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## Review Paper

# Community preferences for the allocation of scarce healthcare resources during the COVID-19 pandemic: a review of the literature



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## ABSTRACT

**Objective:** The purpose of this thematic review is to examine the literature on the public's preferences of scarce medical resource allocation during COVID-19.

**Study design:** Literature review.

**Methods:** A review of Ovid MEDLINE, Embase, CINAHL and Scopus was performed between December 2019 and June 2022 for eligible articles.

**Results:** Fifteen studies using three methodologies and spanning five continents were included. Five key themes were identified: (1) prioritise the youngest; (2) save the most lives; (3) egalitarian allocation approaches; (4) prioritise healthcare workers; and (5) bias against particular groups. The public gave high priority to allocation that saved the most lives, particularly to patients who are younger and healthcare workers. Themes present but not supported as broadly were giving priority to individuals with disabilities, high frailty or those with behaviours that may have contributed to their ill-health (e.g. smokers). Allocation involving egalitarian approaches received the least support among community members.

**Conclusion:** The general public prefer rationing scarce medical resources in the COVID-19 pandemic based on saving the most lives and giving priority to the youngest and frontline healthcare workers rather than giving preference to patients with disabilities, frailty or perceived behaviours that may have contributed to their own ill-health. There is also little public support for allocation based on egalitarian strategies.

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## Background

Since the outbreak of the coronavirus (COVID-19) pandemic, there have been over 496 million confirmed cases and 6.17 million deaths.<sup>1</sup> The rapid evolution of the virus saw a dramatic increase in patients, particularly the elderly and those with severe illness, which began to overwhelm the health systems in many countries, resulting in shortages of medical resources, such as ventilators and intensive care unit (ICU) beds and now vaccines.<sup>2</sup> The surplus in demand exceeding the availability of healthcare resources led to the unavoidable rationing of medical equipment and interventions, most notably critical care resources which are challenging to

expand in a short time.<sup>3–6</sup> How health services and clinicians respond to the need for rationing of scarce but vitally important resources could potentially be a life-and-death situation for patients.

Previous authors have highlighted that hospitals lack a standardized foundation on which to make these rationing decisions.<sup>7–9</sup> In response, ethicists and healthcare policymakers developed guidelines and protocols to avoid health systems becoming overwhelmed<sup>10</sup> as well as to help physicians make challenging decisions.<sup>3,5,10,11</sup> These decision-making frameworks can have a direct impact on the access to services and health of the public. This process is not dissimilar to what has occurred in other fields where there are scarce health resources. Arguably the most prominent example is that of allocating donated organs, where previous work has synthesised the views of ethicists,<sup>3,12–14</sup> clinicians<sup>15,16</sup> and the public<sup>17–20</sup> as to how this allocation process should take place. However, none of the current COVID-19 guidelines involved community consultation;<sup>21–27</sup> therefore, it is

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unknown to what extent the current COVID-19 allocation policies align with community preferences and values.

Allocation of scarce health care during pandemic conditions that can be guided by rules and recommendations that do not align with the public's opinions and values could create feelings of injustice and distrust of governments and health systems. This was shown in the UK where early in the pandemic, the UK's National Institute for Health and Care Excellence (NICE) drafted allocation guidelines proposing that all adults on admission to hospital, irrespective of COVID-19 status, be assessed for frailty and that comorbidities and underlying health conditions should be considered.<sup>27</sup> This was eventually revised after concerns were raised by several patient groups that the policy would disadvantage some groups, such as those with disabilities.<sup>28</sup> This example highlights the difficulty of balancing different ethical criteria, a difficulty exacerbated by the need to make urgent clinical decisions.<sup>3</sup> It further highlights the importance of engaging the public in priority setting in health care, a principle that has been widely advocated for.<sup>29</sup>

As COVID-19 will not be the last pandemic to occur and challenge healthcare systems and in addition to preparing for future healthcare resource shortages, efficient allocation of resources need to be better planned. Therefore, it is necessary to involve the public in discussions before another healthcare crisis eventuates so that resource limitations would not lead to arbitrary allocation decisions, which can lead to public confidence in both health professionals and health systems.<sup>30–33</sup> To help inform such discussions, we conducted a synthesis of the literature that has examined the public's perceptions regarding scarce medical allocation during the COVID-19 pandemic.

## Methods

### Search strategy

A systematic search was carried out using Ovid MEDLINE, Embase, CINAHL and Scopus using the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 Statement.<sup>34</sup> Specific search strategies were developed with expert librarian support using the search terms: 'COVID-19', 'coronavirus', 'community', 'layperson\*', 'general public', 'decision making', 'preferences', 'healthcare resource allocation', 'rationing' and 'medical ethics'. Additional data were located with the use of Google Scholar and a search of the reference lists of included articles.

### Eligibility criteria

Included were articles that met the following inclusion criteria:

1. Studies published in a peer-reviewed source since December 2019 to coincide with the COVID-19 pandemic outbreak. Abstracts, comments, posters and editorials were excluded.
2. Studies that assessed community preferences for allocation of scarce healthcare resources during the COVID-19 pandemic outbreak. Note: Healthcare resources are defined as any material (e.g. ventilator, ICU bed, vaccine) and facility (e.g. hospital) that can be used for providing healthcare services.

### Article selection

The initial database searches were conducted by two researchers and the retrieved literature was imported into Endnote 9.1. Two researchers also independently screened the titles and abstracts of the search results and cross-checked. After initial screening, full texts were downloaded and two researchers read full texts.

Disagreements between the researchers were resolved through discussions with a third researcher until consensus was reached.

### Data charting process

Relevant data were extracted by two researchers using Excel (Microsoft Corporation), including the first author, country of origin, study design, sample size and key findings for each selected article.

### Collation of results

The variation in study designs across articles meant that conducting a systematic review was not possible. Therefore, a thematic synthesis of the findings was conducted using inductive coding to identify emerging themes. As there are no formal guidelines for literature reviews with thematic synthesis, two researchers organised the review into paragraphs that present the themes and identified trends relevant to our topic. Following this, descriptive themes were developed to group common preferences and named accordingly.

### Search results

Overall, 636 records were identified (Fig. 1). After the removal of 33 duplicates, 603 abstracts were reviewed against the inclusion criteria. The full texts of 57 articles were reviewed and 44 were excluded. The addition of two articles, identified in a later search, resulted in 15 eligible articles being included.

## Results

### Study characteristics

Table 1 shows that included studies were conducted in the USA,<sup>5</sup> Australia and Germany (2 apiece), Iran, Belgium, Israel, the UK and Portugal (1 apiece), while one study was conducted across 11 nations. Studies focused on the allocation of: ventilators,<sup>35–42</sup> ICU beds<sup>43–45</sup> and COVID-19 vaccines.<sup>35,46,47</sup> Various combinations of ethical allocation principles were examined using hypothetical scenarios with ranking,<sup>38,41,46</sup> rating tasks<sup>36,48</sup> or person trade-off methods.<sup>35,37,39,40,42,43,45,47–51</sup> Participant sample size ranged from 306 to 5175. Data were collected between April and December 2021 using cross-sectional online surveys (all) and telephone interviews.<sup>46</sup>

### Themes

Five themes emerged from the data that represented the public's preferences for scarce resource allocation under COVID-19 conditions. These are discussed in more detail below.

#### Theme 1: Prioritise the youngest

Thirteen studies examined the public's preference for favouring younger patients under pandemic conditions.<sup>35–43,45,46,50,51</sup> This theme aligns with the 'prioritisation' principle, where the goal is to give preference to younger individuals over older individuals because they have had the least opportunity to live through life's stages.<sup>52</sup>

Patient age appeared to be a major criterion across studies as when patient age and prognosis were examined together, most respondents gave priority to the youngest patients irrespective of prognosis. Several studies reported that most study participants elected to allocate treatment to a younger patient rather than an older patient in situations where life expectancy and survival chance were said to be the same.<sup>38,42,46,48</sup> For example, one study

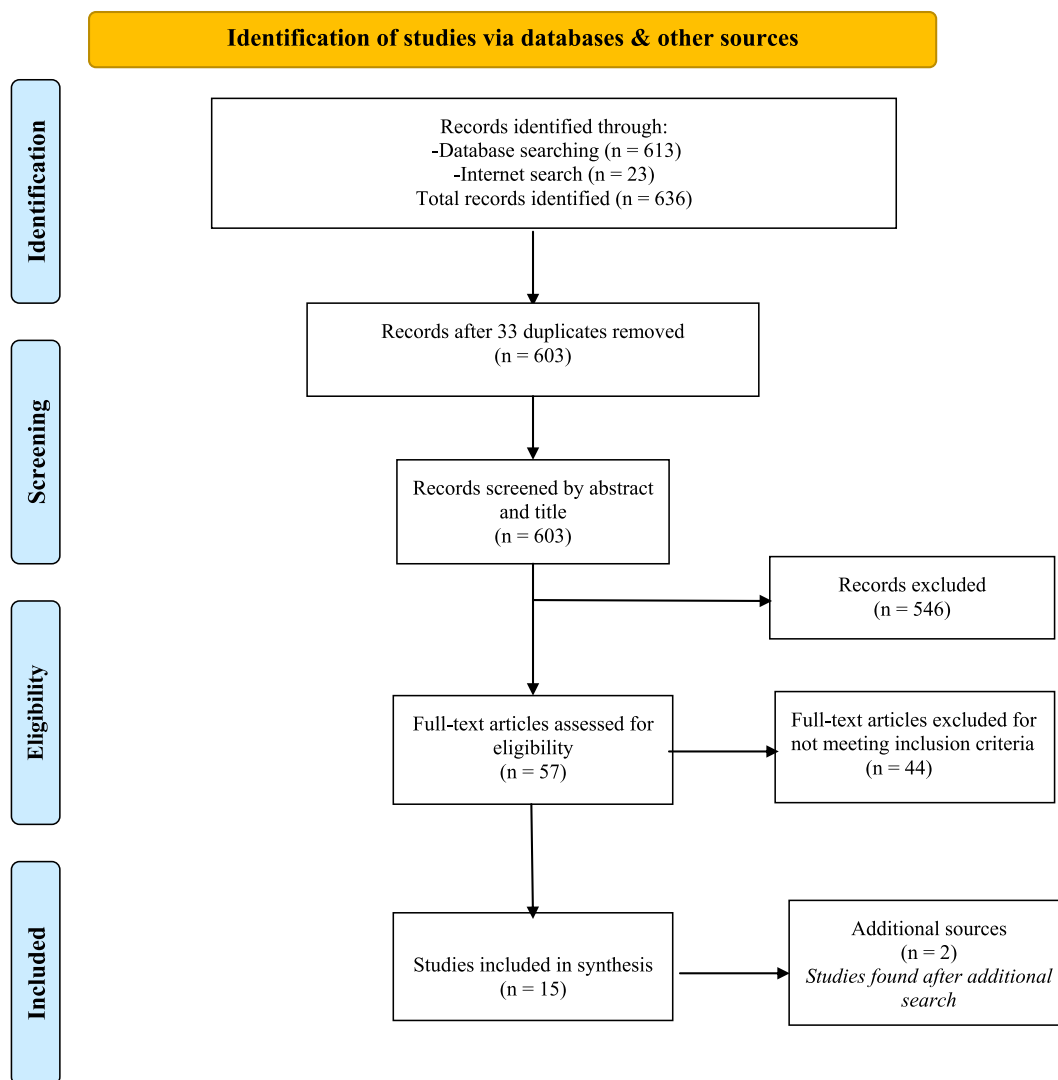


Fig. 1. Search process flowchart (PRISMA flow diagram).<sup>38</sup>

reported that when participants were asked to allocate ventilators to patients with similar prognoses, priority was given to younger patients over older patients.<sup>38</sup> Another study identified that the public were more in favour of treating a 10-year-old child with little chance of recovery over a 70-year-old with a high survival probability (30% vs 41%, respectively).<sup>35</sup>

*Theme 2: Save the most lives*

Another prominent theme was for saving the most lives during COVID-19 and can be regarded as an application of utilitarianism, which seeks to maximise total population health by saving the most lives or as many years of life as possible.<sup>53</sup> This was assessed across 10 studies in terms of a patient's survival probability.<sup>35,36,39,40,42,43,45,48,50,51</sup>

In most studies, the majority of participants allocated high priority for triage policies that prioritised allocation for patients with higher survival chances.<sup>36,39,40,42,43,45,46,48,50,51</sup> For example, Wilkinson and colleagues found that approximately 92% of participants chose to treat a patient with an 80% survival chance, whereas only 5% gave priority to a patient with a 10% probability of survival.<sup>42</sup> Several studies found that participants appeared willing to withdraw treatment from a patient in ICU who had a lower survival

chance than another patient with a higher survival probability currently presenting with COVID-19.<sup>42,43</sup>

*Theme 3: Egalitarian allocation approaches (e.g. waiting lists and random allocation)*

This theme relates to giving all patients an equal chance at receiving scarce resources through applying a first-come, first-served basis or random allocation strategy,<sup>54</sup> and encompasses the principles of egalitarianism, which aims to give all patients an equal chance at receiving scarce resources.<sup>54</sup> Nine studies assessed public support for these allocation strategies.<sup>35–37,39,40,42,43,45,46,48,50,51</sup>

Evident across studies that while the public are least supportive of allocation based on order or randomisation, there was heterogeneity in people's moral judgements toward them and this appeared to be influenced by whether or not specific characteristics of competing patients were presented to participants. For example, when asked to consider triage policy statements that contain no information about the patients' age or prognosis, most participants outrightly rejected both randomisation and first-come, first-served principles<sup>35–37,39,40,42,43,46,48,50,51</sup> or were ambivalent.<sup>40</sup> Conversely, when presented with patient clinical information, and age, participants were more likely to default to an 'equal chance'

**Table 1**  
Characteristics of included studies.

Author/Year	Study description	Country of origin	Participants (n)	Key findings
<b>Ventilator allocation</b>				
Asghari (2021) <sup>40</sup>	Online survey; 11 allocation statements; respondents agreed/disagreed with statements.	Iran	1262	Priority based on survival probability, quality of life & social usefulness. Little agreement with prioritization based on first come, first served.
Huang (2020) <sup>41</sup>	Online survey. Two-stage experimental design (respondents assigned to conditions with/without veil of ignorance applied).	USA	1276	Veil of ignorance (VOI) reasoning <sup>b</sup> favours allocating scarce ventilators to younger patients over older patients, showing that when engaged in VOI reasoning, respondents are more likely to approve of allocation that aims to saving the most lives.
Huseynov (2020) <sup>42</sup>	Online survey; 1 hypothetical scenario: allocation of 100 ventilators among 1000 COVID-19 patients of varying ages.	USA	586	Priority based on survival probability (younger patients). Preference for treating own age group equally.
Jin (2021) <sup>43</sup>	Online choice based conjoint design; 15 choice sets; 2 hypothetical patients. Recruitment across 11 countries (USA, Brazil, India, UK, Italy, Germany, France, Australia, Spain, China and South Korea)	USA	5175	Priority based on survival probability (i.e. allocation to younger patients).
Norman (2021) <sup>44</sup>	Online DCE <sup>a</sup> ; 12 choice sets.	Australia	1050	Priority based on survival probability (i.e. younger, non-smokers), social usefulness & without disability.
Werner & Landau (2020) <sup>45</sup>	Online survey; 3 hypothetical patients with/without Alzheimer's Disease. Respondents allocated ventilator by order (1st, 2nd and last).	Israel	309	Priority based on survival probability & quality of life. Least priority is given to oldest patient with cognitive disorder.
Wilkinson (2020) <sup>46</sup>	Online survey; 38 choices: 2 hypothetical patients.	UK	768	Priority based on survival probability, quality of life & social usefulness. Support for reallocating treatment to save more lives
<b>Intensive care bed (ICU) allocation</b>				
Fallucchi (2020) <sup>47</sup>	Online survey; 8 hypothetical triage statements: 2 patients.	USA	1033	Priority based on survival probability, social usefulness & those infected with COVID-19. Support for reallocation only when patient has received treatment for 2 months.
Street (2021) <sup>48</sup>	Online DCE <sup>a</sup> ; 7 choice sets; 14 patient pairs. Respondents prioritise care between two patients requiring ICU bed.	Portugal	306	Priority given to patients based on their prognosis (e.g. younger) and social usefulness (i.e. healthcare workers, caregivers).
<b>Ventilator and intensive care bed (ICU) allocation</b>				
Pinho (2021) <sup>39</sup>	Online survey; 6 hypothetical allocation statements; 2 patients of different ages, professions, symptom severity, survival.	Australia	306	Priority given to patients based on their prognosis, followed by severity of health condition and age. When confronted with survival, youngest first was preferred. Egalitarian allocation least preferred.
Sprengholz (2022) <sup>49</sup>	Online survey to investigate public's prioritisation preference toward ICU admission for patients who differed in health condition, expected treatment benefits and COVID-19 vaccination status.	Germany	1014	Priority given to treating (1) patients who are vaccinated over non-vaccinated; (2) patients with serious health conditions (e.g. heart attack) over patients with COVID-19. The public also more likely to admit a patient to ICU when this meant withholding rather than withdrawing care from another patient.
<b>Generic triage policy allocation</b>				
Buckwalter & Peterson (2020) <sup>50</sup>	Three online experiments to investigate public attitude toward hypothetical triage allocation statements.	USA	1868	Priority based on survival probability & seriousness of condition, but not when entail reallocation between existing patients, or when they disadvantage at risk groups.
<b>COVID-19 vaccine allocation</b>				
Gollust (2019) <sup>49</sup>	Online & telephone survey to assign preference (high-med-low) for delivery of COVID-19 vaccination; 8 hypothetical population groups.	USA	586	Priority to people with lower age, higher risk of dying from COVID-19; are pregnant, medical workers or non-medical essential workers.
Luyten (2020) <sup>51</sup>	Online survey to assign preference (most appropriate-least appropriate) for delivery of COVID-19 vaccination (8 hypothetical population groups).	Belgium	2060	Priority to people who are: essential workers, chronically ill and older. Least preferred were egalitarian strategies (e.g. lottery, first come, first served).

Table 1 (continued)

Author/Year	Study description	Country of origin	Participants (n)	Key findings
Sprengelholz (2021) <sup>51</sup>	Online survey to examine public opinion toward: (1) government COVID-19 allocation policy objectives; and (2) allocating vaccine priority to certain groups (e.g. older vs younger, workers with high exposure risk, nursing home residents).	Germany	1379	Public support official COVID-19 vaccination policy objectives. Public support giving vaccine priority to workers with high exposure risk. Least support for assigning priority to older individuals and those living in nursing homes.

<sup>a</sup> DCE = discrete choice experiment.

<sup>b</sup> Veil of ignorance reasoning = is designed to elicit impartial decision making by denying respondents potentially biasing information about who will benefit the most or least from the available options.

position.<sup>35–37,39,40,42,43,46,48,50,51</sup> For example, one study found that over half of participants (55%) chose a coin toss to decide between two patients with small differences in life expectancy (15 vs 14 years).<sup>42</sup>

#### Theme 4: Prioritise healthcare workers

Eight studies<sup>35–37,39,40,42,43,46,48,50,51</sup> examined public attitude toward prioritization of healthcare workers patients. This appeared to be a popular strategy among participants in seven studies.<sup>35–37,39,40,42,43,46–48,50,51</sup> For example, one study examining COVID-19 vaccine priority found that almost all participants (92%) preferred to give vaccines to frontline healthcare workers before others, including individuals who were at high risk of mortality from COVID-19.<sup>46</sup> Another study reported that 63% of the study sample prioritised healthcare workers to receive the remaining ventilator over a non-healthcare professional.<sup>42</sup>

#### Theme 5: Bias against particular groups

Nine studies examined the public opinion toward allocation bias.<sup>36,39–42,45,48,50,55</sup> That is, differences in how participants' preferences for assigning treatment to specific patient groups, such as those with disabilities and frailty and those with perceived behaviours that may have contributed to their ill-health.

The general public did not appear to favour allocating limited healthcare resources, such as ventilators or ICU beds to patients who were smokers,<sup>40</sup> had poor self-rated health,<sup>50</sup> had criminal histories,<sup>39</sup> or were illicit drug users.<sup>48</sup> Patients who were considered likely COVID-19 spreaders or did not comply with COVID-19 rules, such as mask wearing or social distancing were also not given treatment priority by the community.<sup>55</sup> The public were also less willing to give lower priority to patients with disabilities<sup>40,42,48</sup> or those with high degrees of frailty.<sup>42</sup> For example, one study reported that the majority of respondents (74%) elected to allocate treatment to a non-disabled patient in preference to a patient with a profound learning disability,<sup>42</sup> whereas only a minority (~19%) elected to treat patients with greater disability.<sup>42</sup> Another study reported that the public gave priority for COVID-19 vaccinations to staff in medical facilities, outpatient care and nursing homes for the elderly over vulnerable groups (e.g. nursing home residents and people aged 75 years and older).<sup>47</sup>

## Discussion

This study identified several themes related to how the general public preferences the allocation of health care resources during the current COVID-19 pandemic. Our findings show that the public have a clear preference for allocation that aims to save the most lives and give priority to younger patients and health care workers. Participants also demonstrated some degree of allocation bias, deprioritising of those with disabilities and directing resources

away from people with behaviours that increased their own risk of becoming diseased. Less support was also found for egalitarian allocation approaches such as first-come, first-served or randomization approaches, particularly when additional information about patient scenarios (e.g. prognosis) were added into scenarios.

These findings can be contrasted with previous research and published opinions that have examined how to allocate resources in the context of resource scarcity (see Appendix 1). Donor organ allocation is one area that faces ongoing scarcity and ethical debate and therefore makes a useful and relevant comparison to our study.<sup>17,56</sup> It is evident that, irrespective of context, the public view reducing mortality as an important achievement when considering scarce healthcare allocation. When selecting organ transplant recipients, the public regard the capacity to survive and benefit as one of the most important criteria,<sup>17,56</sup> which aligns with our finding of prioritised allocation for patients with higher survival chances under COVID-19 conditions. This is also consistent with prior research examining community preferences under pandemic conditions.<sup>57–62</sup> It is also apparent that across contexts the public make judgements based on a patient's lifestyle decisions under conditions of scarcity in that the public are willing to assign less priority to individuals with perceived behaviours that may have contributed to their illness for both donor organ recipients<sup>17,56</sup> and COVID-19 patients.<sup>36,39–42,45,50,55</sup> Prior studies also suggest that the public tend to negatively sanction those who are deemed responsible for their predicament.<sup>63–67</sup> These overall findings suggest that while the community are willing to endorse allocation policies that maximise the number of lives saved during conditions of healthcare scarcity, they also believe the patient's *deservingness* to receive scarce treatment should be taken into consideration. Our findings may have particular importance in the current COVID-19 context as individuals with substance abuse disorders, for example, are a high-risk group for contracting COVID-19 and its transmission and casualties because they usually suffer from poorer health, weaker immune function, chronic infections, as well as various issues with physical and psychiatric comorbidities.<sup>68,69</sup>

Some of our findings appear less consistent with the preferences expressed among community members for the allocation of donor organs<sup>17,56</sup> (see also Appendix 1). When considering donor organ allocation, the public are not in favour of prioritising patients based on their occupation,<sup>17,56</sup> whereas we found strong community support for giving preferences to healthcare workers during COVID-19. Rather, community opinion is that patients in need of a donor organ should be placed on a wait list *unless* they are children, patients with dependents or have spent long periods on a wait list.<sup>17,56</sup> Under COVID-19 conditions, we observed little community support for treating patients on a first-come, first-served basis. When comparing our findings with prior studies of allocation during pandemics, we also find mixed support for these principles.<sup>59,70</sup> Studies examining public attitudes toward limited



healthcare distribution during an influenza pandemic, for example, have reported inconsistent results.<sup>59,61</sup> For example, one study found community support for prioritising healthcare workers for treatments,<sup>62</sup> whereas another study reported public support for wait lists but not instrumental value.<sup>61</sup> However, it should be noted that these studies were not conducted under ‘real-life’ global pandemic conditions, so it is plausible that our findings may be more of an accurate reflection of community sentiment during a public health crisis.

Expert opinions related to this field have also been published. For example, in 2020, the New England Journal of Medicine published an opinion paper written by medical ethicists discussing recommendations for the allocation of scarce medical resources during the COVID-19 pandemic.<sup>71</sup> Overall, there was high agreement between our findings and the opinions of these authors for allocation strategies under COVID-19 conditions (see Appendix 1). For example, the overarching view among both groups is that one of the most important goals of pandemic preparations is mortality reduction or ‘saving the most lives’, especially to individuals who may be at ‘risk of dying young and not having a full life’.<sup>71</sup> In addition, members of the community and ethicists agree that treatment preference should be given to frontline COVID-19 healthcare workers because of their instrumental value in keeping critical infrastructure operating.<sup>71</sup> However, the public disagree with these authors’ recommendation that treatment priority should be given to people involved in COVID-19 therapeutics research and development (e.g. vaccines).<sup>71</sup> Further agreement was also reached on allocation strategies where patients had small differences in treatment outcomes. That is, when presented with patients with small differences in survival probability, the public appears to agree with the authors’ position that randomization should be applied rather than wait lists.<sup>71</sup>

### Conclusion

Under COVID-19 conditions, the public appear to agree that saving the most lives, especially the youngest, is the most important principle for scarce resource allocation. In addition, the public support giving treatment priority to frontline healthcare workers and are willing to deprioritise particular patient groups, such as those with disabilities or those who are considered to have contributed to their own ill health in some way (e.g. drug takers, smokers). Allocation involving egalitarian approaches received the least support among community members. The values expressed by the public under pandemic conditions were found to both converge and diverge from expert guidance as well as with community attitudes toward donor organ allocation. Awareness of these differences highlights the importance of involving the public in discussions around the efficient allocation of scarce resources and here qualitative research would be helpful in understanding an individual’s motivation for their allocation preferences.

### Author statements

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### Competing interests

All authors declare that they have no financial, personal, or potential conflict of interest.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2022.06.004>.

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