contrast, older patients should be prioritized in vaccination, as the survival rate of younger patients is higher for the same waiting period [1]. The principle of “Maximizing individual benefits” requires using scarce resources either for increasing the number of lives saved or for increasing post-treatment life-years, both of which generally favor younger patients [1, 9, 10].

Based on the four mentioned principles, Emanuel et al. (2020) recommend that if patients have similar COVID-19 severity symptoms, life-saving equipment and resources should be allocated to younger patients to maximize the benefit from post-treatment life-years [1]. However, they also highlight the importance of scrutinizing these values with the affected parties, including the general public, to ensure consensus for the fair allocation of scarce medical resources. Information about the general public’s preferences for allocation of scarce medical resources such as ventilators is important and can help guide public health experts and policy makers.

## Survey details

Our study answers Emanuel et al. (2020)’s call by using a survey to measure the U.S. general public views on the fair allocation of ventilators among patients who have similar morbidities and experience similar severity of COVID-19 symptoms. We conducted an online survey with 586 U.S. participants using the MTurk platform on April 6, 2020, when the COVID-19 pandemic was spreading rapidly across the United States. Our sample constitutes a wide range of socio-demographic characteristics (see Table A1). The participants were presented with a hypothetical

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<sup>4</sup><https://www.cdc.gov/flu/pandemic-resources/national-strategy/planning-guidance/index.html>

scenario, in which 1000 COVID-19 patients, with a similar level of severity of observed symptoms, were seeking treatment in a hospital. Since the current state of the medical ethics literature overwhelmingly prioritizes patients based on age considerations, our main focus is the age of the patients. Each respondent was asked to allocate 100 available ventilators among patients with similar prognosis that differed in age across 10 age categories, ranging from “0-10” years old to “90 or older” groups (see Figure A1). We partnered with public health officials and emergency disaster responding agencies and informed participants that their aggregate responses would be shared with Government officials.<sup>5</sup> Providing respondents with an opportunity to voice their opinions to policy-makers over the utilization of limited medical resources enabled us to incentivize participants to respond truthfully regarding their opinion for the fair allocation of scarce medical resources during COVID-19.

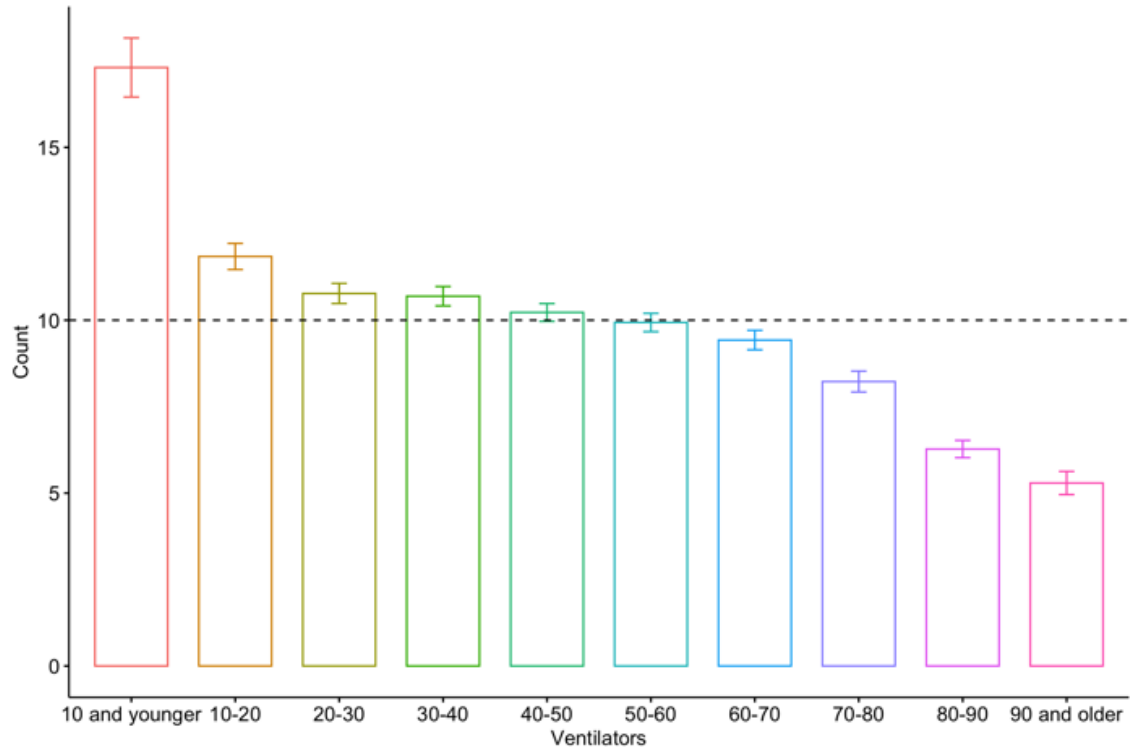
## Main Findings

Figure 1a shows the average number of ventilators allocated across age groups. Notice that the principle of *Treating patients equally* requires the allocation of exactly 10 ventilators to each age group since in the presented scenario, all patients have similar levels of severity of detectable symptoms and prognosis. The other three principles would require allocating more ventilators to younger patients conditional on the assumption that younger patients have more post-treatment life-years. The results of the survey indicate that our respondents allocate more ventilators to the “0-10”, “10-20”, “20-30” and “30-40” age groups and less ventilators for patients 60 years old or older. This finding suggests that the general public favors allocating more ventilators to younger patients, which is in conformity with the clinical ethical procedures suggested by the majority of the medical literature (see Emanuel et al. (2020) for details). Moreover, this result shows that the general public supports the ethical values adopted by some practitioners operating beyond capacity during COVID-19 [11].

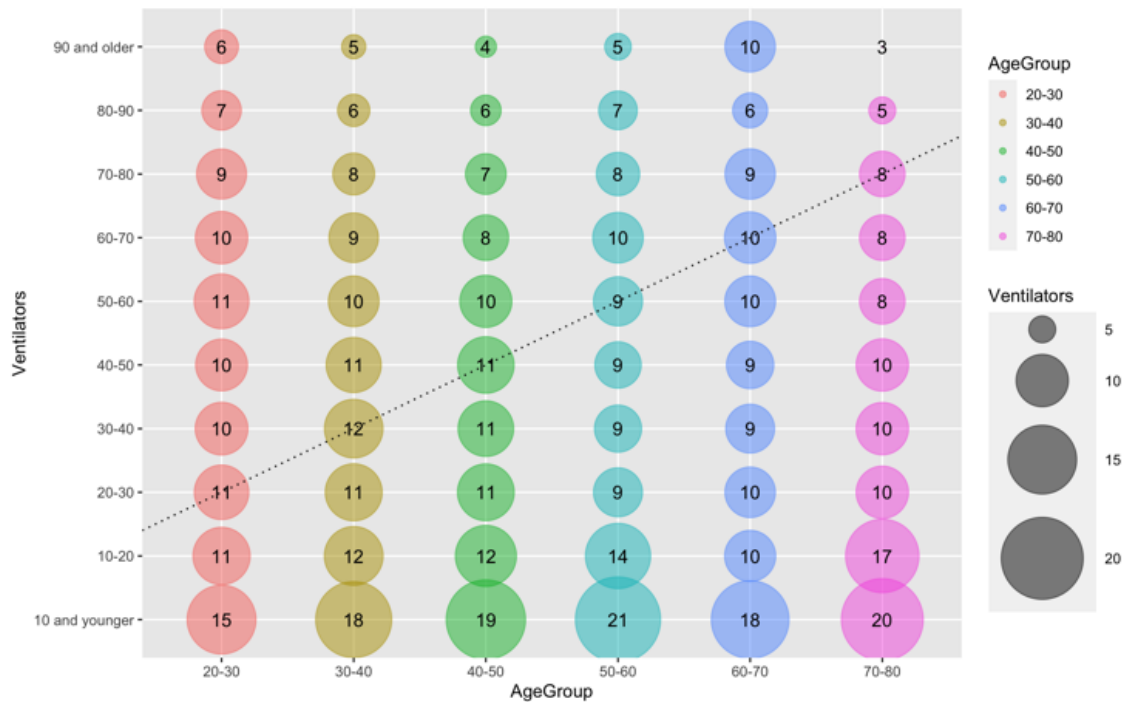
Figure 1b shows that, on average, participants from all age groups allocate more ventilators to younger patients, especially to patients younger than 10, while allocating around 10 ventilators to

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<sup>5</sup>This study was approved by Texas A&M University IRB2020-0400M and based on the IRB approved protocol requirements, personnel identifiers are removed from individual response data. Therefore, only aggregate results are reported.



(a)



(b)

**Figure 1: Allocations of ventilators across age groups.** (a) The average number of ventilator allocations across patient age groups. (b) The average number of allocated ventilators. The x-axis represents the age groups of decision-makers (i.e., respondents), and the y-axis shows patient age groups.

their “own age group.” This result shows that while respondents adhere to egalitarian principles when treating their own age group (i.e., allocating 10 ventilators), when it comes to other age groups, they tend to favor younger patients. It is noteworthy that even patients 60 or older who receive the lowest allocation of ventilators also show a favoritism for younger age groups (20 or younger) at similar rates as all the other age groups. Table A2 shows that most socio-demographic factors and current psychological mood measures are not strong predictors of preferences over the utilization of scarce medical resources. Females demonstrate a stronger preference for allocating ventilators to younger patients, while pro-democratic participants favor younger patients with a relatively lower magnitude. The underlying principles followed in the construction of the allocation index by age are discussed in the Appendix.

## Conclusion

COVID-19 surged the demand for public health resources at unprecedented levels since World War II [12]. Across several countries, healthcare workers had to apply strict rationing and ethical principles to efficiently utilize limited medical resources. Although the existing medical literature predominantly favors ethical rules that prioritize younger patients in terms of receiving access to scarce medical resources, the number of studies documenting the general public’s views on daily clinical procedures is scant. Emanuel et al. (2020) urge for the added perspective of other affected parties in the determination of existing ethical values. Our study speaks to this literature, and documents that, indeed, the general public predominantly favors younger patients, when it comes to allocation of limited number of ventilators among COVID-19 patients with similar severity of observed symptoms and prognosis. We find that this result is robust to the age of the decision-makers and some other socio-demographic variables. While in reality the ethical question is more complex, since patients do not always present the same severity in symptoms, our results provide useful information that aligns the general public views with the ethical standards set by the medical profession governing principles.

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## Appendix

Table A1: The main socio-demographic variables

	N	Min	Max	Mean	Std. Dev.
Female	586	0	1	0.40	0.49
Age	586	18	76	36.68	10.77
White	586	0	1	0.80	0.40
Religiosity	586	1	10	3.12	3.79
Has College Degree	586	0	1	0.47	0.50
Married	586	0	1	0.41	0.50
Age of Oldest Adult	586	18	94	45.27	15.10
Approves Rep. Party	586	0	100	35.38	35.88
Approves Dem. Party	586	0	100	52.86	33.55

Notes about variables: 1) Female - binary measure (1-“Yes”), 2) Age - age of participant, 3) White - binary measure (1-“Yes”), 4) Religiosity - increasing scale [0,10], 5) Has college degree - binary measure (1-“Yes”), 6) Married - binary measure (1-“Yes”), 7) Age of oldest adult - age of the oldest adult in household, 8) Approves Rep. Party - scale [0,100], 9) Approves Dem. Party - scale [0,100]

Table A2: The role of socio-demographic variables in ventilator allocations (OLS regression)

	<i>Dependent variable:</i>		
		index	
	(1)	(2)	(3)
Female	2.943* (1.553)	2.983* (1.561)	2.700* (1.582)
Age	0.039 (0.079)	0.035 (0.079)	0.030 (0.079)
White	5.582*** (1.905)	5.817*** (1.906)	5.874*** (1.918)
Religiosity	-0.132 (0.207)	0.043 (0.229)	0.106 (0.237)
Has College degree	0.262 (1.507)	0.423 (1.504)	0.499 (1.509)
Married	0.624 (1.644)	1.235 (1.658)	1.191 (1.664)
Age of Oldest Adult	0.004 (0.055)	0.00004 (0.055)	-0.006 (0.055)
Approves Rep. Party		-0.059** (0.027)	-0.044 (0.028)
Approves Dem. Party		-0.048* (0.025)	-0.044* (0.026)
Ingroup preferences			-0.736 (0.673)
Considers Harm consequences in decisions			0.452 (1.021)
Fairness			0.725 (1.016)
Constant	52.023*** (3.503)	55.913*** (3.914)	52.621*** (5.157)
Observations	586	586	586
R <sup>2</sup>	0.026	0.036	0.040
Adjusted R <sup>2</sup>	0.014	0.021	0.020
Residual Std. Error	18.037 (df = 578)	17.977 (df = 576)	17.984 (df = 573)
F Statistic	2.212** (df = 7; 578)	2.386** (df = 9; 576)	1.999** (df = 12; 573)

*Note:*

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Notes about variables: Since Figure 1A shows that subjects allocate 10 ventilators for middle age groups "40-50" and "50-60" and deviate from the "Treating patients equally" principle for younger and older patients, we constructed an index to capture the changes in allocations on the tails of the distribution. Index=( $\frac{"0-10"}{10} * 5 + \frac{"10-20"}{10} * 4 + \frac{"20-30"}{10} * 3 + \frac{"30-40"}{10} * 2 + \frac{"40-50"}{10} * 1 + \frac{"50-60"}{10} * (-1) + \frac{"60-70"}{10} * (-2) + \frac{"70-80"}{10} * (-3) + \frac{"80-90"}{10} * (-4) + \frac{"90 \text{ and older}"}{10} * (-5) + 50$ ). The value of the index varies in the range of [0,100]. The index is sensitive to disproportional allocation on the tails. It receives a value above 50 if a respondent disproportionately favors younger patients. Conversely, if the respondent prefers older patients, then the index receives values in the range of [0,49]. A value of "0" represents full allocation to the oldest group, while a 100 represents full allocation to the youngest age group. "Ingroup preferences", "Considers harm in decisions", and "Fairness preferences" were constructed based on Moral Foundation Questionnaire questions (MFQ-20) [13].

Imagine that Hospital Center X has 100 available ventilators to treat COVID-19 patients. There are a total of 1000 patients seeking treatment. All of the patients are experiencing similar level of severity in their observed symptoms. The table below shows a description and the number of people seeking treatment. Your task is to assign patients to the 100 available ventilators. The total number of patients allocated cannot exceed the 100 available ventilators.

**The results of this task will be shared with Government officials. So please make your choices very carefully.**

100 patients under 10 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 10-19 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 20-29 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 30-39 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 40-49 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 50-59 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 60-69 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 70-79 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients between 80-89 years old. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
100 patients who are 90 or older. The number of ventilators I allocate for this group is:	<input type="text" value="0"/>
<hr/>	
Total	<input type="text" value="0"/>

**Figure A1:** Respondents were presented a hypothetical scenario, in which they had to allocate ventilators among COVID-19 patients. Only the 10% of patients had a chance to get a ventilator. The respondents were required to allocate ventilators based on 10 age groups.