

# Individual moral responsibility for antibiotic resistance

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## Abstract

Antibiotic resistance (AR) is a major threat to public health and healthcare worldwide. In this article, we analyse and discuss the claim that taking actions to minimize AR is everyone's responsibility, focusing on individual moral responsibility. This should not be merely interpreted as a function of knowledge of AR and the proper use of antibiotics. Instead, we suggest a circumstantial account of individual responsibility for AR, where individuals do or do not engage in judicious antibiotic behaviour with different degrees of voluntariness. Furthermore, we suggest a notion of responsibility as a virtue, in which individuals have the opportunity to develop a sensitivity towards the AR theme and, consequently, are capable of engaging, actively and voluntarily, in judicious antibiotic behaviour. The development of such sensitivity depends on the creation of adequate circumstances, that is individual capacities and availability of resources.

## KEYWORDS

antibiotic resistance, individual responsibility, moral responsibility, responsibility as virtue, virtue ethics

## 1 | INTRODUCTION

Antibiotic resistance (AR) is a form of antimicrobial resistance, in which bacteria can survive exposure to and proliferate in the presence of therapeutic levels of antibiotics. AR is speeded up due to human action, as the use of antibiotics enriches and selects for it in humans, animals, and the environment.<sup>1</sup> AR is a major threat to public health and healthcare worldwide, because it limits our ability to treat bacterial infections and hampers medical procedures that require efficient infection prophylaxis.<sup>2</sup> As antibiotics under development are not deemed sufficient for current and anticipated patient needs,<sup>3</sup>

efforts to preserve antibiotic effectiveness are made as part of the endeavour of ensuring effective mechanisms against infectious diseases. Thus, the point is not to preserve specific classes of antibiotics per se, but to retain (or even enhance) the capacity to treat infections.

AR raises a broad spectrum of ethical questions. The topic is often framed in relation to intra- and intergenerational justice. Recently, there has been an increase in access to antibiotics, especially in low- and middle-income countries. This increase has posed the challenge of widening access to antibiotics, while at the same time restricting inappropriate and excessive use.<sup>4</sup> At present, inequalities increase the risk that some individuals or groups will suffer more from issues related to AR and antibiotic access than will

<sup>1</sup>European Centre for Disease Prevention and Control, European Food Safety Authority, & European Medicines Agency. (2017). ECDC/EFSA/EMA second joint report on the integrated analysis of the consumption of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals. *EFSA Journal*, 15(7), e04872.

<sup>2</sup>World Health Organization. (2019). *Ten threats to global health in 2019*. <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>

<sup>3</sup>Pew Research Center. (2020). *Tracking the global pipeline of antibiotics in development*, April 2020. Issue Brief. <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2020/04/tracking-the-global-pipeline-of-antibiotics-in-development>

<sup>4</sup>Heyman, G., Cars, O., Bejarano, M. T., & Peterson, S. (2014). Access, excess, and ethics—Towards a sustainable distribution model for antibiotics. *Uppsala Journal of Medical Sciences*, 19(2), 134–141; Laxminarayan, R., Mouton, R. P., Pant, S., Archer, G. F., & Archer, G. F., et al. (2016). Access to effective antimicrobials: A worldwide challenge. *Lancet*, 387(10014), 168–175.

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others.<sup>5</sup> Intragenerational justice rests on the assumed equality of the moral status of all currently living people, just as intergenerational justice relies on the assumption that current and future generations are equal in moral status. The core of the intergenerational justice problem is that present use of antibiotics leads to increasing pathogen resistance, that is, decreasing antibiotic effectiveness for future patients. This progressive loss of antibiotic effectiveness poses a moral challenge: If future people are just as entitled to effective antibiotics as those living here and now, there is a *prima facie* moral obligation for people alive today to preserve antibiotic effectiveness for as long as possible. However, balancing the present use of antibiotics against the needs of future patients entails other ethical issues, such as what criteria we should apply when constraining present access or what we should make of physicians' duties towards their patients.<sup>6</sup> Antibiotics use also raises concerns about animal welfare and sustainable farming practices.<sup>7</sup>

Against this background, the following question arises: Who is responsible for AR? It is fair to assume that securing antibiotic effectiveness through stewardship and coordinated actions is the duty of national governments and international bodies. This can be referred to as responsibility as authority.<sup>8</sup> It indicates that it is a particular agent's bailiwick to make decisions or that an agent is in charge and can for that reason be held accountable. For example, healthcare professionals (both medical and veterinary) can play a critical role in curbing AR, and they can be held accountable because being responsible is their duty (responsibility as a task). The latter notion refers to an agent's duty to provide some services that benefit others as part of the distinctive position or office that agent occupies.<sup>9</sup>

Notwithstanding the above, many have claimed, including the WHO,<sup>10</sup> that taking actions to minimize AR is *everyone's*

responsibility, thus including the public.<sup>11</sup> Individuals can be responsible in their capacity as consumers,<sup>12</sup> travellers,<sup>13</sup> patients,<sup>14</sup> and, more generally, as citizens who should adopt judicious behaviours, such as getting vaccinated.<sup>15</sup>

In the present paper, we analyse and discuss the following question: Do laypeople have individual moral responsibility for AR? In the following, we attempt to answer this question by discussing the notion of individual moral responsibility for AR and by suggesting a virtue-based account of this notion.

## 2 | COLLECTIVE AND INDIVIDUAL RESPONSIBILITY FOR AR

We start by clarifying the distinction between collective and individual responsibility for AR and argue that the notion of collective responsibility is often used in a metaphorical sense to indicate what, instead, is individual responsibility. Furthermore, we argue that the individual's responsibility in the case of AR is different from that brought on by other global challenges.

On the one hand, everyone may be considered responsible for adopting (or failing to adopt) judicious behaviour in relation to AR, which can be mitigated only if sufficiently large numbers of people contribute to the common good and refrain from harmful behaviour. On the other hand, there is a collective interest in maintaining antibiotic effectiveness. We consider such references to collective moral responsibility to be metaphorical, that is the term is primarily used to convey dependence on multi-stakeholder involvement and the gravity of AR consequences for society. However, this does not necessarily imply the existence of an entity with an ontological status at whose feet the responsibility for AR can be laid. Indeed, aggregating individual moral agents and their responsibilities does not necessarily constitute a collective moral agent or entail collective moral responsibility. The question of whether it is reasonable to hold collectives responsible is controversial and the topic of considerable debate.<sup>16</sup> In addition to the need for analytical clarity, there is an additional aspect to consider, that is the risk that the responsibility of the individual may be diluted if a problem is essentially conceived of as a matter of collective responsibility. It is therefore important to

<sup>5</sup>Millar, M. (2019). Inequality and antibiotic resistance: A contractualist perspective. *Bioethics*, 33(7), 749–755. See also ReAct report. (2020). *Scoping the significance of gender for antibiotic resistance*. <https://www.reactgroup.org/wp-content/uploads/2020/09/Scoping-the-Significance-of-Gender-for-Antibiotic-Resistance-IDS-ReAct-Report-October-2020.pdf>

<sup>6</sup>Millar, M. (2012). Constraining the use of antibiotics: Applying Scanlon's contractualism. *Journal of Medical Ethics*, 38(8), 465–469; Leibovici, L., Paul, M., & Ezra, O. (2012). Ethical dilemmas in antibiotic treatment. *Journal of Antimicrobial Chemotherapy*, 67(1), 12–16; Tarrant, C., Krockow, E., Nakkawita, D., Bolscher, M., Colman, A. M., Chattoe-Brown, E., Perera, N., Mehtar, S., & Jenkins, D. (2020). Moral and contextual dimensions of "inappropriate" antibiotic prescribing in secondary care: A three-country interview study. *Frontiers in Sociology*, 5(7).

<sup>7</sup>Bengtson, B., & Greko, C. (2014). Antibiotic resistance—Consequences for animal health, welfare, and food production. *Upsala Journal of Medical Sciences*, 119(2), 96–102; Anomaly, J. (2020). Antibiotics and animal agriculture: The need for global collective action. In M. Selgelid & Z. Jamrozik (Eds.), *Ethics and drug resistance: Collective responsibility for global public health* (pp. 297–308). Springer International Publishing.

<sup>8</sup>Ibo van de Poel describes nine notions of responsibility; responsibility as authority together with responsibility as task can be considered as responsibility as role. See: van de Poel, I. (2011). The relation between forward-looking and backward-looking responsibility.

In N. Vincent, I. van de Poel, & J. van den Hoven (Eds.), *Moral responsibility* (pp. 37–52). Springer.

<sup>9</sup>Ibid.

<sup>10</sup>The World Health Organization has reiterated this message multiple times, for example in its 2015 report 'Antibiotic resistance: Multi-country public awareness survey' (<https://www.who.int/drugresistance/documents/baselinesurveyynov2015/en/>) or in the infographic material for 2017's World Antibiotic Awareness Week, entitled 'Acting against antibiotic resistance is a shared responsibility' (<https://www.euro.who.int/en/health-topics/disease-prevention/antimicrobial-resistance/education,-awareness-and-behaviour-change/infographics/infographic-acting-against-antibiotic-resistance-is-a-shared-responsibility>).

<sup>11</sup>Cars, O. (2014). Securing access to effective antibiotics for current and future generations. Whose responsibility? *Upsala Journal of Medical Sciences*, 119(2), 209–214; Harris, A. M., Hicks, L. A., & Qaseem, A. (2016). Appropriate antibiotic use for acute respiratory tract infection in adults: Advice for high-value care from the American College of Physicians and the Centers for Disease Control and Prevention. *Annals of Internal Medicine*, 164(6), 425–434.

<sup>12</sup>Giubilini, A., Birkel, P., Douglas, T., Savulescu, J., & Maslen, H. (2017). Taxing meat: Taking responsibility for one's contribution to antibiotic resistance. *Journal of Agricultural and Environmental Ethics*, 30, 179–198.

<sup>13</sup>Millar, M. (2015). The choice to travel: Health tourists and the spread of antibiotic resistance. *Public Health Ethics*, 8(3), 238–245.

<sup>14</sup>Giubilini, A. (2019). Antibiotic resistance as a tragedy of the commons: An ethical argument for a tax on antibiotic use in humans. *Bioethics*, 33(7), 776–784.

<sup>15</sup>Jansen, K., Knirsch, C., & Anderson, A. (2018). The role of vaccines in preventing bacterial antimicrobial resistance. *Nature Medicine*, 24(1), 10–19.

<sup>16</sup>May, L., & Hoffman, S. (Eds.). (1991). *Collective responsibility: Five decades of debate in theoretical and applied ethics*. Rowman & Littlefield Publishers.

clarify the distinction between collective and individual moral responsibility for AR.

Giubilini and Levy argue that the notion of collective responsibility is often not used to refer to a responsibility that is genuinely collective, but that it instead comes down to some form of individual responsibility that is attributed to collectives.<sup>17</sup> In their view, two requirements need to be satisfied for there to be a true collective moral agent (sine qua non condition for the attribution of collective moral responsibility). First, a collective entity must have an ontological status that identifies it as such and not merely be an aggregation of individuals. Second, the collective entity must possess basic capabilities to qualify as a moral agent, that is to form intentions and perform actions. The case in which collectives satisfy these two conditions is when a group—which can be identified by the fact that its members engage in joint actions, such that each individual intentionally contributes and is aware of others' contributions towards a common desired end—produces morally relevant outcomes.<sup>18</sup> We consider this a literal (or genuine) sense of 'collective moral responsibility'. Thus, claims about laypeople's collective moral responsibility for AR should be intended metaphorically.

Giubilini and Levy conceive of collective moral responsibility by focusing on its 'basic desert' sense.<sup>19</sup> A conceptual distinction to draw is that between backward-looking responsibility (retrospective), which concerns responsibility for the current situation, and forward-looking responsibility (prospective, remedial), which concerns current responsibility for the future situation. The bulk of the philosophical literature has focused on backward-looking responsibility, investigating the conditions under which someone is an appropriate target of desert. In contrast, forward-looking approaches to moral responsibility focus on the outcomes that different practices could bring about as well as on the circumstances that could promote the most favourable outcomes. It is difficult to identify any collective moral agent whose intentional and coordinated action brought about AR as an intended outcome and who should be considered the appropriate target of reactive attitudes (second requirement for the existence of a true collective moral agent).<sup>20</sup> As backward-looking responsibility is the focus of Giubilini and Levy's work, individuals' joint actions towards common ends are primarily judged on the basis of their morally relevant outcomes. In forward-looking terms, the focus must shift from the outcomes, as there are none yet, to what the different practices aim to bring about and on what is done to create the circumstances, that is the capacities and resources, that could promote the most favourable outcomes. Potential targets of gratitude or praise may be all individuals who take action to increase or strengthen awareness of antibiotic use and resistance. For instance, ReAct is an international independent network that, among its

many other initiatives, shares and promotes an AR toolbox: a repository on AR that provides interested parties with information, inspiration and guidance on the basis of which one can take action.<sup>21</sup> Individuals who join ReAct to take action and who use the material to raise awareness and promote judicious behaviour in their communities are contributing to a common effort towards an intended common end (the mitigation of AR). We believe that such a group of people can be described as having a collective (forward-looking) moral responsibility, in the sense of 'taking responsibility'. For the majority of people, we should think in terms of individual moral responsibility (though some may of course also feel an obligation to join a group that aims to mitigate AR).

In addition to the responsibility of the individual for his/her own contribution to AR as a global problem, non-judicious behaviour in relation to AR involves ethically relevant features that make the moral responsibility for AR different from other global challenges. Individuals who become carriers of resistant bacteria as a consequence of non-judicious behaviour, bear the cost themselves as they are at risk of developing infections that may be very hard to treat. Moreover, they can infect others and cause them harm.<sup>22</sup> This dimension of proximity, in which the consequences of one's action can directly harm oneself and others, is intrinsic to the problem of AR but not to other global problems, such as poverty and climate change. For instance, someone who engages in environmentally unfriendly food and travel choices, can contribute to the overall environmental problem but it is hardly the case that it will directly cause harm to anybody. This dimension of proximity, which is bigger in the case of AR, does not only refer to the causal nexus but involves also the foreseeable consequences of one's actions.

After providing an account of the individual dimension of the moral responsibility for AR, we now focus on the conditions for holding someone responsible for AR.

### 3 | GROUNDS OF RESPONSIBILITY

Moral responsibility is often interpreted as moral accountability: 'the (moral) obligation to account for what you did or what happened (and your role in it happening)'.<sup>23</sup> For an agent to be in the kind of relationship with his/her own actions and related consequences that allows us to properly hold him/her accountable, certain criteria have to be met. Intuitively, causality is an obvious condition for holding an agent responsible.<sup>24</sup> The responsibility depends on the fact that an agent has somehow contributed to a given state of affairs.

The causality condition in the case of responsibility for AR deserves particular attention. Potentially, anyone has contributed to AR by taking antibiotics, travelling, being a carrier of resistant

<sup>17</sup>Giubilini, A., & Levy, N. (2018) What in the world is collective responsibility? *Dialectica*, 72(2), 191–217.

<sup>18</sup>Ibid.

<sup>19</sup>Ibid.

<sup>20</sup>Strawson, P. F. (1962). Freedom and resentment. *Proceedings of the British Academy*, 48, 1–25.

<sup>21</sup>ReAct. (2021). *Toolbox*. <https://www.reactgroup.org/toolbox/>

<sup>22</sup>Giubilini et al., op. cit. note 12.

<sup>23</sup>van de Poel, op. cit. note 8, p. 39.

<sup>24</sup>On the connection between causal and moral responsibility as well as on causation by omission, see: Harris, J. (1980). *Violence and responsibility*. Routledge & Kegan Paul; Willemsen, P. (2019). *Omissions and their moral relevance*. Mentis.

bacteria, and so forth. One obvious objection is the impossibility of determining each individual's contribution to AR, considering all the possible actions that could influence AR.<sup>25</sup> Single actions may or may not contribute to AR and even when they do, single contributions to AR are hard to detect. If this is true, a counterfactual understanding of individual causal responsibility is problematic. One counterfactual applied to AR could be as follows: an individual's behaviour is causally responsible for an AR-related event (any state of affairs contributing to worsening the AR situation) if, and only if, the AR-related event would not have occurred if the individual had not behaved as he/she did. As it is in practice extremely difficult to single out the cause of a specific AR-related event, claims that individuals' behaviour influences AR may not pass the counterfactual test. Considering the causal responsibility for the spread of infectious diseases of those who opt out of vaccination, Jamrozik et al. conclude that in a case where '[b]ind adherence to a counterfactual test of causal responsibility will give an absurd answer to questions of blameworthiness', the counterfactual test should be rejected as a basis for assigning responsibility.<sup>26</sup> Instead, the authors draw attention to the distinction between moral responsibility for conduct and moral responsibility for the consequences of conduct.<sup>27</sup> Responsibility for conduct results in non-causal responsibility ascription, that is holding agents responsible for what they do, for their behaviour, irrespective of the measurable consequences of their actions, which seems to be a reasonable ground for ascribing responsibility for AR.<sup>28</sup> Moreover, given the fact that an individual contribution to worsening the AR situation typically cannot be determined, it does not follow that individual contribution does not occur. This suggests that the counterfactual test did not fail because AR-related events are not caused by individual behaviour, but because the individual contribution could not be determined.

As already mentioned, it is sometimes claimed that acting to minimize AR is everyone's responsibility; individuals contribute to AR and thus public involvement is needed to curb AR. People are in this regard accountable for AR. Of course, from saying this it does not follow that laypeople are the appropriate targets of reactive attitudes. Therefore, we also need to consider the grounds for blameworthiness.

It is a commonly held view that moral competence, that is the ability to act in a responsible manner, is a condition for moral responsibility and that agents who are morally impaired cannot be held fully responsible for their actions.<sup>29</sup> However, responsibility is not

just a matter of attributing actions and establishing what the relationship is between an agent and his/her behaviour. In fact, in evaluating whether or not an agent is accountable, it is also important to assess whether his/her conduct conforms to what we require of one another. This assessment includes normative assumptions about the moral norms to which a community adheres. In other words, to attribute blame, we need other elements in addition to causality and competence. Typically, these elements are knowledge, freedom and wrongdoing.<sup>30</sup> Here, we will focus on knowledge.<sup>31</sup>

Traditionally, an agent who is in the kind of relationship with his/her own actions and related consequences such that he/she could be blamed can be excused if it can be demonstrated that he/she lacked the relevant knowledge needed to act otherwise. Agents who act in ignorance are not always excused, of course. For example, an agent might not have had the relevant knowledge, but it might be reasonable to claim that he/she *should* have known; we might maintain that this agent should have taken action to obtain the relevant knowledge in circumstances where information is available and easily retrievable.<sup>32</sup> Although at present there is a certain degree of ignorance among laypeople about AR and the proper use of antibiotics,<sup>33</sup> such ignorance may soon be considered inexcusable, especially in high-income countries.<sup>34</sup> Whether ignorance should be considered an excusing condition is a matter of context. Anomaly suggests that non-judicious antibiotic behaviour may be explained, but not justified, in terms of rational ignorance.<sup>35</sup> This denotes the tendency for people to hold poorly formed beliefs (and therefore act carelessly) about subjects that require a personal effort, which is unlikely to make a difference to solving the problem. These beliefs about AR can be held insofar the problem is only conceived as one's contribution to a collective problem but should not hold once the potential consequences of individual behaviour for oneself and close ones are taken into account.

Notwithstanding this, it should be acknowledged that health behaviour is not simply reducible to knowledge. There is a gap between raising AR awareness and inducing change towards judicious antibiotic behaviour, because creating change is not just a matter of adding a missing piece of information.<sup>36</sup> While AR awareness can be considered a prerequisite for behaviour change,

Harvard University Press; Fischer, J. M., & Ravizza, M. (1998). *Responsibility and control: A theory of moral responsibility*. Cambridge University Press.

<sup>30</sup>van de Poel, op. cit. note 8; Nihlén Fahlquist, J. (2019). *Moral responsibility and risk in society: Examples from emerging technologies, public health and environment*. Routledge.

<sup>31</sup>Of course, an individual who is forced to take antibiotics or is given an antibiotic treatment while unconscious should not be blamed. In the same vein, an individual who takes antibiotics only to contribute to AR is blameable. However, these examples are rather airy-fairy.

<sup>32</sup>Smith, H. (1983). Culpable ignorance. *The Philosophical Review*, 92(4), 543–751;

Zimmerman, M. J. (1997). Moral responsibility and ignorance. *Ethics*, 107(3), 410–426.

<sup>33</sup>McCullough, A. R., Parekh, S., Rathbone, J., Del Mar, C. B., & Hoffmann, T. C. (2016). A systematic review of the public's knowledge and beliefs about antibiotic resistance. *Journal of Antimicrobial Chemotherapy*, 71(1), 27–33.

<sup>34</sup>Littmann, J., & Viens, A. M. (2015). The ethical significance of antimicrobial resistance. *Public Health Ethics*, 8(3), 209–224.

<sup>35</sup>Anomaly, J. (2017). Ethics, antibiotics, and public policy. *Georgetown Journal of Law & Public Policy*, 15, 999–1015.

<sup>36</sup>Huttner, B., Saam, M., Moja, L., Mah, K., Sprenger, M., Harbarth, S., & Magrini, N. (2019). How to improve antibiotic awareness campaigns: Findings of a WHO global survey. *BMJ Global Health*, 4, e001239; Essilini, A., Kivits, J., Caron, F., Boivin, J.-M., Thilly, N., & Pulcini, C. (2020). 'I don't know if we can really, really change that': A qualitative exploration of public perception towards antibiotic resistance in France. *JAC-Antimicrobial Resistance*, 2(3), dlaa073.

<sup>25</sup>About non-judicious behaviour and individual responsibility for AR, see: Ancillotti, M. (2021). *Antibiotic resistance: A multimethod investigation of individual responsibility and behaviour*. Acta Universitatis Upsaliensis.

<sup>26</sup>Jamrozik, E., Handfield, T., & Selgelid, M. J. (2016). Victims, vectors and villains: Are those who opt out of vaccination morally responsible for the deaths of others? *Journal of Medical Ethics*, 42, 762–768.

<sup>27</sup>Ibid.

<sup>28</sup>On causality's role in traditional moral responsibility assignment, see: van de Poel, op. cit. note 8; Driver, J. (2008). Attributions of causation and moral responsibility. In W. Sinnott-Armstrong (Ed.), *Moral psychology. The cognitive science of morality: Intuition and diversity* (pp. 423–439). MIT Press.

<sup>29</sup>Wolf, S. (1987). Sanity and the metaphysics of responsibility. In F. Schoeman (Ed.), *Responsibility, character, and the emotions: New essays in moral psychology* (pp. 46–62). Cambridge University Press; Wallace, R. J. (1996). *Responsibility and the moral sentiments*.

antibiotic use and other human behaviour that affect AR are part of a system of health beliefs and lifestyle habits, which vary for different individuals.<sup>37</sup>

Therefore, the notion that individuals do or do not engage in judicious antibiotic behaviour with different degrees of voluntariness (due to different circumstances) should inform our ascriptions of responsibility. The idea that agents perform morally relevant acts with different degrees of voluntariness and that this affects the blameworthiness of those agents has been present in philosophical discussions since Antiquity and, in recent years, has entered also into the environmental debate—with which the discourse on AR shares many analogies. As noted by Nihlén Fahlquist, claims about what individuals ought to do (engaging in environmentally friendly behaviour) are problematic because they assume a relative homogeneity in individuals' social, economic, cultural and political contexts, which does not exist.<sup>38</sup>

In the following, we consider what we can reasonably demand of individuals.

#### 4 | DEMANDINGNESS

While accountability primarily concerns being held accountable by others, and in this sense is passive,<sup>39</sup> it also entails an active forward-looking element: in most situations, it is reasonable to expect that agents will take steps to remedy their actions. However, we are now interested in analysing the forward-looking notion of responsibility without reference to any potential harmful outcome that has already occurred, but instead analysing this notion in a broad prospective sense.

The fact that an agent is morally competent has fundamental forward-looking connotations, especially when considering AR. The widely accepted assistance principle states in broad terms that if there exists an important need (such as a need for food, shelter or medicines), that someone is able to meet at little cost, then there exists a moral duty to do so. It has been applied under various guises to global problems such as poverty and climate change.<sup>40</sup> It can be applied to AR too: if individuals can contribute to curbing AR, for instance by engaging in and promoting judicious behaviour in relation to antibiotic use, then they have a moral responsibility to do so. If they are less capable of contributing, then they are not responsible to the same extent.

In considering what we can demand of individuals, knowing what constitutes 'too high a cost' is fundamental.<sup>41</sup> Collins argues that, in determining whether the 'not too high a cost' clause of the assistance principle is met, three distinct costs could be considered: 'agent-relative costs', 'recipient-relative costs' and 'ideal-relative costs'.<sup>42</sup>

The agent-relative costs are obtained by subtracting the gross costs of engaging in judicious antibiotic behaviour from the gross benefit of it. The gross benefit of engaging in judicious antibiotic behaviour is manifold (including values, e.g. the satisfaction of doing the right thing). The gross costs of engaging in judicious antibiotic behaviour vary with agents' particular situations. For an individual who has difficulties obtaining prescribed medications due to limited health insurance or who lives far away from a healthcare centre, the gross costs of taking antibiotics only after a prescription, instead of buying them over the counter or using leftover medication, may be very high. Therefore, in some cases, the net agent-relative costs may be very small while in others they may be significant.

The recipient-relative costs result from subtracting the gross costs to recipients entailed by agents' actions from the gross benefit entailed by these actions. In this case, the recipients are all individuals affected by the agents' behaviour. In the circle of individuals immediately close to the agents, agents' engagement in judicious behaviour can bring about both gross costs and gross benefits. For instance, individuals close to the agents can benefit from a diminished likelihood of contracting infections caused or aggravated by resistant bacteria. However, they may also have to pay a high cost due to agents' judicious behaviour if, as in the above example, they depend on agents who have difficulties obtaining prescribed medications due to limited health insurance or great distance to a healthcare centre. To other people, agents' judicious antibiotic behaviour seems to bring only gross benefits. 'Other people' are both currently living and future people, all of whom can be assumed to have an interest in maintaining antibiotic effectiveness and limiting antibiotic pollution. Every agent engaging in judicious antibiotic behaviour contributes to recipients' benefits. In the event of particular adversities, individuals in the agents' close circles may incur substantial gross costs and their recipient-relative costs may be extremely demanding.

The ideal-relative cost, or ideal-relative sacrifice, points at the difference between taking the ideal action and taking the non-ideal action to attain a result: 'in acting to fulfil an important interest, we sometimes sacrifice the more ideal actions that others would have taken to fulfil that very interest'.<sup>43</sup> The 'more ideal' action is the one that imposes lower costs on both the agent taking the action and on the interest-bearer (the recipient). This notion is of limited utility in the context of actions that hold the potential to contribute to AR because while it is true that there may be ideal actions, it is difficult to imagine situations in which someone engages in judicious antibiotic

<sup>37</sup>Stålsby Lundborg, C., & Tamhankar, A. J. (2014). Understanding and changing human behaviour—Antibiotic mainstreaming as an approach to facilitate modification of provider and consumer behaviour. *Uppsala Journal of Medical Sciences*, 119(2), 125–133; Ancillotti, M., Eriksson, S., Veldwijk, J., Nihlén Fahlquist, J., Andersson, D. I., & Godsken, T. (2018). Public awareness and individual responsibility needed for judicious use of antibiotics: A qualitative study of public beliefs and perceptions. *BMC Public Health*, 18, 1153; Thorpe, A., Sirota, M., Juanchich, M., & Orbell, S. (2020). Action bias in the public's clinically inappropriate expectations for antibiotics. *Journal of Experimental Psychology: Applied*, 26(3), 422–431.

<sup>38</sup>Nihlén Fahlquist, J. (2009). Moral responsibility for environmental problems—Individual or institutional? *Journal of Agricultural and Environmental Ethics*, 22, 109–124.

<sup>39</sup>Bovens, M. (1998). *The quest for responsibility. Accountability and citizenship in complex organisations*. Cambridge University Press.

<sup>40</sup>Singer, P. (1972). Famine, affluence, and morality. *Philosophy & Public Affairs*, 1(3), 229–243; Nihlén Fahlquist, op. cit. note 38.

<sup>41</sup>On people's views on responsibility for AR and demandingness, see: Ancillotti, M., Eriksson, S., Godsken, T., Andersson, D. I., & Nihlén Fahlquist, J. (2020). An effort worth making: A qualitative study of how Swedes respond to antibiotic resistance. *Public Health Ethics*, 14(1), 1–11.

<sup>42</sup>Collins, S. (2018). When does 'Can' imply 'Ought'? *International Journal of Philosophical Studies*, 26(3), 354–375.

<sup>43</sup>Ibid: 355.

behaviour in place of another agent so to generate lower costs for the parties involved.

In the Introduction, a *prima facie* moral obligation to preserve antibiotic effectiveness for as long as possible was mentioned. This means that agents have a duty to engage in judicious antibiotic behaviour, other things being equal, that is unless this duty is overridden or trumped by other duties. But things are not equal, and no one should be held responsible for non-judicious antibiotic behaviour if their agent-relative costs are particularly disadvantageous or if judicious antibiotic behaviour is detrimental to the well-being of those around them. This does not mean they have no responsibility. Instead, it means that their responsibility is relatively less than that of those whose responsibility entails less demanding agent-relative costs and whose judicious antibiotic behaviour only, or almost only, entails gross recipient-relative benefits. As with many other things, responsibility for AR is not a black-and-white issue; instead it comes in degrees.

The problem of AR remains a global public health threat, which requires the involvement of large groups globally. In the following, we delineate our suggestion that a virtue-based approach is one way forward in our efforts to curb AR.

## 5 | RESPONSIBILITY AS A VIRTUE

Because individual antibiotic behaviour is morally problematic, ethical theories may have something to say about what people ought to do to mitigate AR. Rephrasing a statement made by Jamieson, one may say that, if our primary concern is how we should act in the face of global AR, then we need a theory that is seriously concerned with what people bring about.<sup>44</sup> There is a need for a theory that is not primarily concerned with agents' actions and their intended consequences, nor centred on who can be part of an 'antibiotic agreement', as it excludes precisely the people for whom AR will be a major problem, such as infants and future generations.<sup>45</sup> Irrespective of the ethical theory endorsed, there can be advantages in adding the virtue approach. For instance, Jamieson argues that the utilitarian approach may be a first step towards doing what is right in the context of global environmental change, as morality in a utilitarian framework requires competent agents to act in ways that contribute to bringing about the best possible world.<sup>46</sup> Arguably, the best possible world is one that has effective antibiotics and is less affected by environmental change. The quest for the best possible world also passes through individual behaviour. According to Jamieson, in a utilitarian framework, the most effective strategy for addressing the problem would require agents to be primarily focused on minimizing their own contributions and on causing others to minimize their contributions. The major limit identified by Jamieson concerns the utilitarian calculation

being a suitable, or successful, way to generate utility-maximizing behaviour. He argues that, in looking for solutions to large-scale collective action problems, we should not focus on calculative generators of behaviour but on non-calculative ones, such as character traits, dispositions, emotions or, more broadly, virtues.<sup>47</sup>

Previously, we applied the assistance principle to AR to understand how much we can ask of individuals. As soon as we began estimating what the principle would demand in terms of agent-relative costs and recipient-relative costs, there clearly seemed to be limits to agents' ability to engage in judicious antibiotic behaviour or it seemed that judicious antibiotic behaviour has to be conceived of dynamically, as the best course of action under the prevailing circumstances. Determining what constitute the best actions for mitigating AR is difficult due to the variance in people's circumstances. In considering individuals' moral responsibility for their own conduct, it is reasonable to envision people living in particular socioeconomic, cultural and political contexts, such that it becomes clear that they have different degrees of responsibility for their contribution (or potential contribution) to AR.

Responsibility as a virtue refers to an agent cultivating certain character traits and habits that make him/her a responsible person.<sup>48</sup> The desirability of specific character traits is contextual. An agent is not responsible or irresponsible in a social vacuum. Responsibility as a virtue is a relational, normative and forward-looking notion of responsibility, requiring morally desirable actions that an agent actively and voluntarily performs. Responsibility as a virtue has been described as a 'readiness to respond to a plurality of normative demands'.<sup>49</sup> The complexity of the AR problem can be seen as requiring a certain sensitivity to the plurality of normative demands involved. For instance, this sensitivity could consist of actively developing an understanding of when antibiotics are necessary and having perfected the ability to make the right choice (judicious antibiotic behaviour). A perfect ability is an ideal to guide people's behaviour. People ought to aim to get as close as possible to 'perfect' antibiotic behaviour, which would entail, for instance, adhering to antibiotic treatment prescriptions, avoiding use of leftover antibiotics (instead, disposing of them correctly), adopting sustainable food consumption habits, getting vaccinated, and so forth.

Theoretically focusing on the agent's character, namely on individual moral responsibility as a virtue, should not be interpreted as an attempt to hold the individual solely or primarily responsible for AR. This should be complemented by reflecting on what kinds of citizens and what kind of society would be ideal in managing AR and, possibly, reducing the effect of similar problems in the future. If it is to succeed, this additional focus should entail the creation of capacities and resources that promote responsible individual behaviour as well as a society that promotes and facilitates such capacities. Accomplishing this requires that institutions assume responsibility and create circumstances that can facilitate agents' engagement in judicious antibiotic behaviour. To exemplify, we can

<sup>44</sup>The original was: 'But if our primary concern is how we should act in the face of global environmental change, then we need a theory that is seriously concerned with what people bring about'. Jamieson, D. (2004). When utilitarians should be virtue theorists. *Utilitas*, 19(2), 160–183, p. 161.

<sup>45</sup>Ibid.

<sup>46</sup>Ibid.

<sup>47</sup>Ibid.

<sup>48</sup>Nihlén Fahlquist, J. (2019). Public health and the virtues of responsibility, compassion and humility. *Public Health Ethics*, 12(3), 213–224.

<sup>49</sup>Williams, G. D. (2008). Responsibility as a virtue. *Ethical Theory and Moral Practice*, 11(4), 455–470.

consider the medical use of antibiotics. Notoriously, antibiotics are victims of their own success, in that people seek and use antibiotics in an attempt to find a quick solution and get healthy as soon as possible. To create the right circumstances, it is important to give people the right tools with which to acquire information and act upon it. Therefore, on the one hand, educational and awareness-raising campaigns should be properly designed. As mentioned, there is not only an information gap, as knowledge is not the only determinant of AR-related behaviour. Empirical research has identified other cognitive factors, such as people's attitudes, beliefs and social norms, which also determine what we do with the information.<sup>50</sup> There is a non-trivial difference between understanding information and appreciating it and, as a consequence, sensing the wrongness of non-judicious antibiotic behaviour. On the other hand, those who understand, appreciate, and want to do the right thing and use antibiotics properly may still lack the *resources* needed to engage in judicious antibiotic behaviour. Empirical evidence clearly indicates that socioeconomic factors (e.g. poverty, marginalization, financial vulnerability, precarity) are important determinants of antibiotic-related health behaviour.<sup>51</sup> Welfare policies and social interventions, such as improving work environments and social support structures, would be needed to create the circumstances that can facilitate agents' engagement in judicious antibiotic behaviour.

## 6 | CONCLUDING REMARKS

The purpose of the present paper was to answer the following question: Do laypeople have individual moral responsibility for AR? We have argued that they do. Starting from the claim that acting to minimize AR is everyone's responsibility, we clarified the distinction between collective and individual moral responsibility for AR. Firstly, the notion of collective responsibility should be primarily understood in a metaphorical sense. Secondly, we highlighted morally relevant peculiarities of individual responsibility for AR with respect to other global problems: in addition to the responsibility for contributing to the AR global problem, individuals who carry resistant bacteria are themselves at risk of developing antibiotic-resistant infections and can infect others. Considering the grounds of responsibility, virtually everyone may be held accountable for contributing to AR. However, we suggest that the difference between responsibility for conduct and responsibility for the consequences of conduct is relevant and that moral competence should not be simply reduced to AR knowledge. This approach promises a more nuanced and circumstantial account of individual responsibility for AR, where individuals engage, or fail to engage, in judicious antibiotic behaviour with different degrees of voluntariness.

An agent's moral competence and ability to take actions to reduce AR have fundamental implications. It is crucial to estimate how much we can demand of individuals because there are personal and circumstantial limits to agents' ability to engage in judicious antibiotic behaviour. This has to be conceived of dynamically, as an ideal to guide behaviour according to people's particular socioeconomic, cultural and political contexts. Therefore, the focus should not be on calculative generators of behaviour, but on non-calculative ones, such as character traits and habits that have the potential to make individuals behave like responsible persons. This kind of responsibility, responsibility as a virtue, in which agents have opportunities to develop a sensitivity to the AR theme, can give these agents the ability to engage actively and voluntarily in judicious antibiotic behaviour. The development of such sensitivity is dependent on both the creation and sustainment of 'adequate circumstances', that is institutional resources, and the existence of social and moral norms that support behaviour change.

### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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<sup>50</sup>Fletcher-Miles, H., & Gammon, J. (2020). A scoping review on the influential cognitive constructs informing public AMR behavior compliance and the attribution of personal responsibility. *American Journal of Infection Control*, 48(11), 1381–1386.

<sup>51</sup>Ancillotti, M., Eriksson, S., Andersson, D. I., Godskesen, T., Nihlén Fahlquist, J., & Veldwijk, J. (2020). Preferences regarding antibiotic treatment and the role of antibiotic resistance: A discrete choice experiment. *International Journal of Antimicrobial Agents*, 56(6), 106198; Haenssge, M. J., Charoenboon, N., Xayavong, T., & Althaus, T. (2020). Precarity and clinical determinants of healthcare-seeking behaviour and antibiotic use in rural Laos and Thailand. *BMJ Global Health*, 5, e003779.

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