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Public Health Resources, Religion, and Freedom as Predictors of COVID-19 Vaccination Rates: A Global Study of 89 Countries

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Abstract: The COVID-19 global pandemic necessitated adequate compliance to safe and effective vaccinations developed against the disease. Vaccination reduces high infection, morbidity, and mortality rates, develops herd immunity, and alleviates overburdened healthcare systems and massive economic costs. COVID-19 also raised awareness about the importance of robust health systems, notably public health competence and the number and training of community health workers. Using the World Health Organization, Global Development of Applied Community Studies project, and other available cross-sectional secondary data on 89 countries, we found that the strength of community health training and research (CHTR), the importance of religion, and freedom score (political rights, civil liberties) are associated with COVID-19 full-vaccination rate. Significant bivariate correlations included per-capita-GDP, number of nurses, per-capita health spending, aged population, noncommunicable disease rate, life satisfaction, government response stringency, nonviolent activism, education, and strength of community development, urban planning, and liberation theology fields. Our assessment of CHTR contribution to the COVID-19 response revealed a great resource for effectively targeting vaccine-hesitant individuals and increasing vaccination rates. The results suggest that to motivate vaccine adherence countries need adequate community health workforce training and research, a population not hesitant to adhere to public health measures based on religion, and societal-level freedoms.

Keywords: COVID-19 vaccination; vaccine hesitancy; freedom; religion; public health resources; community health workers



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1. Introduction

The novel coronavirus disease-2019 (COVID-19) global pandemic necessitated adequate adherence to the safe and effective vaccinations developed against the disease to restore normalcy, following a high mortality toll, overburdened health systems, and enormous economic costs [1]. Immunized individuals reduce the spread of vaccine-preventable illnesses, providing indirect safety, or herd immunity, to the broader community and lowering the risk of infection in vulnerable groups [2]. Vaccinations are among the most cost-effective methods of reducing health risks and mortality, averting around 2–3 million worldwide deaths even before COVID-19 [3]. While vaccination is widely regarded as a viable method of drastically reducing the COVID-19 threat, its efficacy is contingent on a large majority of the population getting vaccinated [4]. Vaccination campaigns are only effective when the vaccine is widely accepted [5,6]. Comparative analysis of vaccination rates between nations is critical to determine what societal conditions and strategies lead to the highest vaccination rates and, thus, the best chance of controlling the pandemic [7,8].

1.1. Public Health Worker Shortages

The COVID-19 outbreak has increased public health awareness and the importance of community health experts and nurses in containing the outbreak. Early in the COVID-19

pandemic, health officials realized that a significant increase in the number of community healthcare personnel would be required to manage COVID 19 diseases in the short term, tracing and assisting in the provision of social support for isolation and quarantine and addressing other disease hardships, particularly for disadvantaged populations [9]. Additionally, community health workers are crucial for delivering treatments, such as beginning control measures, testing, immunization, interacting with the people, and addressing treatment and control alternatives [10].

During the 2008 financial crisis, cutbacks reduced contact tracers, also referred to as disease intervention experts, in the United States to roughly 2000 by the start of the outbreak. However, COVID-19 contact tracer need for the United States alone ranged between 100,000 and 300,000 personnel [11]. Years of inconsistent investment in community health have resulted in policy gaps, a shortage of essential equipment, insufficient personnel, and staff demand [9,12,13]. Growing population, while the community health workforce remains stagnant, adversely affects the services available to people, particularly during calamity and distress [14,15]. Despite the need for well-trained public health workers, only 17% of the public health workforce has received a public health degree [16,17]. The widening public health employment gap and the persistence of a small number of staff with formal public health education raise concerns about expertise and training gaps that may result in a dissonance between the skills available to the workforce and the expertise demanded by the community [18,19]. Addressing knowledge and training shortages might help local health organizations make more effective use of their time and money resources to address critical needs [9,20], such as increasing vaccination rates.

Recent research has underlined the need to reduce turnover, improve recruiting methods, and establish an investment baseline through extensive and regular training programs [16,18,19]. The aim is to bring, develop, and keep talented individuals to enhance capacity and build a more robust community health workforce. Personnel with an academic community health background can provide the necessary training and mentoring, and may be crucial in developing and implementing a country's pandemic response [21].

1.2. Vaccine Hesitancy

Vaccine hesitancy limits vaccine efficacy. This circumstance is detrimental since it increases the danger of epidemics and pandemics of vaccine-preventable diseases [22]. Impactful vaccination initiatives and population approval are shaped by a range of factors, including the ideological and socio-cultural setting, the state of the health system, the role of public health and vaccination policies, medical professionals, financial means, the personal decision-making process, individuals' vaccination awareness, and the educational circumstances in the various nations [1–23].

Hesitancy is prevalent in low, middle, and high-income nations, and it affects people from all socioeconomic, religious, and ethnic backgrounds [24]. Countries with inept healthcare systems, poor sanitation facilities, and aging populations face significant challenges [1]. Increased apprehension and lack of faith in vaccinations are also connected with a general decline in public trust in research and institutional efforts to safeguard public health [25]. Confidence in science and immunizations are inextricably linked. The consensus on science credibility is far greater in countries with better formal education. There is a widespread belief that more education generally results in a higher rate of vaccine acceptability across populations. For example, two studies in the United States and Italy found that the less educated population was less likely to be vaccinated against influenza [26,27]. Lu et al. [28] report that among people aged 60 years or older, those with a higher level of education were more likely to obtain herpes zoster immunization than those with a lower level of education. Other research demonstrates that uneducated parents in Pakistan were more likely to decline immunization for their children [29].

Risk Factors. While COVID-19 potentially affects persons of all ages, older adults and those associated with chronic non-communicable diseases (NCDs), such as hypertension, diabetes, cancer, heart disease, are highly susceptible to severe and fatal COVID-19

infection [30]. In addition, prevalent NCD risk factors, such as obesity, tobacco use and alcohol consumption, have been linked to faster infection development and more vulnerability [31,32]. The impacts of the outbreak are also more severe for vulnerable populations, such as those with pre-existing mental problems [33]. Individuals with severe mental disorders are more likely to struggle with comorbid chronic illnesses, such as cancers, asthma, cardiovascular diseases, and obesity, linked with an increased risk for severe COVID-19 illness, higher hospitalization and mortality rates and may have difficulty evaluating health information and following preventative measures [34]. Individuals with schizophrenia or associated psychiatric illnesses, are considerably more likely to have COVID-19 vaccine hesitancy [35].

Given the epidemic proportions of COVID-19 deaths among the elderly and other at-risk groups, developing a vaccine that is both effective and administered as widely as possible has been a worldwide requirement [36,37]. According to a study examining the factors that influence vaccine hesitancy and compliance to COVID-19 prevention efforts, health literacy levels, old age, the presence of chronic disease, obesity, and a higher level of life satisfaction are positively correlated with a higher rate of immunization and greater compliance to COVID-19 mitigation strategies [38]. Recent findings indicate that the COVID-19 pandemic has reduced life satisfaction, especially in vulnerable groups [39]. Life satisfaction is linked to how positively an individual perceives the overall well-being and quality of life, and it is well established that individuals who have a higher level of life satisfaction are best prepared to partake in more rational behavior in challenging circumstances, such as a worldwide COVID pandemic [40].

Community Development and Planning. In each country there are five categories of issues that might affect and obstruct patients' access to healthcare and vaccination, including availability, access, cost, acceptability, and accommodation. Availability refers to the sufficiency of the current volume and variety of supplies and services. However, accessibility depends on the relationship between the location of the supply and the location of the population, considering transportation resources and commute time, distance, and expense. The term cost relates to the affordability of the provided services. Acceptability is the association between users' *perceptions* of the personal and professional traits of providers and the actual features of such providers. Finally, accommodation is the link between how the supply resources are arranged to accept persons, the individual's capacity to adjust to these elements, and the individual's judgment of appropriateness [41].

Optimizing the spatial distribution of health facilities is a critical issue in community planning. When COVID vaccines were approved, planning the efficient distribution of vaccine doses within the region of vaccination hubs required complex accounting for population demography, geography, and access to infrastructure, such as transport networks and advanced equipment for storing, transferring, and administering vaccines. Therefore, the adoption of planning tools for developing resource mobilization plans became critical. A pandemic causes abrupt changes, confusion, and emotional reactions in the population, requiring clear and accurate information dissemination and logistics by the government in partnership with schools, businesses, and community organizations [42], which is community developers' forte. Furthermore, community-based initiatives can boost vaccination rates, either population-wide or through targeting hard-to-reach groups. To raise vaccine confidence and uptake among members of minority populations, community developers can set up, or strengthen, existing partnerships with community health workers, local organizations, and community representatives. They can use their insights and skills to help plan, identify barriers, and facilitate implementing strategies [43].

Religious Factors. Research shows religion influences decision-making about preventive behaviors, such as vaccination; often in unpredictable ways. Numerous studies have suggested that religion significantly influences people's vaccination decisions [44,45]. Some research points to the beneficial effects of faith-based public health outreach in influencing parents' decisions to vaccinate their children. Religious leaders speaking out about vacci-

nations can be highly successful. More than half of those who regularly attend religious services report that a faith-based approach motivated them to be vaccinated [46].

Other research suggests that religious influence tends to increase vaccine hesitancy, however, particularly for sexually transmitted diseases. In an international country-level study, religious views have an effect on vaccination hesitancy across all economic levels and WHO regions. Vaccine rejection has been ascribed to Rastafarian beliefs, interference with spiritual growth, and a lack of halal certification, whereas anthroposophical views regard the sickness as divine will [47]. Kasstan [44] examined Orthodox Jewish vaccination decision-making in Israel and the UK during the 2020–2021 coronavirus pandemic, as well as the 2014–2015 and 2018–2019 measles outbreaks. Religious exemption and anti-vaccine rhetoric conceal the variety of practices and beliefs that impact vaccine decisions, as well as the situational influences of religious legislation and leaders. In contrast to secular anti-vaccination arguments, Orthodox Jewish parents prioritized safety, trust, and choice over religion. Religious doctrines were galvanized, and even exploited, in order to avoid coercive or compelled vaccination regulations. COVID-19 clusters have been seen among ultra-Orthodox Jews in New York and diverse religious groups in Germany and Korea, implying the connection. Religiosity has been associated with hostile perceptions and mistrust of immunizations [48,49].

Additionally, the role of religious groups and faith leaders has been identified as critical in evaluating vaccination attitudes [50]. Factors such as frequency of attendance at religious services and religious denomination may influence vaccine-related attitudes and decisions. Christian nationalism is a particularly antagonistic theological worldview to science and vaccinations [51,52]. Religious conservatism, especially evangelical and born-again Christianity, has been linked to poorer confidence levels in science, vaccination uptake, vaccine awareness, and vaccine aversion in the United States [52,53]. Another study found that, across Christian denominations, those who attend religious services frequently are less likely to vaccinate their children [45]. The Catholic Church has raised ethical concerns about the use of vaccines made on human cell lines and derived from aborted fetal cells [54]. The effect of religion varies, however: e.g., Catholics [45] and the unaffiliated have a higher vaccination rate than Protestants, other Christians, and followers of other religions [55]. Hindus [56] and Jews [57] are more likely than Muslims to get immunized. Muslim parents in the United Kingdom refused the influenza vaccine for religious concerns, owing to the vaccine's inclusion of porcine gelatin [58]. Lastly, findings from Malaysia indicate that Buddhists are twice as likely to hesitate than Muslims [59].

Political Rights, Civil Liberties, and Stringency of Pandemic Response. Government and community responses to COVID-19 entail trade-offs between individual rights and collective public health interests. Each country depends on its official response and management to slow the spread of infection and hospitalization [60]. To avert an oncoming healthcare catastrophe, governments have implemented stringent measures, like nationwide lockdown, quarantine, or isolation, in conjunction with proper handwashing, enforced mask use, and physical distancing. During the global lockdowns, international and domestic travel was temporarily prohibited, and individuals were advised to self-isolate and remain in their homes. Countries have mandated public face mask use and increased mass testing, community testing, and contact tracing as part of their complex response [61]. The epidemic decisions also impacted religious freedom—notably, limitations on public meetings. In Canada and the United States, coronavirus outbreaks were associated with religious services, although religious groups exerted some of the most strident efforts to reduce lockdown restrictions [62]. Numerous governments have imposed restrictions on visits to long-term care facilities, requiring visits to be conducted outside and at a social distance, or prohibiting visits entirely [63]. Many actions were accompanied by penalties or the threat of incarceration.

While people adhering to lockdown laws have accepted the notion of collective welfare, others prioritize individual freedoms over the common good, even during an outbreak. As a result, public health policies have been seen by many as a breach of civil

rights [61] and resistance to such breaches may take the form of organized grassroots activism against stringent government measures. Some countries have a long history and greater culture of such activism than others. Mandatory vaccination to protect population life and health is weighed against individuals' bodily freedom, which includes the right to decline treatment options [64]. COVID-19 disease results in high morbidity and mortality losses and tremendous economic expenses to the health service. This diverts human and financial resources from other illnesses and patients [65]. In other terms, the lack (or inadequacy) of official involvement to improve public health, and thereby lessen the potential for injury to people, also constitutes an infringement of rights [66].

The American Civil Liberties Union (ACLU) [67] asserts that vaccination requirements—far from jeopardizing civil rights—protect the rights of society's most susceptible members, such as individuals with disabilities or compromised immune systems, children too young to receive immunizations, and minority groups that the virus has severely harmed. Vaccination requirements also benefit individuals whose jobs expose them to the public daily, such as doctors and teachers. Therefore, by immunizing people against the virus's most lethal effects, vaccines offer the hope of reestablishing liberties in the future, allowing them to return safely to normal life. Thus, mandated vaccination limits some individual autonomy but is more than offset by protecting the rights and health of the more vulnerable [68].

Hypotheses. To our knowledge, there has been no study on the association between the COVID vaccination rate and country-level factors, such as community health expertise, the importance of religion, and freedom score. We hypothesized that there would be a significant and positive correlation between vaccination rate, socioeconomic factors, and community health expertise. Further, we postulated that the extent of community health expertise, the importance of religion, and freedom score in a country would significantly predict its COVID-19 immunization rate.

2. Methods

2.1. Data Sources

The study analyzed secondary data from cross-sectional and panel studies. Country-level full COVID-19 vaccination rates, socioeconomic indicators, health resources, government expenditures, nationally representative social surveys, and estimated strength of relevant professional expertise were acquired for the same 89 countries. Data were gathered from various sources, including the World Bank (WB), Gallup Poll, Freedom House, the World Health Organization (WHO), and the Vanderbilt University's Global Development of Applied Community Studies (GDACS) project database of country-level social, economic, political, and education indicators and the estimated strength of 12 community-focused professional and research fields in 105 countries.

2.2. Dependent Variable

Current World Health Organization (WHO) data on the number of fully vaccinated individuals per 100 for 89 countries were accessed on 14 January 2022 [69]. These statistics are derived from official reports, such as health ministries, government publications, and official social media accounts and are extensively used by the press, politicians, academics, and the general public to compare the efficiency of national immunization programs [70,71].

2.3. Predictor Variables

2.3.1. Strength of Health System

Community Health Training and Research (CHTR). We drew on data from the GDACS project's database, including estimates of trained professional and research human resources in four of 12 disciplines aimed at human and community development at the local level: CHTR, community planning, community development, and religious studies for community development [72]. The database used the internet and published sources to identify relevant professional associations or conferences, undergraduate and graduate courses, and programs, publications, and journals in each of the above fields in each of the

89 countries in the analysis, representing over 95% of the world's population. The strength of the CHTR field is the one most relevant to the overall strength of the health system.

Community health workers estimate. Currently, there is a universal lack of health workers, particularly nurses and midwives, who account for more than half of the gap, which can undermine countries' vaccination rates [73]. Therefore, as a proxy measure of community health workers, we used WHO's estimate of community nurses and midwives (per 10,000 population) in our analysis.

Government Stringency Index. The GSI comprises nine isolation and restriction regulations deemed to prevent virus spread successfully. The nine indicators include regulatory responses to public events (cancellations of public affairs, and school and office closures), restrictions on mobility (public transportation closures, restrictions on domestic and foreign travel), and public health initiatives. The Oxford dataset rescaled the ordinal values for each of the nine categories to a number between 0 and 100 (100 being the strictest response) [74].

2.3.2. Non-Health Related Factors

Importance of Religion. Another predictor is the importance of religion. The data were extracted from a survey by the CEOWORLD magazine in partnership with the Global Business Policy Institute, a characterization of 148 countries based on the survey of more than 370,000 citizens in 2020 [75].

Freedom Score. Through its annual Freedom in the World report, Freedom House assesses people's access to political rights and civil liberties in 210 nations and territories [76,77]. The 2022 Global Freedom Score averages the separate 0–100 political rights and civil liberties ratings, with higher scores indicating greater freedom. Respecting liberty and democratic ideals (laws and regulations, civic duties, lack of corruption, and freedom of expression) is critical in individual vaccine decision-making.

History of Nonviolent Activism. Swarthmore College's Global Nonviolent Action Database documents the size and success of thousands of grassroots activist protests, campaigns, and movements in over 100 countries across time. We used a product score combining the number of recorded cases in each country and the average success rating of all cases in that country. We then applied a base-10 logarithmic adjustment to the original database to reduce positive skewness caused by extreme scores for some nations [72].

Strength of Other Relevant Community Studies Fields. Three variables measuring the strength of community planning, community development, and Liberation Theology (or religious studies for community development) disciplines were added to the analysis from the GDACS database (see above) to investigate the association of non-health-focused community-oriented professional training and research fields with the dependent variable.

Life Satisfaction. The 2020 World Happiness Report measures overall life satisfaction based on the Gallup World Poll, a series of national survey polls conducted in over 160 countries and 140 languages. The poll's primary life evaluation question is: "Imagine a ladder with steps numbered from 0 to 10. The top of the ladder depicts the best possible life and the bottom the worst possible life. On which step of the ladder would you say you personally feel you stand at this time?" [78].

Education Index. This measure is a part of the United Nations Development Program's annual Human Development Index and is calculated by the arithmetic mean of two indices: the mean years of schooling of the adult population in a country and the mean expected years of schooling of current school-aged children [79,80].

2.4. Control Variables

Economic variables. **Gross Domestic Product (GDP)** per capita calculates overall national income proportionate to its midyear population. GDP is defined as the summation of the gross value added of all resident producers, plus any product taxes, minus any subsidies not reflected in the price of products. We used the World Bank's 2020 GDP figures in current US dollars as the currency [81–84]. **Health expenditure**, compiled by the World

Bank, refers to spending on the final usage of healthcare resources, including individual health care and collective health care, except investment spending [85–87].

Risk Factors. As a proportion of the total population, the **elderly population** is defined as individuals aged 65 and over: The number is calculated using the existing concept of population in 2020, which includes every individual despite nationality or legal status. The World Bank’s website compiled the data [88]. **Non-communicable diseases** (NCDs) rates comprise four significant risk variables, including the prevalence of current cigarette use, hypertension among adults aged 30–79 years, and the prevalence of alcohol and obesity among adults [89]. These are significant factors because an effective COVID vaccination will minimize the death rate and avoid infection or sickness, which is critical for protecting the elderly and those with non-communicable diseases, who are most at risk of suffering from the disease [36,90].

2.5. Data Analysis

To examine the association between country-level variables and vaccination rates per 100 people, bivariate correlations and multivariate models were applied to the data to find the most relevant factors explaining variance in vaccination rates between countries. The data were analyzed using SPSS and Microsoft Excel 2016. First, descriptive statistics (mean, standard deviation) were used to better understand the data dynamics relevant to this inquiry (see Table 1).

Table 1. Descriptive Statistics.

	N	Mean	Std. Deviation
Persons Fully Vaccinated per 100	89	44.258	27.992
GDP per capita (current US\$)	89	13,623.848	19,007.467
Strength of CHTR	89	7.54	3.045
Nursing and midwifery personnel (per 10,000)	89	42.488	46.622
Importance of religion (% Yes)	89	73%	25%
Freedom Score	89	55.88	27.990
Current health expenditure per capita (current US\$)	89	1309.701	2116.548
Population aged 65 and above (% of the total population)	89	9.906	6.927
Non-Communicable Disease	89	0.012	0.603
Life satisfaction	89	5.489	1.116
Government Response Stringency Index	89	45.520	18.045
Culture of nonviolent activism	89	1.486	0.479
Education Index 2019	89	0.664	0.183
Strength of Community Development	89	4.96	3.226
Strength of Urban Planning	89	6.63	3.167
Strength of Religious Studies	89	4.73	3.309

The next step was to use Pearson correlations to examine the bivariate linear relationships between the predictor variables and the outcome variables, and also among the predictors. Correlation coefficients quantify the degree of a positive or negative association between two variables.

The cumulative effect of predictor variables (selected to minimize multicollinearity among predictors) on the outcome variable was determined using linear hierarchical multiple regression. The hierarchical regression’s first step included Gross Domestic Product per capita. The second step included factors from the health system, including the strength of the CHTR and the number of nursing and midwifery personnel (per 10,000). After controlling for these variables, freedom score and religious importance were entered as predictors in the final stage. The analysis was done at the two-tailed $p < 0.05$ level of statistical significance.

3. Results

Supporting our hypotheses, simple bivariate Pearson correlation analysis showed significant positive country-level correlations ($n = 89$) between persons fully vaccinated per 100 people and GDP per capita ($r = 0.616, p < 0.001$), strength of CHTR ($r = 0.508, p < 0.001$), nursing and midwifery personnel (per 10,000) ($r = 0.581, p < 0.001$), importance of religion ($r = -0.587, p < 0.001$) and Freedom Score ($r = 0.432, p < 0.001$) (see Table 2). Other significant bivariate predictors of vaccination rate included health expenditure ($r = 0.477, p < 0.001$), population aged 65 and above ($r = 0.729, p < 0.001$), non-communicable disease (NCD) rate ($r = 0.439, p < 0.001$), life satisfaction ($r = 0.659, p < 0.001$), government response stringency index ($r = 0.260, p < 0.05$), culture of nonviolent activism ($r = 0.355, p < 0.001$), education index ($r = 0.793, p < 0.001$) and the strength of relevant professional and research fields, such as community development ($r = 0.273, p < 0.01$), community planning ($r = 0.384, p < 0.001$) and Liberation Theology, or religious studies for community development ($r = 0.330, p < 0.002$).

Although there was a significant correlation between our dependent variable and all predictor variables mentioned above, for the multivariate analysis, we chose the variables that were most independent from each other. When independent variables are too strongly intercorrelated, such as GDP, education index, and health expenditure, such multicollinearity can make regression coefficients unpredictable and uninterpretable. There was also a need to limit the number of predictors in the model, given a sample size of 89 countries. Therefore, we excluded those variables before running the regression analysis.

Hierarchical Linear Multiple Regression was used to see if each predictor made a significant and unique contribution to the prediction of the vaccination rate in each country (see Table 3). In the first step, the overall regression was statistically significant ($R^2 = 0.379, F(1, 87) = 53.11, p < 0.001$). GDP significantly predicted vaccination rate ($\beta = 0.616, p < 0.001$). Adding strength of CHTR and nursing and midwifery personnel (per 10,000) to GDP in step two further increased the variance explained by 10.9% ($R^2 = 0.488, F(2, 85) = 9.06; p < 0.01$) and showed the positive influence of strength of CHTR ($\beta = 0.316; p < 0.01$) on vaccination rate of each country. The nursing staff variable ($\beta = 0.239; p = 0.62$) did not reach significance, controlling for the other variables in step two. In step three, the R-squared value ($R^2 = 0.509, F(2, 83) = 4.34; p < 0.01$) added about 5.1% more explained variance in the vaccination rate, for a total of almost 54%, by including importance of religion and freedom score (after controlling GDP per capita in the first step and strength of public health and nursing personnel in the second step of the regression model). In the final model, strength of CHTR ($\beta = 0.284; p < 0.01$), importance of religion ($\beta = -0.244; p < 0.04$), and freedom score ($\beta = 0.185; p < 0.03$) each uniquely, and significantly, predicted a country's vaccination rate.

Table 2. Correlation Between Country-Level Predictors and Vaccination Rate.

Pearson Correlations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1—Persons fully vaccinated per 100															
2—GDP per capita (current US\$)	0.616 **														
3—Strength of CHTR	0.508 **	0.380 **													
4—Nurses and midwives (Per 10,000)	0.581 **	0.790 **	0.314 **												
5—Importance of religion	−0.587 **	−0.703 **	−0.319 **	−0.705 **											
6—Freedom (civil & political rights)	0.432 **	0.438 **	0.263 *	0.329 **	−0.269 **										
7—Current health spending per capita	0.447 **	0.836 **	0.287 **	0.708 **	−0.601 **	0.319 **									
8—% of population aged 65+	0.729 **	0.729 **	0.388 **	0.692 **	−0.762 **	0.530 **	0.561 **								
9—Noncommunicable Disease Rate	0.439 **	0.376 **	0.283 **	0.451 **	−0.448 **	0.403 **	0.340 **	0.652 **							
10—Life satisfaction	0.659 **	0.743 **	0.392 **	0.649 **	−0.676 **	0.508 **	0.629 **	0.712 **	0.433 **						
11—Gov. Response Stringency Index	0.260 *	0.203	0.151	0.241 *	−0.143	0.162	0.244 *	0.237 *	0.159	0.202					
12—Nonviolent activism	0.355 **	0.403 **	0.412 **	0.382 **	−0.232 *	0.345 **	0.422 **	0.342 **	0.217 *	0.355 **	0.214 *				
13—Education Index 2019	0.793 **	0.730 **	0.505 **	0.715 **	−0.744 **	0.489 **	0.601 **	0.830 **	0.660 **	0.759 **	0.318 **	0.411 **			
14—Strength of Community Development	0.273 **	0.234 *	0.480 **	0.219 *	−0.090	0.263 *	0.184	0.148	−0.002	0.216 *	−0.082	0.374 **	0.241 *		
15—Strength of Urban Planning	0.384 **	0.359 **	0.608 **	0.314 **	−0.323 **	0.313 **	0.387 **	0.411 **	0.284 **	0.320 **	0.201	0.497 **	0.491 **	0.449 **	
16—Strength of Lib. Theology	0.330 **	0.310 **	0.430 **	0.331 **	−0.191	0.355 **	0.319 **	0.216 *	0.122	0.295 **	0.270 *	0.476 **	0.405 **	0.579 **	0.500 **

* = $p < 0.05$, ** = $p < 0.01$.

Table 3. Summary of Linear Regression Analysis for Variables Predicting COVID Vaccination Rate ($N = 89$).

Variable	Model 1			Model 2			Model 3		
	B	SE B	β	B	SE B	β	B	SE B	β
GDP per capita (current US\$)	0.001	0.000	0.616 ***	0.000	0.000	0.307 *	0.000	0.000	0.120
Strength of CHTR				2.905	0.771	0.316 ***	2.610	0.750	0.284 **
Nursing and midwifery personnel (per 10,000)				0.144	0.076	0.239	0.099	0.077	0.164
Importance of religion (% Yes)							−0.266	0.125	−0.244 *
Freedom Score (Political Rights & Civil Liberties)							0.185	0.084	0.185 *
R ²		0.379			0.488			0.509	
F for change in R ²		53.114 ***			9.066 ***			4.341 *	

Dependent Variable: Persons fully vaccinated per 100. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

4. Discussion

This paper was the first attempt to evaluate the influence of community health expertise and socioeconomic factors on COVID-19 vaccination rates. We gathered data on 89 countries from eight secondary sources and created a new primary source estimate of the strength of CHTR and other applied community studies fields. The data indicate that the strength of CHTR, the importance of religion, and freedom score (political rights and civil liberties) are all associated with the level of COVID-19 immunization at the country level. We found a significantly negative relationship between the importance of religion and vaccination rates, but the strength of CHTR is the strongest unique predictor of COVID-19 vaccination rates. That finding is reassuring given notable outliers, such as the United States, with very strong public health expertise but only a modest vaccination rate compared to many less-resourced countries.

Our findings support our hypothesis that GDP per capita and COVID-19 vaccination rates are positively related. This is consistent with the 2017 WHO report indicating that high-income countries had the highest chance of achieving universal vaccination coverage at 90 percent [91]. These findings corroborate a recent study establishing a connection between GDP and COVID-19 immunization uptake in 46 countries [92]. Additionally, Basak et al. [81] discovered that wealthier countries have a greater immunization rate. The study showed that three countries, the Democratic Republic of Congo (DRC), Haiti, and Chad, with a gross domestic product (GDP) of less than \$1700, had a vaccination rate of less than 1%. Higher-income countries protect their citizens through vaccination, in contrast to low-and-moderate-income countries with lower immunization rates, largely due to less access to vaccines. As a result, there are significant differences in the ability of countries to establish herd immunity, and efforts to obtain worldwide herd immunity are severely impeded.

Similar to a previous study, we found that the importance of religion is negatively related to COVID-19 vaccination [92–94]. Religiosity is associated with a lack of faith in science [95], as Muslims, Hindus, and Christians have shown the same pattern [95–97]. Some Christians are opposed to COVID-19 vaccination because the laboratory development of some vaccinations used aborted fetal tissue, which contradicts conservative Christian opinion on abortion [98].

The COVID-19 pandemic has exposed the critical role of robust health systems, particularly public health expertise and the number and training of community health workers (CHWs). The epidemic has focused attention on community health workers and their involvement in tackling the pandemic. Our assessment of the contributions of CHTR to the COVID-19 response revealed a great resource for increasing vaccination rates. CHWs can target groups at the highest risk of contracting COVID-19 and can work efficiently with various populations due to their racial/ethnic and language compatibilities, which is critical to the effectiveness of broader healthcare and public health interventions.

Additionally, CHWs are trained in culturally competent health education. During the pandemic, people have reported acquiring information about COVID-19 via podcasts, news outlets, media platforms, forums, messaging services, and friends and relatives. Individuals who obtain information via social media, etc., are more prone to trust falsehoods [98,99]. CHWs have received training in health communication and are ideally suited to conduct community engagement initiatives, as advised by the World Health Organization, that attempt to deliver reliable information about the pandemic's risks and preventive measures that individuals can acquire. As the COVID-19 vaccine becomes more widely accessible, it is expected that these networks, particularly CHWs, will play a critical role in its delivery and acceptance. Since CHWs are trustworthy people in society, they can assist in raising immunization rates and decreasing hesitancy [9].

One of our hypotheses attempts to explain this association by examining the strength of each country's community health discipline in terms of the extent of training and research. COVID-19 training is provided to CHWs in various ways and to varying degrees across regions and even between countries. Despite its critical role in the employment

and safety of CHWs, training was not always adequate, consistent, or practical [21]. A well-trained community workforce is required to provide culturally sensitive, linguistically compatible care and assistance. This workforce is crucial for successful program design and management and for establishing the trust necessary for contact tracing, immunization, and other health interventions to be accepted. Current statistics on the community health workforce have indicated worker characteristics, such as years of experience and academic background, which can guide evidence-based treatments for outcome metrics [100]. Community health graduates provide a solid knowledge base in the field and excellent leadership and managerial abilities [12]. With more graduates and undergraduates trained in community health than ever before [18], and the onset of the COVID-19 pandemic, traditional recruitment hurdles may not be as significant in the future of the community health workforce.

Interestingly, we found a significant correlation between vaccine uptake and freedom score. Treated as an independent variable, potential freedom is thought to be a motivator (along with health and safety) for getting vaccinated. COVID-19 vaccination, both individually and especially at the population level, increases people's safe freedom of movement, association, work, and school attendance, and contributes to restoring normalcy [101]. Choosing to get vaccinated is based in part on expected gain in freedom (i.e., lessening of limitations). Temporary restrictions on high-risk, unnecessary activities, such as religious services, political events, public meals, theater attendance, and overseas travel, were imposed throughout 2020. The steps made to "flatten the curve" have resulted in significant collateral harm, including the postponement of elective surgeries, which has slowed the treatment of life-threatening conditions. Lockdown orders had a detrimental effect in a number of areas: on mental health, resulting in depression, anxiety, and an increased risk of suicide; home quarantine increased the risk of physical harm for domestic violence victims; and, globally, the disruption of the economy and government services aggravated food shortages. Additionally, constraints have resulted in significant economic shocks, job losses, and financial troubles, negatively affecting health. In contrast to broad government restrictions on activities, COVID vaccination allows individuals to freely travel, attend political gatherings, and attend religious services.

In contrast, we found freedom was *not* generally a motivator to avoid vaccination, as some may think. Ferguson and Caplan [102] argue that freedom-based resistance is founded on a faulty understanding of what it means to be free. Vaccination requirements are not a kind of "coercion". They are more akin to liberty inducers. They promote, rather than restrict, liberty. They are referred to as liberty constraints. However, they safeguard, maintain, and foster liberty by guaranteeing adequate vaccination rates. A successful COVID-19 vaccination campaign will liberate us—personally and collectively—from the pandemic's endless misery.

Limitations. The current study has several limitations. To begin with, data for each variable are gathered for the most recent year available, ranging from 2015 to 2020. Second, because this study is being conducted during the onset of a pandemic in various nations, the statistics are liable to alter throughout any relatively short period of time. Additionally, there are different arguments and disagreements on the quality and legitimacy of the information compiled by each country, with governments then attempting to explain their positions. At this point, in order to conduct our research, we were required to use the COVID-related data provided by the nations and perform our analysis.

5. Conclusions

Two justifications exist for the vaccine mandate. The first is to avert significant illness, hospitalization, and mortality. The second perspective is participatory, emphasizing the individual's involvement and membership in their community. In this case, liberty is communal rather than individualistic. Individuals in a free community are obligated to, and dependent on, one another. Collective freedom achieves far more than individual

freedom. It creates new opportunities and expands perspectives. When a community is free, individuals gain from communal liberty and the benefits it produces.

According to Gostin [103], there are two types of freedom: personal liberty and the ability to live everyday life without significant risk of injury. Mandatory vaccinations in workplaces and schools are supported based on both liberties. A fully vaccinated workforce, especially when paired with additional risk mitigation measures, such as mask use and improved ventilation, significantly increases safety for everyone. As a result, vaccines are the only way to effectively manage, if not end, the global COVID-19 pandemic, contain the development of more lethal variants, and reintroduce a sense of security and normalcy. Our data suggest that it may require countries to have adequate community health workforce training and research, and a population not hesitant to adhere to public health measures due to their religion, and societal-level freedoms to motivate adherence.

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