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Public opinion on global COVID-19 vaccine procurement and distribution policies: A nationally representative survey in Aotearoa New Zealand 2022

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ABSTRACT

The World Health Organisation and many health experts have regarded vaccine nationalism, a "my country first" approach to vaccines procurement, as a critical pandemic response failure. However, few studies have considered public opinion in this regard. This study gauged public support for vaccine nationalism and vaccine internationalism in a representative survey in New Zealand (N = 1,135). Support for vaccine internationalism (M (mean rating) = 3.64 on 5-point scales) was significantly stronger than for vaccine nationalism (M = 3.24). Additionally, support for openly sharing COVID-19 vaccine manufacturing knowledge and technology (M = 4.17 on 5-point scales) was significantly stronger than support for safeguarding vaccine manufacturers' intellectual property (M = 2.66). The public also supported a utilitarian approach that would see distributions based on need (M = 3.76 on 5-point scales) over an equal proportional international distribution (M = 3.16). Akin to the few preceding studies, the present observations suggest that the public is likely to be more supportive of pandemic responses that are globally equitable and long-term orientated. Our findings have substantial implications for pandemic preparedness as the congruence or lack thereof of public vaccine-related values with government policies can affect public trust, which, in turn, can affect public cooperation. It may pay for governments to invest in proactive public engagement efforts before and during a pandemic to discuss critical ethical issues and inequities in global vaccine procurement and distributions.

1. Introduction

Vaccine nationalism – a "my country first" approach to vaccines procurement – was exacerbated during the COVID-19 pandemic and turned the development and securing of vaccines into a global competition [1–3]. This competition was inconsistent with the World Health Organisation's (WHO) call for treating COVID-19 vaccines as a global public good and a commitment to the needs of people in countries lacking the financial capacity to secure needed doses [4]. Vaccine nationalism incentivised the patenting of potentially life-saving COVID-19 vaccines by private manufacturers [2], prioritised distributions to wealthy nations that invested in the vaccines' development [1], and promoted the prepurchase and hoarding of vaccines by affluent countries [5]. New Zealand was as complicit in vaccine nationalism as most other high-income countries [6,7].

Dr Tedros Adhanom Ghebreyesus, the Director-General of the WHO, was quoted to have referred to inequities in COVID-19 vaccine access as a "catastrophic moral failure" and to vaccine nationalism as "self-defeating because it would push up prices", "encourage hoarding," and ultimately, "prolong the pandemic" [8]. While the simultaneous global demand for COVID-19 vaccines was unprecedented, vaccine nationalism is not new. During the 2009 swine flu outbreak, available vaccines were monopolised by high-income countries through pre-production agreements and shared with poorer countries only after meeting national needs [1]. A similar monopolisation strategy was used by high-income countries to secure HIV/AIDS treatments and vaccines for smallpox and polio [9].

In response to the COVID-19 pandemic, the WHO established a global vaccine sharing scheme, 'COVAX,' in April 2020 to secure doses for low-income countries and advance vaccine internationalism.

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However, bilateral advance purchase agreements between high-income nations, including New Zealand, and pharmaceutical companies limited the global supply of vaccines available to COVAX [7,10–13]. New Zealand made early purchase agreements with manufacturers between October and December 2020 for various vaccines in development with intent to vaccinate its entire population [14,15] (see Figure S1, Supplementary Document 1). In December 2020, Canada had ordered a stockpile of COVID-19 vaccines sufficient to vaccinate each Canadian five times over [16]. Likewise, the US, the UK, and Australia had ordered surplus vaccine stocks [16]. These early purchases reduced the availability of vaccines to poorer nations that most needed them at that time, given their higher disease burden, underdeveloped healthcare, overcrowded living conditions, and poorer access to water and sanitation [17,18]. As New Zealand was not as impacted early in the pandemic, this raised another ethical dimension concerning New Zealand's vaccine prepurchases which limited the supply to countries with higher transmission and death rates [13].

While COVAX was a much-needed establishment during the pandemic, some argued that its model of equal proportional international distribution failed to consider the differing circumstances of cases and deaths in different countries, and proposed ethics-based distribution models (e.g., distributions that reduces the most deaths) [19–22]. COVAX aimed to provide a "platform for all participating governments to access a diversified portfolio of COVID-19 vaccines when they become available, distributing risk across multiple vaccine candidates" [12]. However, COVAX became a means for richer countries to secure even more vaccines. For instance, New Zealand's investment of NZ$27 million to COVAX announced on the 21st of September 2020 was expected to "act as a pre-purchase" to "ensure that New Zealand receives enough vaccines to cover up to 50 per cent of the population of New Zealand and the Realm, which includes Tokelau, Cook Islands and Niue" [23].

New Zealand's vaccine sharing with its closest Pacific neighbours also reflects nationalistic interest due to close trading ties, labour market access, and geopolitics. This earmarking is patterned on the geographic priorities of New Zealand's official development assistance that is closely aligned with its strategic foreign policy interests [24]. Such earmarking, where donor countries specify recipients, also observed in Spain's, Japan's, Canada's, and Italy's donations, appear to be a breach of the dose-sharing principle in COVAX's fair allocation mechanism and exacerbated COVAX's distribution challenges [25,26].

Vaccine-sharing justifications by political leaders speaking to their voters were also underpinned by nationalistic agendas: "If we don't help to get more of the world's population vaccinated, variants are likely to develop that could spread and affect citizens of our country" [27]. In general, donations by high-income nations also came with the condition of priority access and occurred only after sufficient doses to cover their own populations were secured [1,28].

Vaccine inequity was also portrayed in wealthier nations' stockpiling of the most effective mRNA vaccines capable of being tweaked to respond to mutations [29]. In New Zealand, the initial plan had been to make vaccines of different efficacy levels available to New Zealanders, but this quickly changed following evidence identifying the Pfizer vaccine as having a 95% efficacy level for preventing COVID-19 seven days after the second dose [7,30,31].

New Zealand's lack of support for vaccine internationalism was also reflected in its initial reluctance to support developing countries' pleas for intellectual property rights waivers on COVID-19 vaccines which could have increased their vaccine manufacturing capacities [32,33]. New Zealand followed suit only after the United States pledged its support for a patent waiver, with the New Zealand Trade Minister indicating how the shift in position was "in all our interest" and repeating the "no-one is safe from the virus until everyone is safe from it" mantra [33].

Vaccine inequities led to virus mutations in unvaccinated populations [34] and prolonged the COVID-19 pandemic, as anticipated by scholars [35–37] and illustrated in a SARS CoV-2 dynamics model testing the effects of vaccine nationalism [38]. This outcome suggests that there may be a lesson to be learned from this historical event, where nationalism appears to conflict with morality and science. Vaccine internationalism, also referred to as vaccine globalism, where vaccines are distributed based on need at the international level and through international cooperation has been contrasted with vaccine nationalism [39,40]. These are critical values-related pandemic responses, the ethics and morality of which became a heavily debated topic following the rush to develop COVID-19 vaccines [1,3,11,41]. Experiences from previous pandemics show that congruence between values held by the public and those held by policymakers is a critical basis for trust, confidence, and cooperation [42]. However, our review of the literature from April through July 2021 found very few studies that had considered public perspectives about global COVID-19 vaccine-sharing policies.

In September 2020 in the UK, qualitative responses suggested that vaccine trial participants who expressed national pride in vaccine development were supportive of, but pessimistic about, vaccine internationalism [39]. But analyses of COVID-19 vaccine-related Twitter chat data of 583,499 users from 11 March 2020 through 31 January 2021, revealed that global cooperation and support that advocated against vaccine nationalism was the second most tweeted of 16 topics [43], suggesting the possibility of public support for vaccine internationalism.

In an online survey done from 24 November through 28 December 2020 in seven high-income countries, when asked who should be first prioritised in global allocation of COVID-19 vaccines, "those who need them most" received the highest average agreement (average: 70–80 on a 0 to 100 scale), followed by "those who cannot afford to buy them" (average: 62–70) and "those who live in the country in which they are first developed" (average: 28–58) [44] – suggesting a slant towards vaccine internationalism. Additionally, the proportions of respondents supporting the donation of purchased vaccines to lower-income countries (51% in Australia, 56% in Canada, 48% in France, 54% in Italy, 55% in Spain, 51% in the UK, and 52% in the US) were more than twice the proportions opposing such donations [44]. In another study, though not specified by the authors as a measure of internationalism, 78% of participants in the UK and 69% in the US indicated that they would be happy to donate their booster dose if a test showed they did not need it – an expression that was consistent regardless of participants' self-reported COVID-19 status [45].

Given the lack of comparable studies in New Zealand, we designed and implemented novel items in the International Social Survey Programme (ISSP) Health and Health Care 2021 module to explore public perceptions about vaccine nationalism and vaccine internationalism in a representative sample (N = 1,135) from 1 February through 31 July 2022. In this paper, we address the following research questions and discuss the global implications of our findings:

1. To what extent does the New Zealand public support vaccine nationalism and internationalism, and which of the two elicits greater support? Are they more supportive of an equal proportional international distribution or an ethics-based distribution?
2. Which, if any, demographic and political preference variables predict vaccine nationalism and internationalism?
3. Is either vaccine nationalism or internationalism associated with (a) confidence in the Government's handling of the COVID-19 pandemic; (b) support for border closure (regarded as an expression of health nationalism through a non-pharmaceutical pandemic measure); (c) online vaccine information seeking; (d) pre-existing attitudes towards vaccination; (e) perceptions about natural immunity; (f) COVID-19 vaccination status; and (g) COVID-19-related personal financial impact?

2. Methods

2.1. Dependent measures

At the time of our questionnaire design, from April through July 2021, we did not identify any preceding validated measures for vaccine nationalism or internationalism. Hence, we generated novel items to measure these two constructs based on points raised in scholarly debates on the matter and New Zealand's actions, as detailed in the Introduction section above. Additionally, we adapted Clarke and colleagues' survey question on who should be first in "global allocation of treatments for and vaccines against COVID-19" and response option, "those who live in the country in which they are first developed" [44], to provide a measure of vaccine nationalism. Following the implementation of vaccine mandates in New Zealand in October 2021 [46], our initial set of items was revised alongside vaccine-mandate-related questions, a variation submitted to our University's Ethics Committee to confirm approval, and our questionnaire reprinted.

In the questionnaire, following a statement about the global vaccine supply, "Currently, the global demand for COVID-19 vaccines exceeds supply", respondents were asked to indicate how strongly they opposed or supported the following COVID-19 vaccine purchase and distribution approaches using a 5-point ranked ordinal scale ranging from "Oppose strongly" to "Support strongly" with a "Neutral" midpoint.

Vaccine nationalism

#1 Countries negotiate directly with pharmaceutical companies to secure sufficient national supplies of COVID-19 vaccines.
#2 Countries ensure that they have enough COVID-19 vaccines for their entire population first before donating any surplus to poorer countries.
#3 Populations of countries that produced COVID-19 vaccines are prioritised first in global vaccine distributions.

Vaccine internationalism

#1 Countries obtain COVID-19 vaccines only from COVAX, a coalition aiming for equity in global vaccine distribution while supporting poor countries.
#2 Countries donate COVID-19 vaccines to poorer countries even if this means it takes them longer to vaccinate their entire population.
#3 COVID-19 vaccine sharing ensures that high-risk groups in poor countries are vaccinated before low-risk groups in rich countries.
#4 COVID-19 vaccine sharing ensures that high-risk groups in poor countries receive their initial doses before third-dose boosters are offered in rich countries.

As the internal consistency of the three items representing vaccine nationalism was just marginally low ($\alpha = 0.623$), we treated this as a *Vaccine Nationalism Scale* in our analysis. The four items on vaccine internationalism showed reliable internal consistency ($\alpha = 0.785$), so we treated this as a *Vaccine Internationalism Scale*.

Two additional items concerning vaccine distributions asked respondents to rate their opposition or support for an ethics-based international distribution and an equal proportional international distribution:

- Global COVID-19 vaccine distribution prioritises countries that are hardest hit by COVID-19 first, followed by those with lesser transmission.
- COVID-19 vaccines are distributed equally across all countries irrespective of transmission levels.

We also sought public perceptions about COVID-19 vaccine intellectual property protections (patents) as a collateral indicator of vaccine internationalism. Respondents were asked to indicate their "thoughts on the commercial aspects of COVID-19 vaccines" by rating their level of support for the following two statements using the same 5-point ranked ordinal scale (from "Oppose strongly" to "Support strongly" with a "Neutral" midpoint):

- Pharmaceutical companies that developed COVID-19 vaccines retain exclusive rights to produce and sell their vaccines.
- COVID-19 vaccine manufacturing knowledge and technology are shared so that poorer countries can produce affordable versions of these vaccines.

2.2. Independent measures

In exploring our research questions, we investigated the impact of demographics and political preferences (Table 1), as well as the impact of vaccine and COVID-19-related factors (Table 2). Considering mixed reactions to COVID-19 vaccinations and vaccine mandates in New

Table 1
Demographic and political preference variables included in the New Zealand version of the ISSP Health and Health Care 2021 survey.

Variable	Description
Gender	Responses to an open-ended question, "What is your gender?" were transformed into a dichotomous variable: **Female, Male**.
Age	Respondents were asked to indicate their year of birth. Age was calculated and categorised into four ranked-ordinal categories for analysis: **19–24, 25–44, 45–64**, and **≥ 65 years**.
Qualification level	A single-select question, "Which one of these categories best describes your highest formal qualification?," asked respondents to select from eight ranked categories ranging from no formal qualification through to postgraduate or higher. Responses were recoded into four nominal categories: **No school qualifications** (No formal education; Primary school completed), **School qualifications** (School Certificate, National Certificate Level 1, NCEA Level 1; Sixth Form Certificate, National Certificate Level 2, NCEA Level 2; Higher School Certificate, Higher Leaving Certificate; Bursary/Scholarship, NCEA Level 3), **Post-school qualifications** (Trade or Professional Certificate), **Tertiary qualifications** (Diploma below degree level; Undergraduate university degree; Postgraduate or higher).
Born in New Zealand	Responses to a categorical question, asking respondents to indicate the country where they were born were transformed into a dichotomous variable – Born in New Zealand: **Yes, No**.
Employment status	A single-select question, "Which one of these categories best describes your current employment status?" asked respondents to select from nine different statuses. These were re-grouped into five nominal categories for analysis: **Employed full-time** (30+ hours weekly), **Employed part-time** (15–29 hours weekly; <15 hours weekly), **Apprentice, trainee or student** (Apprentice or trainee; Student), **Not in the labour force** (Unemployed and looking for a job; Permanently sick or disabled; Doing housework, looking after the home, children, or others), **Retired.**
Job sector	A single-select question asked respondents if their employment was with a "public sector organisation", an "overseas-owned private sector company or firm" or a "New Zealand-owned private sector company or firm". Responses were converted into a dichotomous variable: **public sector**, **private sector**.
Voted Labour	A single-select question, "For which party did you cast your party vote at the 2020 General Election?", requested respondents to select from a list of six larger New Zealand political parties or specify a different party. To reflect the ruling Government during the COVID-19 period, responses were recoded to a dichotomous variable – Voted Labour: **Yes, No**.
Political orientation	A single-select question, "In politics, people sometimes talk of left and right. Where would you place yourself on the following scale, where 0 means left and 10 means right?" elicited responses in a 0 to 10 scale. Responses were recoded to form three nominal categories: **Left** (0–3), **Centre** (4–6), **Right** (7–10).

Table 2
Vaccine- and COVID-19-related variables included in the New Zealand version of the ISSP Health and Health Care 2021 survey.

Variable	Description
Vaccination status	A single-select question, "Which one of the following best represents your COVID-19 vaccination status?" elicited nominal responses: 1 Vaccinated (three jabs), 2 Vaccinated (two jabs), 3 Vaccinated (one jab), 4 Undecided, 5 Decided not to get vaccinated, 6 Unable to get vaccinated due to health/medical reasons. Responses were recoded into a dichotomous variable: **Vaccinated** (1–3), **Unvaccinated** (4 and 5) for analysis. Those unvaccinated due to health/medical reasons were treated as missing.
Online vaccine information seeking frequency	A single-select question, "During the past 12 months, how often, if at all, have you used the internet to look for information on vaccinations?" elicited responses in a 5-point ranked-ordinal scale: **Never, Seldom, Sometimes, Often, Very often**.
Attitudes towards vaccination	A 5-point Likert Scale (**Agree strongly, Agree, Neither agree nor disagree, Disagree, Disagree strongly**) elicited a degree of agreement to the statement: "Overall, vaccinations do more harm than good".
Perceptions about natural immunity	A 5-point Likert Scale (**Agree strongly, Agree, Neither agree nor disagree, Disagree, Disagree strongly**) elicited a degree of agreement to the statement: "It is better to develop immunity by getting ill than having a vaccination".
Border closure support	A single-select question, "Do you think the New Zealand government should or should not have the right to close borders to other countries at times of severe epidemics?" sought responses in a 4-point ranked-ordinal scale: 1 Definitely should have the right, 2 Probably should have the right, 3 Probably should NOT have the right, 4 Definitely should NOT have the right. Responses were recoded to a dichotomous variable – Border closure support: **Yes** (1 and 2), **No** (3 and 4).
Confidence in the Government's handling of the COVID-19 pandemic	A single-select question, "Did the way the COVID-19 pandemic was handled in New Zealand increase or decrease your confidence in the government?" elicited responses in a 5-point ranked ordinal scale: **Increased it a lot, Increased it a little, Neither increased it nor decreased it, Decreased it a little, Decreased it a lot**.
COVID-19 effects on household income	A single-select question, "Thinking about the income of your household before the COVID-19 pandemic compared with now, would you say it has increased, decreased or stayed about the same?" elicited responses in a 5-point ranked ordinal scale: **Increased a lot, Increased a little, Stayed about the same, Decreased a little, Decreased a lot**.

Zealand and the associated personal impacts [47–50], it appeared important to understand if demographic and COVID-19-related contextual factors were related to vaccine nationalism and internationalism, and also if any associations between COVID-19-related contextual factors and vaccine nationalism and internationalism varied by demographic factors.

In addition to standard demographics such as gender, age, qualifications, and employment status, we also considered being born in New Zealand as a variable of interest. Given their likely family ties to their country of origin, those born elsewhere may have had differing perceptions about COVID-19 vaccine distributions. Respondents' party vote at the 2020 New Zealand General Election was another variable of interest considering how the Labour Party, the then ruling government, was the primary decisionmaker during COVID-19.

2.3. Survey implementation and sample

We incorporated the questions on vaccine nationalism and internationalism in the New Zealand version of the International Social Survey Programme (ISSP) Health and Health Care 2021 survey, which included 70 ISSP items and 45 demographic items (see Supplementary Document 2). Because of COVID-19 interruptions, our survey was fielded from 1 February through 31 July 2022. During this time frame, the COVID-19 pandemic was still at its peak, with community transmission of Omicron subvariants, vaccination mandates, and movement restrictions still in place in New Zealand [51].

Responses were elicited primarily through a paper-based questionnaire method with an online option. The questionnaire, an invitation letter, an information sheet, and pre-paid return envelope were mailed to a stratified random sample of 5,925 individuals drawn from the New Zealand Electoral Roll. Our research was approved by the University of Auckland Human Participants Ethics Committee (Ref. UAHPEC22565). Considering COVID-19 movement restrictions, respondents were offered the option of having their return envelops picked up from their homes through a courier service. We pre-registered our research plan in March 2022 when data collection was in progress (see https://www.auckland.ac.nz/en/arts/our-research/research-institutes-centres-groups/compass/proposed-papers/global-equity-in-covid-19-vaccine-distribution–do-new-zealander.html).

2.4. Analyses

Analyses were performed using SPSS 27 and Stata-SE18 statistical packages, with survey weights applied to weight the sample to a population representative of the New Zealand electoral roll, from which the sample was drawn. For details on sampling protocols, recruitment, representativeness vetting, and weights construction, see our methods and procedures report [52].

We reverse-coded ranked ordinal scales in predictor and dependent variables so that a higher average value represents a stronger level of agreement, support, or increase.

Considering their internal consistency, we treated both the vaccine nationalism and vaccine internationalism item sets as scales and their overall means as indicators of vaccine nationalism and internationalism. A Pearson correlation test affirmed that the two scales were not correlated with each other ($r = 0.054$, $n = 1118$, $p = 0.073$).

To address our first research question on the extent of support for vaccine nationalism and internationalism and which was stronger, we performed a dependent *t*-test to compare the means of the *Vaccine Nationalism* and *Vaccine Internationalism Scales*. We also calculated the percentage of respondents with total mean scores of ≥ 4 on the two scales, which represents the affirmative end of the 1–5 rating scale used in the measures (i.e., 4 = support and 5 = strongly support). Next, using t-tests we also assessed the support for vaccine manufacturer intellectual property vs. open sharing of knowledge and technology, and international distribution based on ethics (countries hardest hit) vs. equal proportional distribution. Then, we performed a series of bivariate linear regression analyses to determine the predictors of vaccine nationalism and vaccine internationalism as outlined in our second and third research questions aiming to explore the influence of demographic, political preference, and vaccine- and COVID-19-related variables. Linear effects were assessed for ranked-ordinal predictors. For nominal multi-category predictors that showed significant associations with the two scales, pairwise comparisons of the means were examined within the respective regression models. Finally, we included interaction terms between each vaccine- and COVID-19-related variable and three demographic predictors: gender, age, and qualification-level, each in separate models, to test if any associations between COVID-19-related contextual factors and vaccine nationalism and internationalism varied by these factors.

3. Results

3.1. Participant characteristics

Overall, 1,135 people completed the questionnaire, a raw response

Table 3
Characteristics of participants in the New Zealand version of the ISSP Health and Health Care 2021 survey, implemented in 2022 (numbers and percentages with weights applied).

Variables	Description	N (%)
Gender	Female	600 (55.8)
	Male	475 (44.2)
	Excluded: 60 missing	
Age	19–24 years	105 (9.5)
	25–44 years	315 (28.6)
	45–64 years	392 (35.6)
	≥ 65 years	289 (26.2)
	Excluded: 34 missing	
Citizenship	Citizen	955 (89.3)
	Permanent resident	115 (10.7)
	Excluded: 66 missing	
Employment status	Employed Full-Time	570 (51.1)
	Employed Part-Time	139 (12.5)
	Apprentice, Trainee or Student	34 (3.1)
	Not in the labour force	136 (12.2)
	Retired	235 (21.1)
	Excluded: 21 missing	
Job Sector	Public	285 (28.1)
	Private	729 (71.9)
	Excluded: 121 missing	
Qualifications	No formal qualifications	128 (11.5)
	School qualifications	302 (27.0)
	Post-school qualifications	151 (13.5)
	Tertiary qualifications	537 (48.0)
	Excluded: 17 missing	
Voted Labour	Yes	535 (53.2)
	No	470 (46.8)
	Excluded: 130 missing	
Political orientation	Left	224 (25.6)
	Centre	402 (45.7)
	Right	252 (28.7)
	Excluded: 257 missing	

rate of 19.16% [52]. The descriptive statistics of our participants, including their sociodemographic characteristics, political preferences, and COVID-19-related attitudes and perceptions, are detailed in Tables 3 and 4. The sample was representative by gender, age and ethnicity [52].

3.2. Overall responses

Support for vaccine internationalism (Mean (M) = 3.64, Standard Deviation (SD) = 0.875) was significantly stronger than for vaccine nationalism (M = 3.24, SD = 0.898) ($t(1115) = 10.808$, $p < 0.001$). While 43.9% of respondents distinctly supported vaccine internationalism (scores ≥ 4 in the *Vaccine Internationalism Scale*), 25.2% did so for vaccine nationalism in the *Vaccine Nationalism Scale* (see Fig. 1).

Support for open sharing of COVID-19 vaccine manufacturing knowledge and technology (M = 4.17, SD = 1.083) was significantly stronger than support for vaccine manufacturers' intellectual property protection (M = 2.66, SD = 1.274) ($t(1116) = 26.631$), $p < 0.001$). Respondents were significantly more supportive of an ethics-based international distribution which prioritises countries hardest hit (M = 3.76, SD = 1.032) than an equal proportional distribution approach (M = 3.16, SD = 1.190) ($t(1110) = 13.240$), $p < 0.001$).

3.3. Associations with demographic predictors and political preferences

Figures S2 and S3, Supplementary Document 1, provide plots for all bivariate regression analyses including for non-significant associations. Being of older age, having lower qualification levels, being retired, and having a right-wing political orientation, were significantly associated with higher *Vaccine Nationalism Scale* ratings (see Fig. 2). Those with no formal qualifications provided higher *Vaccine Nationalism Scale* ratings than those with school qualifications and tertiary qualifications by 0.40 ($p = 0.01$) and 0.52 ($p < 0.001$) units respectively. Those with post-

Table 4
Vaccine and COVID-19-related perceptions and attitudes among participants in the New Zealand version of the ISSP Health and Health Care 2021 survey, implemented in 2022 (numbers and percentages with weights applied).

Variables	Description	N (%)
Vaccination status	Vaccinated	1087 (96.2)
	Unvaccinated	43 (3.8)
	Excluded: 6 missing	
Online vaccine information seeking frequency	Never	214 (19.5)
	Seldom	273 (24.9)
	Sometimes	362 (33.0)
	Often	175 (16.0)
	Very Often	74 (6.7)
	Excluded: 38 missing	
Vaccinations do more harm than good	Disagree Strongly	520 (46.6)
	Disagree	342 (30.7)
	Neither agree nor disagree	150 (13.4)
	Agree	39 (3.5)
	Agree Strongly	65 (5.8)
	Excluded: 19 missing	
Better to develop immunity by getting ill than having a vaccination	Disagree Strongly	434 (39.1)
	Disagree	366 (33.0)
	Neither agree nor disagree	187 (16.9)
	Agree	79 (7.2)
	Agree Strongly	43(3.9)
	Excluded: 26 missing	
Border closure support	Yes	981 (88.4)
	No	129 (11.6)
	Excluded: 25 missing	
Changes in confidence in the Government's handling of the COVID-19 pandemic	Decreased a lot	257 (23.0)
	Decreased a little	138 (12.4)
	Neither increased nor decreased	218 (19.5)
	Increased a little	251 (22.5)
	Increase a lot	253 (22.7)
	Excluded: 18 missing	
COVID-19-related income impact	Decreased a lot	112 (10.1)
	Decreased a little	192 (17.2)
	Stayed the same	610 (54.8)
	Increased a little	165 (14.8)
	Increase a lot	35 (3.1)
	Excluded: 21 missing	

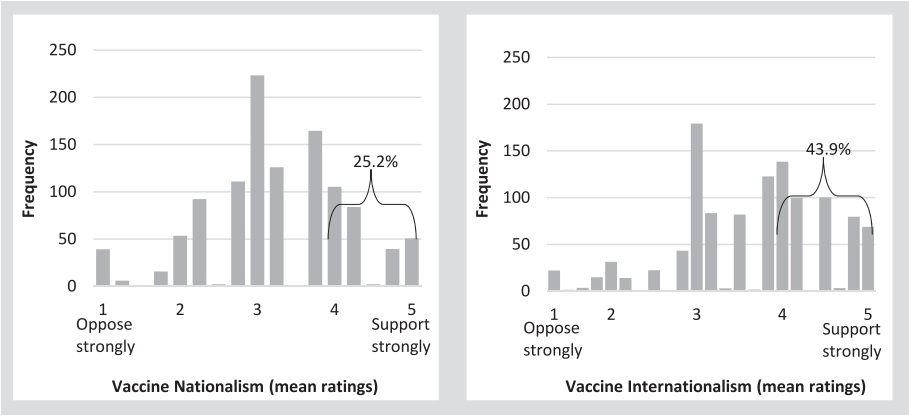


Fig. 1. Overall responses to the *Vaccine Nationalism* and *Vaccine Internationalism* scales.

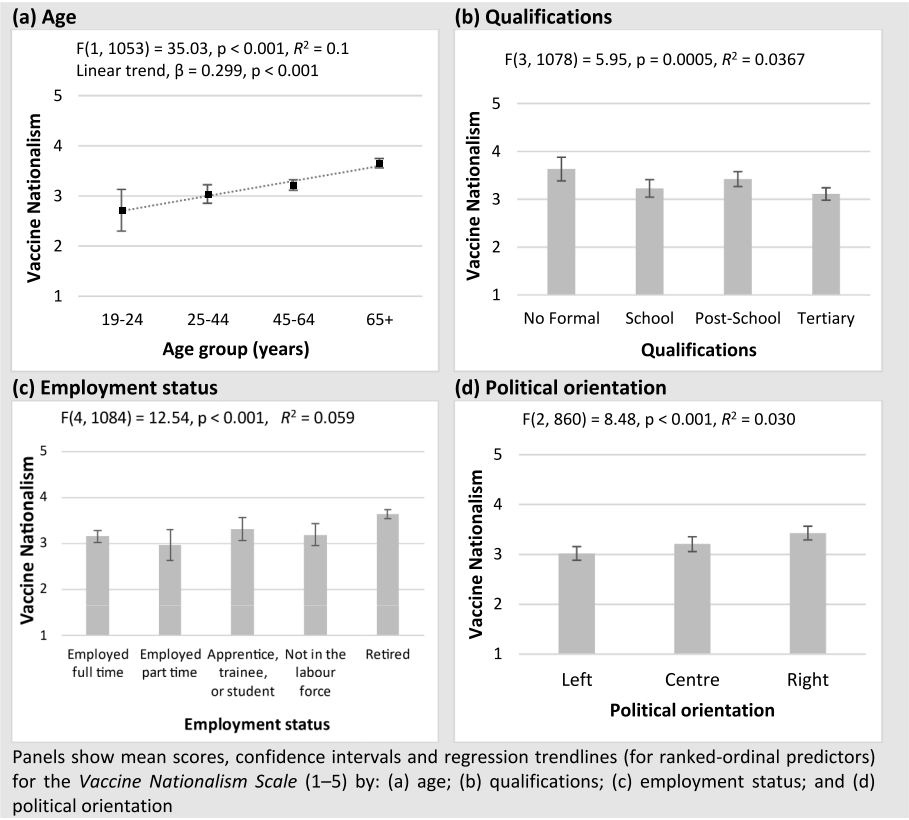


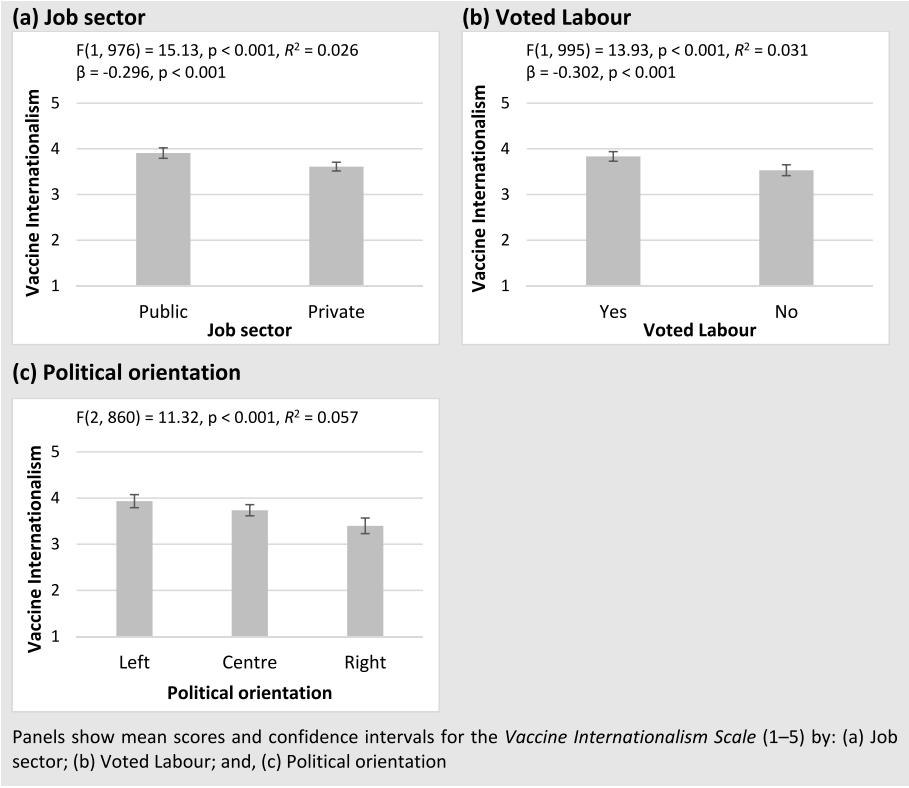
Fig. 2. Demographic and political preference predictors of *Vaccine Nationalism Scale* ratings as shown in bivariate regression analyses.

school qualifications provided 0.31 units higher ($p = 0.003$) *Vaccine Nationalism Scale* ratings than those with tertiary qualifications. *Vaccine Nationalism Scale* ratings among retired respondents were higher than those employed fulltime by 0.49 units ($p < 0.001$), those employed part-time by 0.68 units ($p < 0.001$), those not in the labour force by 0.45 units ($p = 0.001$) and apprentice, trainees, and students by 0.33 units ($p = 0.016$). Right-wing political orientation was associated with higher *Vaccine Nationalism Scale* ratings than left-wing orientation by 0.41 units ($p < 0.001$) and centre-wing orientation by 0.22 units ($p = 0.032$).

Having a job in the public sector, being a Labour party voter (the ruling government during COVID-19), and having a left-wing political orientation, were each significantly associated with higher *Vaccine Internationalism Scale* ratings (Fig. 3). *Vaccine Internationalism Scale* ratings among those with a left-wing political orientation was 0.20 units higher than those with a centrist orientation ($p = 0.039$) and 0.53 units higher than those with a right-wing orientation ($p < 0.001$).

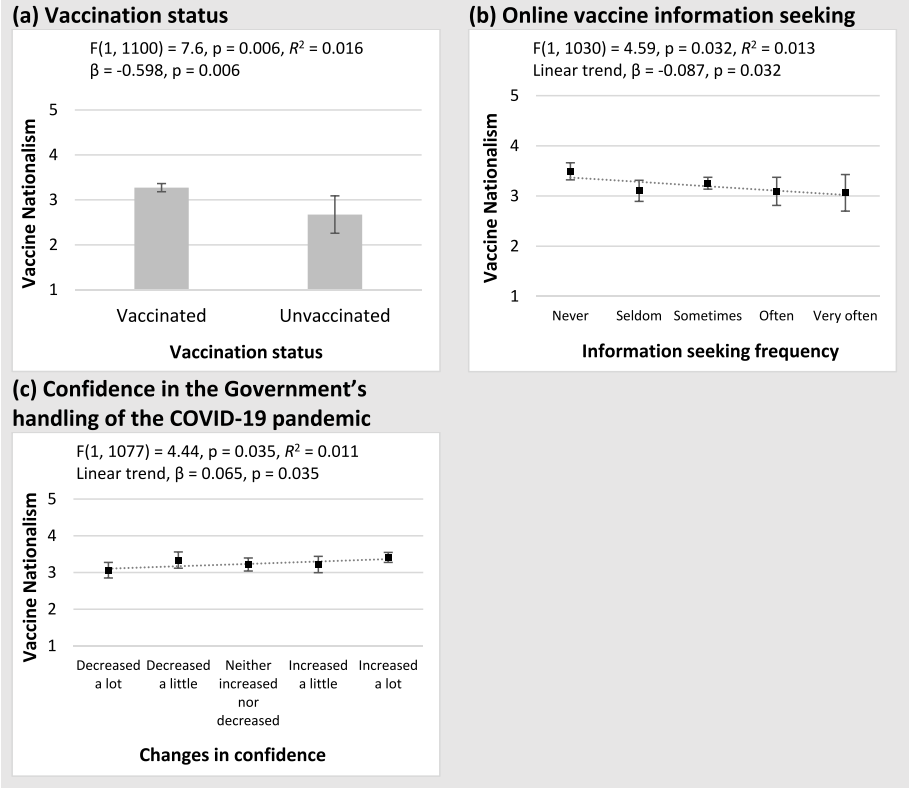
3.4. Associations with vaccine and COVID-19-related perceptions and attitudes

Being vaccinated, having a lower frequency of seeking vaccine information online, and increased confidence in government's COVID-19 handling were associated with higher *Vaccine Nationalism Scale* ratings (Fig. 4). However, associations with the latter two variables were only marginally significant. Tests for interactions with gender, age, and qualification level revealed that (i) the association between being vaccinated and higher *Vaccine Nationalism* ratings was apparent for females only; (ii) there was a marginal association between a lower belief that vaccinations do more harm than good and *Vaccine Nationalism* ratings among those with a school qualification but not among other



Panels show mean scores and confidence intervals for the *Vaccine Internationalism Scale* (1–5) by: (a) Job sector; (b) Voted Labour; and, (c) Political orientation

Fig. 3. Demographic and political preference predictors of *Vaccine Internationalism Scale* ratings as shown in bivariate regression analyses.



Panels show mean scores, confidence intervals and regression trendlines (for ranked-ordinal predictors) for the *Vaccine Nationalism Scale* (1–5) by: (a) Vaccination status; (b) Online vaccine information seeking; and, (c) Confidence in the Government's handling of the COVID-19 pandemic

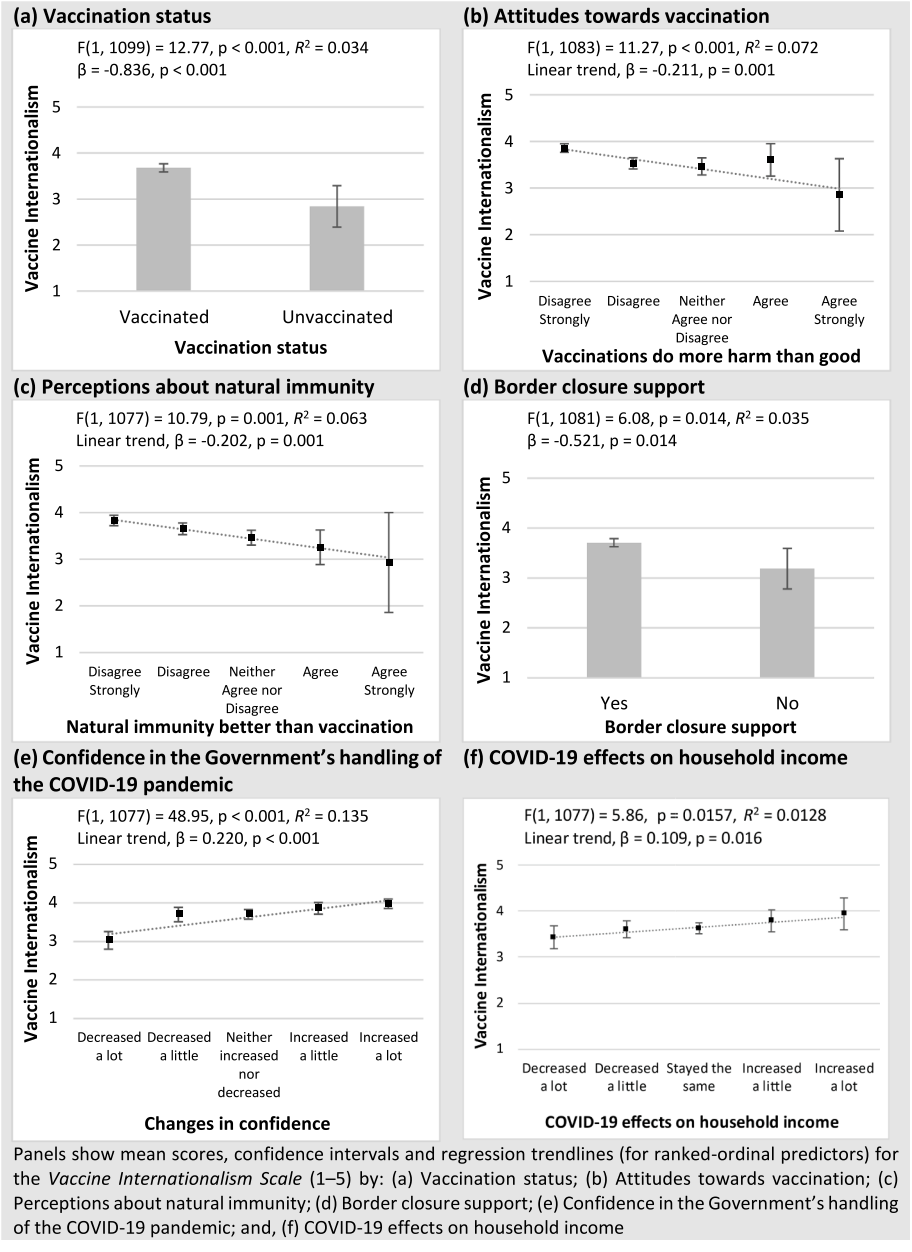
Fig. 4. Vaccine- and COVID-19-related predictors of *Vaccine Nationalism Scale* ratings as shown in bivariate regression analyses.

qualification-level groups; (iii) there was an association between a lower belief that natural immunity is better than vaccination and *Vaccine Nationalism* ratings among those with no qualifications or a school qualification, but not those with higher qualifications; and (iv) there was an association between experiencing an increase in household income due to COVID-19 and *Vaccine Nationalism* ratings among 19–24 year-olds only (see Table S1 and Figure S4, Supplementary Document 1).

Being vaccinated, a lower belief that vaccinations do more harm than good, a lower belief that natural immunity is better than vaccination, support for border closure, increased confidence in government COVID-19 handling, and experiencing increases in household income due to COVID-19 were significantly associated with higher *Vaccine Internationalism Scale* ratings (Fig. 5). Tests for interactions with gender, age, and qualification level revealed that (i) the association between a lower belief that vaccinations do more harm than good and *Vaccine Internationalism* ratings was apparent for all age groups except 65+ year olds; (ii) the association between a lower belief that natural immunity is better than vaccination and *Vaccine Internationalism* ratings was also apparent for all age groups except 65+ year olds; and (iii) the association between increased confidence in government COVID-19 handling and higher *Vaccine Internationalism* ratings was stronger for younger age groups (Table S1 and Figure S5, Supplementary Document 1).

4. Discussion

Many experts have identified the inequitable global distribution of COVID-19 vaccines as a critical pandemic response failure and an important lesson for the future [53]. This study adds to the ongoing debate on vaccine nationalism by providing empirical evidence on the perspectives of the New Zealand public. Findings show that support for vaccine internationalism (M = 3.64) was significantly stronger than for vaccine nationalism (M = 3.24). While 43.9% of New Zealanders affirmatively supported vaccine internationalism only 25.2% supported vaccine nationalism. Additionally, New Zealanders strongly supported open sharing of COVID-19 vaccine manufacturing knowledge and technology over vaccine manufacturers' intellectual property protection



Panels show mean scores, confidence intervals and regression trendlines (for ranked-ordinal predictors) for the *Vaccine Internationalism Scale* (1–5) by: (a) Vaccination status; (b) Attitudes towards vaccination; (c) Perceptions about natural immunity; (d) Border closure support; (e) Confidence in the Government's handling of the COVID-19 pandemic; and, (f) COVID-19 effects on household income

Fig. 5. Vaccine- and COVID-19-related predictors of *Vaccine Internationalism Scale* ratings as shown in bivariate regression analyses.

– a view that was contrary to their country's initial stance on patent waivers [32,33]. These observations suggest that the New Zealand public are likely to be more supportive of a pandemic response that is globally equitable and long-term orientated.

The findings also suggest that support for vaccine internationalism prevailed in the public despite public health messaging that drew on and reflected competitive nationalism. For instance, metaphors founded in sporting success, such as the 'team of five million' in the New Zealand political communication, which appealed to national identity to prompt national support for measures such as border closure [54], also portrayed the COVID-19 response as an international competition to be won, albeit lives and not points were at stake and turned the pandemic discourse from managing COVID-19 to one that was about being the first in the world to eliminate the virus [54,55]. However, contrary to what might be expected, support for border closure, itself a manifestation of health nationalism, was not associated with higher support for vaccine nationalism but was significantly associated higher support for vaccine internationalism in this study.

Our results are consistent with recent studies in other high-income countries where more respondents were in favour of COVID-19 vaccine donations [40,44,45,56] suggesting support for vaccine internationalism. Surveys in 2021 demonstrated public support of vaccine internationalism in the US and UK, with 66% in the US supportive of sharing excess vaccines with other countries [40] and 65% in the UK preferring to donate UK's supply of booster shots to low-income countries [56].

In our study, support for vaccine nationalism increased with age, an observation also evident in the UK, possibly due to the higher risks of COVID-19 associated with older age [56]. Those in the private sector exhibited less endorsement for vaccine internationalism than those in the public sector, possibly because the former group would have included non-essential businesses that faced economic setbacks due to COVID-19 mitigation measures. It is also possible that higher support for vaccine internationalism among those in the public sector is due to a broader understanding of the implications of a global response.

A left-wing political orientation was associated with higher vaccine internationalism endorsement and lower vaccine nationalism support, which was unsurprising as it reflects this group's underlying ideologies, such as equality and cosmopolitanism [57]. Being vaccinated was associated with higher vaccine nationalism among females and being vaccinated was also associated with higher internationalism in general. Increased confidence in government COVID-19 handling were associated with both higher nationalism support and higher internationalism support – suggesting conflicted perceptions among some that may be due to an underpinning desire for personal, national, and global wellbeing.

Key strengths of our study were the use of a nationally representative health survey that enabled an examination of the influence of a wide range of demographic and general vaccine- and COVID-19-related variables on our measurements of vaccine nationalism and internationalism. Our methods led to preliminary work on *COVID-19 Vaccine Nationalism* and *Vaccine Internationalism Scales*, which include novel items on vaccine pre-purchases and purchases through COVAX.

However, there were several limitations. Given the time constraints, we did not pilot test our questions. The two scales require further testing and validation. Due to space limits in the already-extensive ISSP questionnaire and the need to minimise respondent burden, we did not include conventional metrics of nationalism and patriotism that would have helped contextualise our findings. Our questions, framed from the perspective of what nations should do, measure a depersonalised morality, and appear oriented towards a hypothetical future. Questions framed as a personal choice, as used in studies by Lee and Tipoe [56] and the Institute of Global Health Innovation [45], might elicit a more accurate measure of public values in this regard. Our study was conducted when active vaccination campaigns were ongoing in New Zealand, making it impossible to know if they would have responded differently in a scenario where vaccines were not yet available to them. As it is also a cross-sectional quantitative study in one country, it represents opinions held at the time and place of data collection and does not explain the reasons for vaccine nationalism and internationalism. Finally, the low response rate, although inevitable in a voluntary survey model where participants are not compensated for their time, adds to the overall limitation of our study.

5. Conclusion

Collectively, findings from the present and preceding studies reflect shared globalist values concerning vaccine sharing among the public that may be at odds with their governments. Addressing the vaccine nationalism dilemma in pandemic responses is critical because the world will face decisions on vaccine allocation again. Another zoonotic pandemic is inevitable considering its many human-caused drivers [58–61], necessitating the development and equitable distribution of new vaccines. Recently, monkeypox vaccines were allocated to high-income countries that could afford them rather than historically endemic countries that needed them most – illustrating a recurring pattern of vaccine nationalism [62].

Public sentiments concerning global vaccine distribution convey an important factor for policymakers and public health officials to consider during pandemic responses. The congruence or the lack thereof of public vaccine-related values with government policies that, in turn, drive public trust is of essence considering the essentiality of public cooperation in pandemic responses [42]. Public views may eventually affect public policy as demonstrated in past studies [63]; however, policymakers and health officials could choose to act proactively in formulating pandemic responses that reflect public values. Such proactive efforts could include public involvement in pandemic planning; for instance, through investments in effective public engagement, deliberative polling, deliberative forums, and collective problem-solving processes prior to and during a pandemic to discuss critical ethical issues and inequities [64–66]. Public engagement has the potential to give voice to the world's marginalised groups who are "on the receiving end of inequitable policies, and help empower global institutions in providing global public goods" and to resolve the complex moral conflicts through shared decision making [66].

Findings from our study also suggests the risk of potential public backlash. The contradictions in national responses where political leaders including in New Zealand pledged international solidarity, supporting vaccine internationalism, while acting in national self-interests could lead to public criticism, particularly if the media and interest groups pick up these contradictions and hold politicians accountable to their proclamations [67]. For instance, the New Zealand Prime Minister was quoted to have supported the WHO's stance in iterating that "vaccine nationalism only helps the virus" in her call for global collaboration and vaccine equity [68]. However, in addition to early purchase agreements to secure enough vaccines for population-level immunity [14,15], New Zealand also maximised booster doses by introducing policies reducing the approved gap between the second jab and booster dose from four months to three on 4th February 2022 (when 75.9% in New Zealand were fully vaccinated vs 10.5% in Africa), enabling a second booster dose six months post the first booster for specific higher-risk groups on 28th June 2022 (when 79.3% in New Zealand were fully vaccinated vs 17.7% in Africa), and replacing the term "fully vaccinated" (which does not include boosters) with an "up-to-date" status for having received recommended COVID-19 vaccinations which includes booster shots on 4th July 2022 [51,69].

The debate on balancing vaccine nationalism and internationalism [70–72] will continue and it would be critical to include and consider public perspectives in these deliberations. Going a step further, vaccine cosmopolitanism is focused on achieving global wellbeing, and based on the principle that every human being, regardless of their nationality, should have equal right to be vaccinated against severe viral infections

[67,73]. Some propose a middle ground based on a principle of sufficiency where leaders of high-income nations wait for a particular global vaccination distribution to occur before prioritising their own populations [67]. This middle ground approach is thought to recognise that countries have an obligation towards their own constituency, which vaccine cosmopolitanism and vaccine internationalism disregard, and uphold the principle of global equity, which vaccine nationalism disregards [67,71]. In current contexts, this means that vaccinating children who are at lower risk for COVID-19 or administering booster doses to fully vaccinated older adults could be postponed in wealthy nations until adults in priority groups in less affluent countries have received at least two vaccine doses [67]. However, it may be argued that the COVAX model attempted this middle ground approach but failed because nationalism overrode internationalism.

Given public support for vaccine internationalism evidenced in the present and preceding studies, establishing effective vaccination as a global public good, as called for by international organisations such as the WHO and United Nations, will be a good investment in health for the longer term [66]. Vaccine internationalism during pandemics can reduce the risk of new variants and the global death toll [44,74,75]. Be it a middle-ground approach, internationalism or cosmopolitanism, the primary principle remains a just and globally equitable sharing of vaccines, which requires alterations to the policy choices that individual governments make at the local level. A more helpful area of debate would be a utilitarian approach that would see distributions based on need and ethics or an egalitarian one (which reflects COVAX's approach) that distributes vaccines evenly across the globe [20,62,71]. The present study suggests that the New Zealand public is more supportive of the former. Likewise, in an earlier multi-country study, global allocation criterion based on need received the highest public support [44].

A repeat of this study in a post-COVID scenario could capture the views of a public better informed of the global inequities in vaccine distribution and pros and cons of government vaccination procurement strategies. Future studies should investigate shifts in sentiment and include qualitative data to assist in understanding the factors that shape public attitudes and perceptions. Qualitative studies could also help clarify reasons for perception and attitudinal differences among demographic sub-groups, as observed in the present study. Additionally, qualitative studies could also investigate contextually complex aspects of vaccine nationalism, such as vaccine donation earmarking [25,26], wealthier nations' stockpiling of the most effective COVID-19 vaccines [76], and channelling of vaccines deemed unsafe to lower and middle countries [77].

CRediT authorship contribution statement

Komathi Kolandai: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Barry Milne:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Funding acquisition, Formal analysis, Data curation. **Martin von Randow:** Writing – review & editing, Project administration, Methodology, Data curation. **Chris Bullen:** Writing – review & editing, Validation, Methodology. **Samantha Marsh:** Writing – review & editing, Validation, Methodology. **John A. Crump:** Writing – review & editing, Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2024.01.091.

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