

Eating Meat and Not Vaccinating: In Defense of the Analogy

Abstract: The devastating impact of the COVID-19 (coronavirus disease 2019) pandemic is prompting renewed scrutiny of practices that heighten the risk of infectious disease. One such practice is refusing available vaccines known to be effective at preventing dangerous communicable diseases. For reasons of preventing individual harm, avoiding complicity in collective harm, and fairness, there is a growing consensus among ethicists that individuals have a duty to get vaccinated. I argue that these same grounds establish an analogous duty to avoid buying and eating most meat sold today, based solely on a concern for human welfare. Meat consumption is a leading driver of infectious disease. Wildlife sales at wet markets, bushmeat hunting, and concentrated animal feeding operations (CAFOs) are all exceptionally risky activities that facilitate disease spread and impose immense harms on human populations. If there is a moral duty to vaccinate, we also should recognize a moral duty to avoid most meat. The paper concludes by considering the implications of this duty for policy.

Keywords: COVID-19, farming, infectious disease, meat, vaccine, vegetarian, zoonotic

Author: Ben Jones, Rock Ethics Institute at Penn State (btj7@psu.edu)

This article is forthcoming in *Bioethics* and the final published version is available at:

<https://doi.org/10.1111/bioe.12834>.

Infectious disease outbreaks have increased in recent decades, prompting calls for more aggressive measures to prevent them.¹ The devastation of the COVID-19 pandemic emphasizes the urgency of that task, while putting greater scrutiny on activities that heighten infectious disease risk. In particular, COVID-19 highlights the link between meat consumption and infectious disease. Like most emerging infectious diseases today,² COVID-19 is zoonotic—the virus causing it jumped from an animal to human host. Evidence suggests a Chinese wet market selling wildlife facilitated the emergence of this novel disease.³ Wildlife at wet markets have been linked to the emergence of other zoonotic diseases like SARS.⁴ The latest outbreak renewed calls to end wildlife sales, as well as limit other meat consumption linked to disease spread.⁵

Given such concerns, this article examines to what extent there is a moral duty to avoid meat based solely on a concern for human welfare and preventing infectious disease. I argue for this duty by appealing to a relevant analogy: the duty to vaccinate. For reasons of preventing individual harm, avoiding complicity in collective harm, and fairness, many ethicists recognize an individual duty to vaccinate.⁶ These same grounds establish a duty to avoid buying and eating most meat sold today. Wildlife sales at wet markets, bushmeat hunting, and concentrated animal feeding operations (CAFOs) all are exceptionally risky activities that facilitate disease spread and pose immense harms to human populations.⁷ If there is a moral duty to vaccinate, we also

¹ Smith, K., Goldberg, M., Rosenthal, S., Carlson, L., Chen, J., Chen, C., & Ramachandran, S. (2014). Global rise in human infectious disease outbreaks. *Journal of the Royal Society Interface*. 11(101), 20140950.

² Ibid: 3.

³ Anderson, K., Rambaut, A., Lipkin, W., Holmes, E., & Garry, R. (2020). The proximal origin of SARS-CoV-2. *Nature Medicine*. 26, 450–455.

⁴ Woo, P., Lau, S., & Kwok-yung, Y. (2006). Infectious diseases emerging from Chinese wet-markets: Zoonotic origins of severe respiratory viral infections. *Current Opinion in Infectious Diseases*. 19(5), 401–407.

⁵ E.g., Samuel, S. (2020, April 22). The meat we eat is a pandemic risk, too. *Vox*. Retrieved from <https://www.vox.com/future-perfect/2020/4/22/21228158/coronavirus-pandemic-risk-factory-farming-meat>.

⁶ See Giubilini, A. (2019). *The Ethics of Vaccination*. Cham: Palgrave Macmillan.

⁷ See Greger, M. (2007). The human/animal interface: Emergence and resurgence of zoonotic infectious diseases. *Critical Reviews in Microbiology*. 33(4), 243–299.

should recognize a moral duty to avoid most meat. The article closes by considering this duty's implications for policy.

I take no position here on whether nonhuman animals merit moral concern. They very well may, which would further strengthen the case against most meat consumption. But I avoid relying on that claim to show that, even with unfavorable assumptions, there still are compelling reasons for a duty to avoid most meat.⁸

Infectious Disease, Ethics, and Risk

Because of the suffering infectious diseases cause, we clearly have some moral duty to reduce the risk of their spread. Releasing a deadly and contagious pathogen in a crowded subway, for instance, is obviously wrong. The extent of this duty is difficult to specify given the numerous factors impacting infectious disease risk—travel, species loss, deforestation, medical innovation, public health policy, sanitation, farming, urbanization, and others.⁹ Ordinary activities like visiting the store carry *some* risk of spreading infectious disease. It quickly becomes apparent that an unqualified duty to reduce the risk of infectious disease is too demanding.¹⁰

Strategies to determine permissible and impermissible risk in other contexts help clarify duties regarding infectious disease. Consider drunk driving, which most readily recognize as wrong. Though driving generally imposes risks on others, drunk driving stands out as impermissible because its risks are:

- (1) *exceptionally high*: driving drunk is far likelier to cause harm than driving sober

⁸ For a similar approach focused on meat consumption's environmental consequences, see Ilea, R. (2009). Intensive livestock farming: Global trends, increased environmental concerns, and ethical solutions. *Journal of Agricultural and Environmental Ethics*. 22(2), 153–167.

⁹ See Shah, S. (2016). *Pandemic: Tracking contagions from cholera to Ebola and beyond*. New York: Picador.

¹⁰ Verweij, M. (2005). Obligatory precautions against infection. *Bioethics*. 19(4), 323–335, p. 326.

(2) *unnecessary*: other options provide travel without excluding essential goods

(3) *grave*: driving drunk can result in severe injuries or death¹¹

Remove any of these criteria and the moral case against an action becomes less compelling.

Driving sober to an amusement park is unnecessary and comes with grave risks, but the risks are not exceptionally high and thus permissible. Driving an emergency vehicle at high speed comes with exceptionally high and grave risks, but permissible when necessary to achieve the essential good of saving someone's life. Driving a bumper car is unnecessary and poses an exceptionally high risk of accident, but permissible since such accidents do not cause grave harms. In contrast, drunk driving is exceptionally risky, unnecessary, *and* a potential source of grave harms, which together render it morally impermissible.

Importantly, (1) refers to an exceptionally high risk relative to activities achieving similar ends. In isolation, such a risk may appear quite low. Drunk driving in the US leads to a fatal accident in less than one out of every 10,000 cases.¹² Yet that seemingly low risk fails to justify drunk driving, for what matters morally is how the risk compares to driving sober. A likelihood of accident nearly seven times greater for drunk driving makes clear its impermissibility.¹³

The criteria also are not strictly dichotomous. There are degrees to which risks are exceptionally high, unnecessary, or grave. For example, whether a risk is unnecessary may be unclear because the alternative requires sacrificing important goods whose essential status is disputed. The hardship required in upholding the duty raises questions on whether it still applies.

¹¹ Criteria are modified from Huemer, M. (2019). *Dialogues on ethical vegetarianism*. New York: Routledge, p. 19.

¹² Calculation comes from 2014 data estimating 111,000,000 drunk driving episodes with 9,417 fatal crashes. See Centers for Disease Control and Prevention (2020). Impaired driving: Get the facts. Retrieved from https://www.cdc.gov/motorvehiclesafety/impaired_driving/impaired-drv_factsheet.html; National Highway Traffic Safety Administration. (2016). Traffic safety facts 2014 data: State alcohol-impaired-driving estimates. Retrieved from <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812264>.

¹³ Compton, R., & Beming, A. (2015). Drug and alcohol crash risk. National Highway Traffic Safety Administration. Retrieved from https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/812117-drug_and_alcohol_crash_risk.pdf, p. 5.

Such tough cases are common in moral reasoning and do not render the above criteria useless. For when clearly met, the criteria offer clarity on our duties. Applying these criteria to infectious disease risk helps distinguish permissible and impermissible forms of it. That approach guides the rest of the article as it focuses on two major sources of infectious disease risk: meat consumption and not vaccinating.

The Duty to Vaccinate

Vaccines represent one of medicine's most significant innovations, responsible for eliminating diseases that once ravaged human populations. Most directly, vaccines reduce the risk of infection to those vaccinated. The protection ends there for vaccines for non-communicable diseases like tetanus. But vaccines for communicable diseases like measles have an added benefit: they reduce the risk that those vaccinated will infect others. When enough people in a population get vaccinated for a communicable disease, the resulting herd immunity prevents disease outbreaks and helps protect those unable to get vaccines, like infants and the immunosuppressed.¹⁴ Citing the vital public health role played by vaccines for dangerous communicable diseases, a growing consensus of ethicists argue that individuals have a moral duty to get such vaccines for themselves and their children when shown to be safe and effective.¹⁵

¹⁴ Fine, P., Eames, K., & Heymann, D. (2011). "Herd immunity": A rough guide. *Clinical Infectious Diseases*. 52(7), 911–916.

¹⁵ Navin, M. (2013). Resisting moral permissiveness about vaccine refusal. *Public Affairs Quarterly*. 27(1), 69–85; Flanigan, J. (2014). A defense of compulsory vaccination. *HEC Forum*. 26(1), 5–25; Brennan, J. (2018). A libertarian case for mandatory vaccination. *Journal of Medical Ethics*. 44(1), 37–43; Giubilini, A., Douglas, T., & Savulescu, J. (2018). The moral obligation to be vaccinated: Utilitarianism, contractualism, and collective easy rescue. *Medicine, Health Care, and Philosophy*. 21(4), 547–560; Pierik, R. (2018). Mandatory vaccination: An unqualified defence. *Journal of Applied Philosophy*. 35(2), 381–398; Giubilini, A. (2020). An argument for compulsory vaccination: The taxation analogy. *Journal of Applied Philosophy*. 37(3), 446–466.

There is a strong case for this duty because of the risks it guards against. Not vaccinating imposes *exceptionally high* risks compared to vaccinating. Lower vaccination rates lead to outbreaks of preventable diseases like measles, highlighting the comparably high risks of not vaccinating.¹⁶ These risks also are *unnecessary*, since people generally can get safe and effective vaccines without sacrificing essential goods and at little cost. Lastly, not vaccinating imposes *grave* risks on others—long-term adverse health effects and death. According to estimates by the Centers for Disease Control and Prevention and World Health Organization, measles alone causes over 100,000 deaths annually worldwide.¹⁷

Given these risks, there are several rationales for the duty to vaccinate: (1) *prevent individual harm*, (2) *avoid complicity in collective harm*, and (3) *fairness*. Let's look at each.

(1) *Prevent individual harm*. Someone who gets vaccinated reduces their risk of spreading infectious disease. That risk viewed in isolation is small. Still, not vaccinating comes with greater risk that easily could be avoided. Some who forgo vaccinations for nonmedical reasons end up infecting vulnerable individuals unable to get vaccinated.¹⁸ A wide range of normative theories agree that individuals should avoid imposing grave risks on others without their consent, which helps explain the duty to get vaccinated for communicable diseases.¹⁹

(2) *Avoid complicity in collective harm*. When many refuse vaccines, what results is a susceptible population in which disease can easily spread. Together such actions impose substantial and harmful risks on others, violating the principle to avoid complicity in collective harm. For instance, it is wrong to join a murderous mob, even if one's participation has no

¹⁶ Olive, J., Hotez, P., Damania, A., & Nolan, M. (2018). The state of the antivaccine movement in the United States: A focused examination of nonmedical exemptions in states and counties. *PLOS Medicine*. 15(6), e1002578.

¹⁷ Patel, M., Dumolard, L., Nedelec, Y., Sodha, S., Steulet, C., Gacic-Dobo, M., ... Goodson, J. (2019). Progress toward regional measles elimination—worldwide, 2000–2018. *Morbidity and Mortality Weekly Report*. 68(48), 1105–1111, pp. 1108, 1110.

¹⁸ Pierik, *op. cit.* note 15, p. 387.

¹⁹ Flanigan, *op. cit.* note 15.

impact on the ultimate outcome. Not vaccinating also involves complicity in collective harm, suggesting a duty to vaccinate.²⁰

(3) *Fairness*. High vaccination rates offer herd immunity, a public good that reduces the risk of infection for everyone in a population. Beyond just enjoying this benefit, individuals should contribute their fair share to maintaining it, which they can do by getting vaccinated. This basic idea of fairness bolsters the case for the duty to vaccinate.²¹

Altogether, these explanations offer broadly shared reasons for the duty to vaccinate. It is best understood as a *pro tanto* duty—it applies in most cases, but could be overridden in certain circumstances.²² If someone is immunosuppressed and getting a vaccine would endanger their health, that consideration overrides the duty to vaccinate. This person not getting vaccinated still imposes risks on others, but the risks are necessary to safeguard their health and thus permissible. Prohibitively high vaccine costs also could override the duty to vaccinate for those unable to afford it.

Despite support among ethicists for a duty to vaccinate, there remain objections to it, with perhaps the strongest being that the basic human right freedom of conscience overrides it. On this view, those with religious or philosophical objections to vaccines have no obligation to get them. Vaccine refusal on these grounds imposes risks on others that perhaps seem necessary—they are an unavoidable side effect of exercising a basic right. But there is reason to question that view. Though freedom of conscience merits consideration, it is not absolute. Obviously, it does not mint permissions for drunk driving, murder, or many other harmful acts. Freedom of

²⁰ Brennan, *op. cit.* note 15.

²¹ Giubilini, *op. cit.* note 15.

²² Giubilini et al., *op. cit.* note 15, p. 549.

conscience necessarily ends when it imposes impermissible risks and harms on others, as in the case of refusing safe and effective vaccines critical to prevent communicable diseases.²³

Link Between Meat and Infectious Disease

Just as not vaccinating poses exceptionally high, unnecessary, and grave risks of infectious disease, the same is true for many practices related to meat consumption. These practices prove risky due to animals' role in infectious disease spread. Human-animal interactions carry the risk of pathogens spreading from animal hosts to human populations—a risk that increases with more interactions. Not surprisingly, the domestication of animals for farming played a significant role in the emergence of many infectious diseases. Influenza A, measles, smallpox, and tuberculosis all are zoonotic diseases that likely originated from domesticated animals.²⁴ Today, zoonotic diseases are emerging at an accelerated pace. Leading drivers of this trend include more intensive animal farming and hunting, in conjunction with deforestation and development that bring humans into increased contact with wildlife.²⁵ We turn now to some of the riskiest practices: (1) wildlife sales at wet markets, (2) bushmeat hunting, and (3) CAFOs.

(1) Wildlife Sales at Wet Markets

Asian wet markets offer an alternative to supermarkets, where independent vendors sell items valued for their perceived freshness. It has been common for some wet markets to sell live wild animals—bats, pangolins, civet cats, and others. Packing together many exotic species in close

²³ For more on conscientious objection to vaccines, see Clarke, S., Giubilini, A., & Walker, M. (2017). Conscientious objection to vaccination. *Bioethics*. 31(3), 155–161.

²⁴ Wolfe, N., Dunavan, C., & Diamond, J. (2007). Origins of major human infectious diseases. *Nature*. 447, 279–283.

²⁵ Woolhouse, M., & Gowtage-Sequeria, S. (2005). Host range and emerging and reemerging pathogens. *Emerging Infectious Diseases*. 11(12), 1842–1847.

proximity creates ideal conditions for pathogens to jump between animals and evolve in novel ways that infect humans. As Patrick Woo, Susanna Lau, and Kwok-yung Yuen explain,

animals are closely packed in cages and hygienic conditions are inevitably poor, with the shedding of large amounts of animal excreta. These animal excreta may contain high concentrations of zoonotic microbes of potential hazard to human health. High-risk behaviors of customers, such as blowing the cloacae of chickens commonly practised to examine their healthiness, further increase the risk of transmission of these potential microbes. All these factors contribute to the role of these wet-markets as a unique place for transmission of zoonotic disease to humans.²⁶

Wet markets received much attention following the outbreak of COVID-19, since the first cases were linked to one in Wuhan, China. But the risks have been known for some time. Infectious disease experts linked wildlife sales at wet markets to the earlier SARS outbreak and warned about their dangers. All this evidence suggests that wildlife sales pose exceptionally high, unnecessary, and grave risks. The COVID-19 pandemic highlighted that point, and led many in China and elsewhere to call for an end to wildlife sales at wet markets.²⁷

(2) Bushmeat Hunting

Another risky activity is the hunting and trade of bushmeat from Africa. Bushmeat hunting is conducive to the emergence and spread of infectious disease because it involves animals that rarely come in contact with humans. It thus can expose hunters and others to pathogens that previously only dwelled in animal hosts. Species hunted for bushmeat include nonhuman primates, source of a disproportionate share of zoonotic diseases. Due to their genetic similarity, nonhuman primates often carry microbes well suited to survive in humans, which makes hunting

²⁶ Woo et al., *op. cit.* note 4, p. 403.

²⁷ Daly, N. (2020, January 30). Chinese citizens push to abolish wildlife trade as coronavirus persists. *National Geographic*. Retrieved from <https://www.nationalgeographic.com/animals/2020/01/china-bans-wildlife-trade-after-coronavirus-outbreak/>.

them hazardous to public health.²⁸ Scientists have traced outbreaks of Ebola, monkeypox, and other infectious diseases back to bushmeat. One of the deadliest pandemics, AIDS, likely originated from a virus contracted through hunting, preparing, or consuming primate bushmeat.²⁹

As with wildlife sales at wet markets, the exceptionally high and grave risks associated with bushmeat hunting are well documented. These risks may be necessary when people have limited access to food and bushmeat is their only option. But demand for bushmeat persists even where it is clearly unnecessary, like Europe and the US, popular destinations for illegal imports of bushmeat.³⁰ Surveys also find that some higher-income households in Africa prefer and purchase bushmeat, despite its risks and the availability of other food options.³¹

(3) Concentrated Animal Feeding Operations (CAFOs)

It is tempting to conclude from the last two examples that only activities related to exotic meat consumption pose significant risks of infectious disease. Those in the developed world who buy beef, chicken, and pork at the supermarket are not to blame. But that conclusion is mistaken, since the vast majority of meat in the US and many other countries comes from intensive animal farming, in particular CAFOs or factory farms.³² These farms produce meat cheaply but also

²⁸ Wolfe et al., *op. cit.* note 24, p. 282.

²⁹ Greger, *op. cit.* note 7, pp. 247–248.

³⁰ Chaber, A.-L., Allebone-Webb, S., Lignereux, Y., Cunningham, A., & Rowcliffe, J. (2010). The scale of illegal meat importation from Africa to Europe via Paris. *Conservation Letters*. 3(5), 317–323; Smith, K., Anthony, S., Switzer, W., Epstein, J., Seimon, T., Jia, H., ... Marano, N. (2012). Zoonotic viruses associated with illegally imported wildlife products. *PLOS One*. 7(1), e29505.

³¹ Ordaz-Németh, I., Arandjelovic, M., Boesch, L., Gatsio, T., Grimes, T., Kuehl, H., ... Junker, J. (2017). The socio-economic drivers of bushmeat consumption during the West African Ebola crisis. *PLOS Neglected Tropical Diseases*. 11(3), e0005450.

³² Anthis, J. (2019, April 11). US factory farming estimates. Sentience Institute. Retrieved from <https://www.sentienceinstitute.org/us-factory-farming-estimates>. These estimates are based on data from United States Department of Agriculture (2019). *2017 census of agriculture*. Retrieved from https://www.nass.usda.gov/Publications/AgCensus/2017/index.php#full_report.

greatly increase the risk of infectious disease. Various practices of CAFOs raise that risk, with two that stand out: packing many animals tightly together and nontherapeutic use of antibiotics.³³

In the dense confines of CAFOs, with many susceptible hosts constantly exposed to their waste, pathogens have more opportunities to infect animals, mutate into more virulent forms, and spread through a population than in the wild. Intensive animal farming also favors breeds that grow large quickly, and this reduced genetic diversity leaves herds less resistant to disease outbreaks. Moreover, the conditions animals endure in CAFOs—from tight confinement to operations without anesthesia (like beak trimming)—subject them to stress that makes them more prone to disease.³⁴

To counteract unhealthy conditions, prevent disease, and promote growth, many CAFOs give animals subtherapeutic doses of antibiotics through food or water. Most antibiotics consumed in the US go toward farm animals and globally their use is increasing with the growth of intensive animal farming.³⁵ As studies of farmworkers and meat find, nontherapeutic use of antibiotics in agriculture selects for strains of bacteria resistant to drugs.³⁶ Antimicrobial resistance is a serious public health problem that worldwide kills hundreds of thousands of people annually and, if trends continue, will kill millions annually in the coming decades.³⁷ CAFOs significantly contribute to this problem and expose populations to resistant pathogens via farmworkers, meat sold to consumers, and animal waste that pollutes water, air, soil, and crops.³⁸

³³ Silbergeld, E., Graham, J., & Price, L. (2008). Industrial food animal production, antimicrobial resistance, and human health. *Annual Review of Public Health*. 29, 151–169, p. 153.

³⁴ Greger, *op. cit.* note 7, pp. 253–254.

³⁵ Van Boeckel, T., Brower, C., Gilbert, M., Grenfell, B., Levin, S., Robinson, T., ... Laxminarayan, R. (2015). Global trends in antimicrobial use in food animals. *PNAS*. 112(18), 5649–5654.

³⁶ Silbergeld et al., *op. cit.* note 33.

³⁷ O’Neill, J. (2016). *Tackling drug-resistant infections globally: Final report and recommendations*. The Review on Antimicrobial Resistance. Retrieved from https://amr-review.org/sites/default/files/160518_Final%20paper_with%20cover.pdf, pp. 10–12.

³⁸ Silbergeld et al., *op. cit.* note 33, pp. 158–161.

Numerous infectious disease outbreaks have been traced back to CAFOs. In Malaysia in the 1990s, a deadly outbreak of the Nipah virus—which caused respiratory illness and had a fatality rate of 40%—hit the human population due to contact with intensively farmed pigs.³⁹ Drug-resistant pathogens like MRSA are becoming more widespread in human populations and their high concentrations on livestock and meat strongly suggest that intensive animal farming is a significant driver of this trend.⁴⁰ The growth of intensive poultry farming has proved conducive for avian influenza to mutate into more deadly forms, like H5N1 that kills around half the people it infects.⁴¹ The swine flu pandemic of 2009 originated from a virus circulating among intensively farmed pigs, which then infected millions of people and killed thousands.⁴² The continued increase in CAFOs only exacerbates the risk of more frequent and deadly outbreaks in the future.

The Duty to Avoid Most Meat

The risky practices identified above, and particularly intensive animal farming, are responsible for most meat consumed worldwide.⁴³ Given current practices, the same reasons offered for the duty to vaccinate—(1) prevent individual harm, (2) avoid complicity in collective harm, and (3) fairness—also support a duty to avoid most meat.

First, when someone buys, hunts, or cooks meat from risky sources, their contact with it increases the risk of infecting others. To prevent direct harm to others, they should avoid such

³⁹ Greger, M. (2010). Industrial animal agriculture's role in the emergence and spread of disease. In J. D'Silva & J. Webster, *The meat crisis: Developing more sustainable production and consumption* (pp. 161–172). New York: Earthscan, pp. 162–63.

⁴⁰ Ibid: 163–64.

⁴¹ Ibid: 164–65.

⁴² Ibid: 165–66.

⁴³ Anthis, K. (2019, February 21). Global farmed & factory farmed animals estimates. Sentience Institute. Retrieved from <https://www.sentienceinstitute.org/global-animal-farming-estimates>; Greger, *op. cit.* note 7, p. 253.

actions. Second, wildlife sales at wet markets, bushmeat hunting, and CAFOs impose collective and impermissible harms on others. We have reason to avoid meat from those sources because it involves complicity in collective harm. Third, a collective shift away from risky meat provides the public good of reduced infectious disease risk. Buying and eating such meat represents a failure to contribute our fair share to this public good. While the public good of herd immunity provided by vaccination protects against known diseases, the public good provided by avoiding risky meat includes protection against the emergence of novel diseases. If a disease never enters the human population, we lack a concrete sense of the suffering prevented. Still, that public good is incredibly important. Proven vaccines and treatments initially are unavailable for novel diseases, which makes them especially dangerous and preventing them critical.

So reasons of preventing individual harm, avoiding complicity in collective harm, and fairness all point to the same conclusion: individuals have a duty to avoid most meat. This duty, like the duty to vaccinate, is best understood as a *pro tanto* duty, meaning it sometimes can be overridden. If refusing risky meat endangers life because no other food is available, the duty no longer applies. In this case, eating meat to survive imposes a necessary risk on others.

Those with other food options most clearly have a duty to avoid meat from the riskiest sources—wildlife from wet markets, bushmeat hunting, and CAFOs. Now does this duty require giving up all meat? Since the duty is grounded in a concern for human rather than animal welfare, it allows the consumption of species posing a low risk of zoonotic disease. For example, pathogens rarely jump from fish to humans due to the considerable genetic differences between them.⁴⁴ So eating wild-caught fish appears compatible with avoiding risky meat. Farmed fish is

⁴⁴ Woolhouse, M., & Gaunt, E. (2007). Ecological origins of novel human pathogens. *Critical Reviews in Microbiology*. 33(4), 231–242, p. 237.

more questionable, given the nontherapeutic use of antibiotics to produce it and its link to zoonotic disease spread and antimicrobial resistance.⁴⁵

How about meat from farm animals raised in conditions less risky than CAFOs? Long before CAFOs, human contact with domesticated animals gave rise to various zoonotic diseases.⁴⁶ Perhaps, then, the duty to avoid most meat should extend to all meat from mammals and birds—sources of the vast majority of zoonotic diseases.⁴⁷ At the same time, this duty is grounded in the idea of avoiding activities that pose *exceptionally high* risks of infectious disease. Does producing and consuming truly free-range meat, without antibiotics, fall into that category? It poses some risk, but maybe not an exceptionally high one. On that view, giving up free-range meat counts as a supererogatory rather than morally required act.

Since most action imposes some harmful risk on others, it is difficult to know where to draw the line between permissible and impermissible risk. Fortunately, determining that in every case isn't necessary to establish the duty to avoid most meat. We can lack certainty in marginal cases and still identify the riskiest activities to avoid. Even if the implications for the duty defended here are unclear for free-range meat, its prohibition against meat from riskier sources—most meat consumed today—is clear.

Objections

Here is the argument so far:

- (1) If there is a pro tanto duty to vaccinate, there is a pro tanto duty to avoid most meat.
- (2) There is a pro tanto duty to vaccinate.

⁴⁵ Greger, *op. cit.* note 7, pp. 255, 258.

⁴⁶ Wolfe et al., *op. cit.* note 24, p. 281.

⁴⁷ Woolhouse & Gaunt, *op. cit.* note 44, p. 237.

(3) So there is a pro tanto duty to avoid most meat.

The argument is valid but faces potential objections to each premise, which we now consider.

Objections to Premise (1)

Some may reject the duty to vaccinate as an analogy for other duties due to worries that it proves too much. Many activities marginally raise the risk of infectious disease, from travel to living in a city, and expecting people to stop them all is too demanding.

The duty to vaccinate does imply duties beyond just avoiding most meat. Other plausible duties include avoiding certain exotic pets, travel during epidemics, and activities that contribute significantly to deforestation. Accepting such duties does not entail that individuals have a duty to avoid *any* activity that marginally increases the risk of infectious disease. Indeed, we make similar distinctions all the time. Driving drunk and driving sober both impose risks on others, but the former is impermissible because its risks are exceptionally high, unnecessary, and grave. Wildlife sales at wet markets, bushmeat hunting, and CAFOs are the equivalent of drunk driving, which is why there is a moral duty to avoid meat from those sources.

So the analogy between the two duties does not prove too much, but perhaps it fails for another reason: avoiding most meat involves greater sacrifices than getting vaccinated. Consider that over 90% of Americans get vaccinated,⁴⁸ while only 5% are vegetarian.⁴⁹ Policies to promote vaccinations—like subsidies and banning children without vaccinations from attending

⁴⁸ Seither, R., Loretan, C., Driver, K., Mellerson, J., Knighton, C., & Black, C. (2019). Vaccination coverage with selected vaccines and exemption rates among children in kindergarten—United States, 2018–19 school year. *Morbidity and Mortality Weekly Report*. 68(41), 905–912.

⁴⁹ Hrynowski, Z. (2019, September 27). What percentage of Americans are vegetarian? Gallup. Retrieved from <https://news.gallup.com/poll/267074/percentage-americans-vegetarian.aspx>.

school—may partly explain this disparity, but not all of it. If current behavior is any indication, giving up most meat may be too onerous.

Whether a duty is too onerous depends on factors beyond just how many people dislike it. Paying taxes is unpopular, yet that fails to discredit the duty to pay them. One has to look at what makes a purported duty seem onerous and whether those concerns disqualify it as a legitimate duty. For the duty to avoid most meat, common concerns include that it interferes with people's taste preferences, health, cultural values, and economic welfare. Ultimately, all these concerns prove unpersuasive: satisfying taste preferences is not an essential need that justifies impermissible risks to others; diets with little or no meat provide health benefits;⁵⁰ meat's cultural significance deserves consideration but fails to mint permissions to impose impermissible risks on others; and vegetarian diets cost less.⁵¹

It is important to note one objection that holds up under scrutiny. The duty defended here implies that those who sell wildlife, hunt bushmeat, or work in CAFOs should stop given these activities' impermissible risks. That demand *is* onerous for those without alternatives for income or food. Though this concession leaves the duty defended here intact for most people, especially in the developed world, it highlights the need for policies that ease the duty's burdens on those in precarious conditions where their welfare depends on meat from risky sources.

Objections to Premise (2)

Another line of attack questions the duty to vaccinate, aiming to undermine it along with the duty to avoid most meat. Skeptics of these duties emphasize the inefficacy of individual action: one's

⁵⁰ Melina, V., Winston, C., & Levin, S. (2016). Position of the academy of nutrition and dietetics: Vegetarian diets. *Journal of the Academy of Nutrition and Dietetics*. 116(12), 1970–1980.

⁵¹ Flynn, M., & Schiff, A. (2015). Economical healthy diets (2012): Including lean animal protein costs more than using extra virgin olive oil. *Journal of Hunger & Environmental Nutrition*. 10(4), 467–482.

decision to forgo vaccination has virtually no impact on the risks others face. It is difficult to show that such action will be the tipping point that lowers herd immunity and causes an outbreak. Though collectively vaccine refusal imposes substantial risks, our inability to trace these risks back to a particular person casts doubt on the individual duty to vaccinate.⁵²

There are several ways to respond. Most obviously, we can trace *some* risks back to individual decisions not to vaccinate. Someone who refuses vaccination is more likely to infect individuals who cannot get vaccines for medical reasons. These risks are low viewed in isolation, but high compared to the alternative of getting vaccinated.

Some dismiss this response, claiming that the risks in question are too small to establish individual duties. Still, the defender of these duties can point to other reasons for them: by not vaccinating, we become complicit in collective harms and fail to do our fair share to prevent them. The skeptic can counter that we have duties to avoid complicity in grave *intentional* harms (e.g., lynching), but not grave *unintentional* harms (e.g., not vaccinating).⁵³

Though complicity in intentional harm deserves greater blame than complicity in unintentional harm, all else being equal, it is a mistake to categorically reject duties to avoid the latter. Drunk driving rarely involves harmful intent, yet we recognize a moral duty to avoid it. The same holds for actions contributing to unintentional collective harm whose individual risks are tougher to pinpoint. Take the emission of chlorofluorocarbons (CFCs). Individuals have a moral duty to avoid CFC emissions given their significant harms to the ozone layer, even if one person's emissions have no measurable impact.

⁵² See Kingston, E., & Sinnott-Armstrong, W. (2018). What's wrong with joyguzzling? *Ethical Theory and Moral Practice*. 22(1), 169–186.

⁵³ Ibid: 172–173.

The law bans CFCs, the skeptic might note, which explains the moral duty against them but not against vaccine refusal where legal.⁵⁴ But this view runs into problems. If moral duties hinge on whether individual action poses concrete harm, as the skeptic claims, there is nothing wrong with secret emission of CFCs that carefully avoids undermining legal compliance by others. In other words, it is permissible to emit CFCs and break similar laws as long as no one finds out. That seems implausible. The skeptic could claim that individuals should obey laws like bans on CFCs because, in practice, breaking them almost always has the effect of discouraging their observance. But that claim is questionable. Plus, why would there be any less of a duty to avoid *legal* activities contributing to collective harm—like not vaccinating—since breaking that duty could encourage others to do the same? In sum, there are persuasive reasons to reject skepticism toward the duty to vaccinate and other duties to avoid contributing to exceptionally high, unnecessary, and grave risks on others.

Policy Implications

The duty to vaccinate suggests another duty: not buying and eating most meat sold today. This individual duty seeks to promote a public good—lower overall infectious disease risk—that only can be achieved through collective action. It is here that law and policy have a role. Though detailed policy prescriptions are beyond this article’s scope, it is worth considering what the duty to avoid most meat implies for policy.

Scientists overwhelmingly agree that intensive animal farming is a leading cause of increased infectious disease outbreaks. Most also assume that CAFOs are here to stay, so they

⁵⁴ Ibid: 169–170.

propose more surveillance, like testing farmworkers and livestock for pathogens.⁵⁵ Given risky conditions throughout the world, governments and international bodies *should* expand surveillance to help prevent future outbreaks.

Yet that approach is dissatisfying as a long-term solution. More surveillance without addressing the root causes of infectious disease resembles an ever more elaborate game of whack-a-mole, in which we desperately try to fend off threats emerging at a quickening pace. It is a game we are at real danger of losing—and have been losing. Devastating outbreaks continue despite expansions in infectious disease surveillance in recent decades.⁵⁶

In this context, there is value in reframing most meat consumption as analogous to not vaccinating, for it captures a critical point: meat is a major source of unjustified harms to global health. Ending risky meat production would be disruptive to a global industry worth hundreds of billions of dollars annually.⁵⁷ Yet the status quo is *already* disruptive. Pandemics like COVID-19 cost economies trillions of dollars.⁵⁸

When activities impose impermissible risks on others, a core function of government is to find effective measures to limit them. In response to rising levels of vaccine refusal, bans on nonmedical exemptions have succeeded in increasing vaccination rates and preventing outbreaks.⁵⁹ Such policies promote the duty to vaccinate and, ideally, there also should be policies to promote the duty to avoid most meat. The problem, though, is that far fewer people

⁵⁵ Morse, S., Mazet, J., Woolhouse, M., Parrish, C., Carroll, D., Karesh, W., ... Daszak, P. (2012). Prediction and prevention of the next pandemic zoonosis. *Lancet*. 380, 1956–1965.

⁵⁶ Simonsen, L., Gog, J., Olson, D., & Viboud, C. (2016). Infectious disease surveillance in the big data era: Towards faster and locally relevant systems. *The Journal of Infectious Diseases*. 214(S4), S380–S385.

⁵⁷ Winders, B., & Ransom, E. (2019). Introduction to the global meat industry: Expanding production, consumption, and trade. In B. Winders & E. Ransom, *Global meat: Social and environmental consequences of the expanding meat industry* (pp. 1–23). Cambridge, MA: MIT Press.

⁵⁸ Cutler, D., & Summers, L. (2020). The COVID-19 pandemic and the \$16 trillion virus. *JAMA*. 324(15), 1495–1496.

⁵⁹ Olive et al., *op. cit.* note 16.

observe the latter. Since eating meat is such a deeply entrenched practice, laws to discourage it could backfire and lead to black markets that are more difficult to regulate.

Encouragingly, the COVID-19 pandemic bolstered support for limiting the wildlife trade. At present, there isn't similar support for ending other risky practices like CAFOs. But perhaps other reforms are possible in the short term, like curtailing the nontherapeutic use of antibiotics in farming and higher taxes on meat produced by risky practices.⁶⁰ These would be welcome steps in countries that currently subsidize CAFOs.⁶¹ Yet even these reforms will require greater popular support than now exists for reducing meat consumption. That obstacle points back to the individual duty to avoid most meat sold today. For we only are likely to see meaningful reforms as more people embrace this duty and call on others to do the same. Given the incredible harms posed by infectious disease, we would be wise to not tarry.

⁶⁰ Giubilini, A., Birkl, 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(2), 179–198.

⁶¹ Howard, P. (2019). Corporate concentration in global meat processing: The role of feed and finance subsidies. In B. Winders & E. Ransom, *Global meat: Social and environmental consequences of the expanding meat industry* (pp. 31–53). Cambridge, MA: MIT Press.