

Coronavirus Pandemic

COVID-19 vaccine demand, hesitancy, and nationalism: a case of protection motivation behavior in Bangladesh

Mostafizur Rahman¹, Afnan Hossain², Abu Sufian³, Nahida Anwar⁴

¹ Department of Science and Humanities, Bangabandhu Sheikh Mujibur Rahman Aviation and Aerospace University, Dhaka (Old Airport), Bangladesh

² Department of Peace and Conflict Studies, University of Dhaka, Dhaka, Bangladesh

³ Department of Political Studies, Shahjalal University of Science and Technology, Sylhet, Bangladesh

⁴ Department of Philosophy, University of Dhaka, Dhaka, Bangladesh

Abstract

Introduction: Immunization, as a process of fighting against the COVID-19, has gained important research appeal, but very limited endeavor has been paid for vaccine behavioral studies in underdeveloped and developing countries. This study explores the vaccine demand, hesitancy, and nationalism as well as vaccine acceptance and domestic vaccine preference among young adults in Bangladesh.

Methodology: This quantitative study followed the snowball sampling technique and collected responses from 1,018 individuals from various social media platforms. The analysis covered both descriptive and inferential statistics including chi-square, F-statistic, and logistic regression.

Results: The findings of the fully-adjusted regression model suggest that the individuals who had more vaccine demand were 3.29 times (95% confidence interval = 2.39-4.54; $p < 0.001$) higher to accept vaccine compared to those who had no vaccine demand. Conversely, vaccine hesitancy was negatively associated with vaccine acceptance. Here, the odds ratio was found 0.70 (95% confidence interval = 0.62-0.80; $p < 0.001$), which means that those who had higher vaccine hesitancy were about 30% less likely to accept vaccines than those who had no hesitancy. In addition, the persons who had vaccine nationalism were 1.75 times (95% confidence interval = 1.62-1.88; $p < 0.001$) more prone to prefer domestic vaccine.

Conclusions: This study suggests that policymakers may take initiatives for making people aware and knowledgeable about the severity and vulnerability to specific health threats. In this concern, perception and efficacy-increasing programs may take part in increasing protection motivation behaviors like vaccine acceptance and (domestic) vaccine preference.

Key words: COVID-19; protection motivation behavior; vaccine demand; vaccine hesitancy; vaccine nationalism.

J Infect Dev Ctries 2021; 15(10):1388-1395. doi:10.3855/jidc.15029

(Received 11 March 2021 – Accepted 05 June 2021)

Copyright © 2021 Rahman *et al.* This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

The COVID-19 pandemic has posed a major threat to global public health, resulting in substantial morbidity and mortality, particularly among high-risk groups such as frontline workers, the elderly, and those with pre-existing medical conditions [1,2]. Following its immediate outbreak, the global health system imploded due to the absence of a particular antiviral medication or therapy, and the situation remains largely unaltered to this day. Therefore, immunization against the virus is the best option to fight this pandemic. In that purpose, many institutions, research organizations, and pharmaceutical companies worldwide started developing a stable, safe, and effective vaccine [3].

According to the World Health Organization (WHO), till September 24, 2021, the world has made significant progress towards immunization, with 121

vaccines in clinical development and 194 vaccines in the pre-clinical stage [4]. Ahead of that, by early 2021, around nine vaccines were authorized for full or early use in some countries including the United States (US), the United Kingdom (UK), and Canada. But after approval, these vaccines were immediately distributed among their citizens, while other countries were trying and still struggling to get the vaccines [5].

Following the roll-out of the COVID-19 vaccine, people's willingness towards vaccination was affected in many ways and somewhere resulted in vaccine hesitancy [6–9]. The vaccine hesitancy, acceptance, and uptake vary for a variety of reasons including safety, efficacy, novelty, perceived lack of testing, misconception, side effects, and adverse health outcomes of the vaccine [10,11]. The situation has deteriorated to the point that the WHO has identified

vaccine hesitancy as one of the top ten global health risks [12]. Previously, during the 2009 H1N1 pandemic, people’s acceptance of the vaccine varied from 17 to 67 percent across countries like the USA, UK, Australia, France, and Greece [10,13]. If ‘the history repeats itself’ for the current COVID-19 pandemic, global stability will be delayed for a longer period.

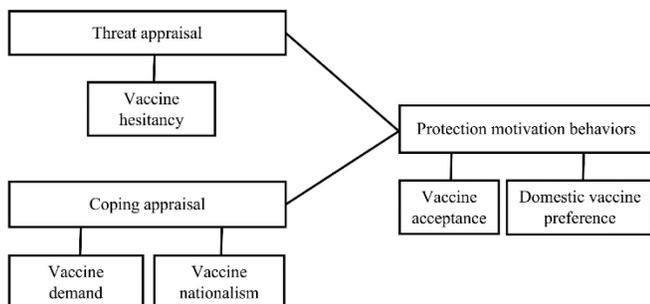
Unfortunately, it has always been difficult for underdeveloped and developing nations to earn or manufacture a vaccine quickly following a pandemic, and this difficulty has been exacerbated by the vaccine nationalism of developed countries [11]. While developed nations are procuring billions of doses of COVID-19 vaccines for their people, vaccine nationalism seems to be an obstacle to worldwide equitable distribution and access to vaccine during the pandemic. In response, developing nations have attempted self-sufficiency in recent years, influencing researches in the arena of health sciences. The ability contributes to robust regional health cooperation and somewhere national vaccine development. More significantly, it may enable poor nations to provide domestic vaccines to their citizens after rigorous clinical evaluation [14,15].

Like other developing and undeveloped nations, Bangladesh has difficulties in vaccinating its huge population with relatively limited resources [16–18], and vaccine hesitancy has fueled the situation more, as 32.5 percent of the country’s population expressed reluctance to the vaccine [9]. Despite many limitations and difficulties, protection motivations can inspire people towards vaccination behavior [19,20]. As no significant studies explored the fact, the purpose of this study was set to examine the protection motivation behavior and its associated factors among the young adults of Bangladesh.

Theoretical framework

Protection Motivation Theory (PMT), developed by R.W. Rogers [21], explains how motivations change

Figure 1. Factors influencing protection motivation behaviors along the dimensions of Protection Motivation Theory.



human behavior during harmful and stressful conditions, and it tests how fear changes individual health behaviors. PMT also interprets health decisions and action motivations. For instance, how and when should a person contact others during the corona pandemic? According to PMT, an individual’s health-related behaviors are fixed by two cognitive processes, namely threat appraisal and coping appraisal. Here, threat appraisal denotes how much one is threatened by health issues. It is composed of perceived severity (of the disease) and perceived vulnerability (possibility of contracting the disease). On the contrary, the coping appraisal refers to responding to a preventive behavior, for instance, meeting with none physically and maintaining physical distance during the COVID-19 pandemic. It is comprised of response efficacy (recommendations) and self-efficacy (beliefs in one’s capability) [21]. Protection motivation comes from these four cognitive beliefs: perceived severity, perceived vulnerability, response efficacy, and self-efficacy. These cognitive factors have significant associations with intentions which in turn impact behavior [21, 22].

When one thinks that a vaccine may bring about severe consequences, it is referred to as perceived vaccine severity [21]. For instance, one’s perception of the side effect of a vaccine is one’s perceived severity. The perceived vaccine severity, in this research, includes: the vaccine first might not be working as it is very new; I had a bad experience with the prior vaccine; I might be infected through the vaccine distribution process, and; coronavirus vaccination seems to be a conspiracy.

Perceived vaccine vulnerability is how much an individual is susceptible to potential vaccine-related health threats [21]. For instance, the vaccine trial volunteers are severely vulnerable to the undesirable effects and health threats of the vaccine. The perceived vaccine vulnerability in the present study consists: I am timid to input outer objects in my body; vaccine might not be effective for its quick approval due to political pressure; immunity of illness is well compared to the immunity of vaccination, and; as the vaccination is against my religious, cultural, and moral values, I would not take it.

Vaccine response efficacy is the belief that certain vaccine behavior will reduce health threats [21]. In this research, the vaccine response efficacy includes: when coronavirus vaccine is available, the world would be normal; I think coronavirus vaccine would be safe; I think coronavirus vaccine would be effective, and; vaccine is the only way for preventing coronavirus.

Vaccine self-efficacy is the faith that a person can perform the coping response to the vaccine [21]. The vaccine self-efficacy contains these items in current study: if coronavirus vaccine is available, I am planning to take it; one may not be affected by the illness if one is once vaccinated against it; getting vaccinated is the best way to avoid coronavirus, and; it is essential to receive as more vaccines (of different diseases) as one can (Figure 1).

In this research, vaccine hesitancy comprised of perceived vaccine severity and perceived vaccine vulnerability appears as a threat appraisal. Further, vaccine demand (as well as vaccine nationalism) composed of vaccine response efficacy and vaccine self-efficacy stands as a coping appraisal. The threat appraisal and coping appraisal generate protection motivation that affects the behaviors of individuals regarding vaccine acceptance and (domestic) vaccine preference.

Methodology

Study design, participants, and sampling

The cross-sectional study was conducted among 1,018 young adults in Bangladesh. The study was quantitative in design and the snowball sampling technique was used to reach the respondents even in the marginal areas. Respondents of beginning levels were asked for rolling out the survey to others.

A self-administered electronic questionnaire was prepared bilingually (English and Bangla). A pilot study was done among 40 individuals. The data collection then finally started only when the flaws and limitations of the questionnaire were cleaned up after the pretest. Each respondent was informed about the procedure, purpose, and objective of the research and their voluntary participation and withdrawal (if inconvenient) at any time. Necessary notes and explanations were attached to the queries that seemed incomprehensible. Finally, an online social media survey started on October 22, 2020, and continued till December 14, 2020.

All queries of the survey questionnaire were closed-ended and categorical. The content of the questionnaire included: (i) socioeconomic and demographic characteristics (age, gender, place of residence, divisional region, marital status, education, occupation, and monthly income); (ii) health history (physical, mental, and both); (iii) perceived risk of the pandemic, coronavirus infection (of the respondents and their family members), impact (on daily life, work, and income); (iv) previous vaccination experience; (v) vaccine trial participation (volunteerism), vaccine

distribution; (vi) vaccine demand, hesitancy, nationalism and; (vii) vaccine acceptance and preference.

Measures and rating instruments

Protection motivation behavior: We assessed the protection motivation behavior of the respondents with two queries: (1) Do you want to receive the COVID-19 vaccine when it is available? (2) Do you prefer to take a domestic vaccine? The queries were dichotomous with the responses, yes and no, where 'yes' meant vaccine intention and 'no' meant otherwise. These two queries were the main outcomes of this study.

Vaccine demand: In this regard, the participants of this study responded to eight items (mean = 5.78; SD = 1.88; Cronbach α = 0.70). The items contained: (1) If coronavirus vaccine is available, I am planning to take it; (2) Getting vaccinated is the best way to avoid coronavirus; (3) One may not be affected by the illness if one is once vaccinated against it; (4) It is essential to receive as more vaccines (of different diseases) as one can; (5) I think coronavirus vaccine would be safe; (6) I think coronavirus vaccine would be effective; (7) Vaccine is the only way for preventing coronavirus; (8) When coronavirus vaccine is available, the world would be normal. All queries were dichotomous and a score of 1 was given for each 'yes' reply and 0 for 'no' and then all items were counted together. The total count scored between 0 and 8, where the higher score referred to more demand of COVID-19 vaccine. Previous studies also used some contents of these items [23,24].

Vaccine hesitancy: The vaccine hesitancy of the respondents was measured with 15 queries (mean = 5.24; SD = 2.66; Cronbach α = 0.73). The items included: (1) I am concerned about the side effect of coronavirus vaccine; (2) The vaccine would not prevent infection; (3) I am fearful of needles and so I do not want to get vaccinated; (4) The vaccine first might not be working as it is very new; (5) I had bad experience with prior vaccine; (6) I might be infected through the vaccine distribution process; (7) Coronavirus vaccination seems to be a conspiracy; (8) The price of coronavirus vaccine would not be reasonable; (9) As I regularly follow all health measures, I do not need the vaccine; (10) I am healthy and young enough to fight against the virus; (11) I do not need to take the vaccine, because the virus infection is gradually decreasing; (12) I am timid to input outer objects in my body; (13) Vaccine might not be effective for its quick approval due to political pressure; (14) Immunity of illness is well compared to the immunity of vaccination; (15) As the vaccination is against my religious, cultural, and

moral values, I would not take it. For each of these dichotomous queries, a score of 1 was given for the response ‘yes’ and 0 for ‘no’. All 15 queries were then summed together and the total score ranged between 0 and 15, where a higher score meant higher hesitancy. The queries of vaccine hesitancy were based on the WHO Report of the SAGE Working Group on Vaccine Hesitancy [25] and other literature [8,23,26].

Vaccine nationalism: An index was developed to assess the vaccine nationalism of the respondents. The index comprised of 7 items (mean = 25.12; SD = 5.95; Cronbach α = 0.90): (1) Bangladesh should be prioritized in foreign vaccine distribution; (2) It is better, Bangladesh should produce a (domestic) vaccine in the country; (3) Domestic vaccine would be safer; (4) Domestic vaccine would be more effective; (5) Domestic vaccine would have more regional, climatic, and biological-feature related standard; (6) I have confidence in a domestic vaccine; (7) I intend to take a domestic vaccine. Each query was Likert-type and ranged from 1 (strongly disagree) to 5 (strongly agree) and the total count scored between 7 and 35, where the higher count meant more vaccine nationalism.

Ethical issues

After some public health scholars’ review and appreciation of this study, institutional ethical approval was sought. The study participants were well informed about the objectives of the research and their voluntary participation in it before seeking electronic consent. The anonymity and confidentiality were maintained.

Data analyses

Data analyses were done using SPSS version 23 (IBM Corporation, Armonk, New York, USA). The analyses involved descriptive statistics, chi-square, F-statistic, and logistic regression. Descriptive statistics were used to analyze respondents’ characteristics including socioeconomic and demographic, health history, perceived risk of pandemic, coronavirus infection and impact, previous vaccine experience, vaccine trial participation (volunteerism), vaccine distribution, and vaccine acceptance and preference. The findings of descriptive statistics were displayed in frequency and percentage form. Chi-square analysis was used to show the association between categorical variables such as respondents’ characteristics (aforementioned) and vaccine acceptance (not shown in table). Furthermore, F-statistic was applied to exhibit the mean differences of vaccine demand, hesitancy, and nationalism regarding vaccine acceptance, and domestic vaccine preference.

Binary logistic regression was performed and presented with an odds ratio (OR) and 95% confidence interval (CI) for divulging the association of vaccine demand, hesitancy, and nationalism with vaccine acceptance, and domestic vaccine preference. Here, three models were run for each outcome variable. The first model was unadjusted, while the second model adjusted for socioeconomic and demographic characteristics and the third model further adjusted for health history, perceived risk of the pandemic, coronavirus infection (of the respondents and their family members), impact (on their daily life, work, and income), previous vaccination experience, vaccine trial participation (volunteerism), and vaccine distribution.

Results

This study collected information on respondents’ socioeconomic and demographic profile, health history, perceived risk of the pandemic, coronavirus infection, impact, previous vaccine experience, vaccine trial participation, vaccine distribution, acceptance, and preference. Out of 1,018 young adults, two-thirds (66%) were male and one-third were female (34%). Of the young adults, 24.2% were from 18-20 age category, 37.8% from 21-23, 24.1% from 24-26, and 13.9% from 26+ age category. More than half (57.5%) dwelled in urban areas and 42.5% lived in rural places. The educational qualification of 0.3% of respondents was secondary, 9.2% higher secondary, 65% graduate (honors), 24.5% postgraduate (master), and 1% MPhil, PhD, and others. A large number of respondents (88.3%) were unmarried, leaving only 11.7% married. A big portion of them was students (75%), 1.4% businesspersons, 9.4% jobholders, 1.4% house workers, 0.8% other workers, and 12% unemployed. Nearly half of the respondents (47.9%) added that they had no earnings, while 52.1% had a monthly income of different ranges (< 10,000 to > 50,000).

Though 17% of respondents had physical health problems and 13.6% had mental health complications, about 95% added that their overall health conditions were satisfactory. Further, 4.3% of the respondents and 12.5% of their family members were infected with COVID-19 and 22.8% reported to be at a high risk of being infected. More than 50% of the respondents divulged that the coronavirus pandemic had a high impact on their daily life, work, and income.

Regarding previous vaccination behavior, more than half of the respondents (53.9%) added to receive vaccines against different viruses, while 14.4% directly refused the vaccines that were available and were taken by other people. For the coronavirus vaccine trial,

Table 1. F-statistic of vaccine demand, hesitancy, and nationalism with vaccine acceptance and domestic vaccine preference.

Variables	Mean (SD)	Minimum, maximum	Vaccine acceptance		Domestic vaccine preference	
			F-statistic		F-statistic	
Vaccine demand	5.78 (1.88)	0, 8	176.95***		4.42**	
Vaccine hesitancy	5.24 (2.66)	0, 15	57.17***		1.23	
Vaccine nationalism	25.12 (5.95)	7, 35	1.88		861.91***	

** $p < 0.05$; *** $p < 0.001$; SD: Standard Deviation.

55.3% of respondents willed for being volunteers. In replying to a query that who should be given the vaccine first, 41.6% opined that the vaccine should first be given to frontline workers, 13.2% told to give to old people with co-morbidity, 14.5% added to give to highly infected areas, and 26.7% divulged to distribute across the country at the same time. Among the young adults, 94.9% wanted to receive any vaccine and 58.1% preferred domestic vaccine.

Table 1 shows the mean, standard deviation (SD), and minimum and maximum score of vaccine demand, hesitancy, and nationalism. The F-statistic indicates that there are significant mean differences between the categories (yes, no) of vaccine acceptance and domestic vaccine preference regarding vaccine demand, vaccine hesitancy, and vaccine nationalism ($p < 0.001$ and $p < 0.05$).

Table 2 displays the odds ratio (OR) predicting the association of vaccine demand, hesitancy, and nationalism with vaccine acceptance and domestic vaccine preference among young adults. Regarding vaccine acceptance, model 1 of logistic regression shows an unadjusted OR, which implies that the persons who had more vaccine demand were 2.25 times (95% CI = 1.90-2.65; $p < 0.001$) more likely to accept vaccine compared to those who had lower vaccine demand. After adjusting for age, gender, place of residence, divisional region, marital status, education, occupation, and monthly income in model 2, the OR increased a little, 2.69 (95% CI = 2.14-3.38; $p < 0.001$). After further adjusting for health history, perceived risk of the pandemic, coronavirus infection (of the respondents and their family members), impact (on

their daily life, work, and income), previous vaccine experience, vaccine trial participation, and vaccine distribution in model 3, the OR again increased, 3.29 (95% CI = 2.39-4.54; $p < 0.001$). The overall findings indicate that the increment in vaccine demand increases the chance of vaccine acceptance among young adults.

Unlike vaccine demand, vaccine hesitancy was significantly and negatively associated with vaccine acceptance. The OR was 0.73 in model 1 (95% CI = 0.67-0.80; $p < 0.001$), 0.69 in model 2 (95% CI = 0.62-0.77; $p < 0.001$), and 0.70 in model 3 (95% CI = 0.62-0.80; $p < 0.001$). More specifically, those who had more vaccine hesitancy were about 30% less likely to accept vaccine than those who had less hesitancy. Moreover, vaccine nationalism was marginally associated with vaccine acceptance, and its OR was found 1.03 (95% CI = 0.97-1.09; $p < 0.1$), significant in model 3 only. Overall, the increment in vaccine hesitancy decreases the likelihood of vaccine acceptance.

Regarding domestic vaccine preference, vaccine nationalism was found robustly associated and the OR was 1.67 (95% CI = 1.56-1.78; $p < 0.001$) in unadjusted model 1. Again, in adjusted models, 2 and 3, the OR increased and was found 1.69 (95% CI = 1.57-1.81; $p < 0.001$) and 1.75 (95% CI = 1.62-1.88; $p < 0.001$), respectively. The findings of these three models indicate that the persons who had more vaccine nationalism were respectively 67%, 69%, and 75% more likely to prefer domestic vaccine. While vaccine hesitancy was not significantly associated with domestic vaccine preference, vaccine demand was marginally associated and its OR was found 1.08 in

Table 2. Binary logistic regression predicting the association of vaccine demand, hesitancy, and nationalism with vaccine acceptance and domestic vaccine preference.

Variables	Vaccine acceptance			Domestic vaccine preference		
	OR (95% CI)			OR (95% CI)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Vaccine demand	2.25*** (1.90-2.65)	2.69*** (2.14-3.38)	3.29*** (2.39-4.54)	1.08** (1.01-1.15)	1.07* (1.00-1.15)	1.06 (0.98-1.14)
Vaccine hesitancy	0.73*** (0.67-0.80)	0.69*** (0.62-0.77)	0.70*** (0.62-0.80)	0.97 (0.93-1.02)	0.97 (0.92-1.02)	0.99 (0.94-1.05)
Vaccine nationalism	1.03 (0.99-1.08)	1.04 (0.99-1.10)	1.03* (0.97-1.09)	1.67*** (1.56-1.78)	1.69*** (1.57-1.81)	1.75*** (1.62-1.88)

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$; OR: Odds Ratio; CI: Confidence Interval. Model 1: Unadjusted. Model 2: Adjusted for age, gender, urbanity, divisional region, marital status, education, occupation, and monthly income. Model 3: Further adjusted for health history, perceived risk of pandemic, coronavirus infection (of the respondents and their family members), impact (on daily life, work, and income), previous vaccine experience, vaccine trial participation (volunteerism), and vaccine distribution.

model 1 (95% CI = 1.01-1.15; $p < 0.05$) and 1.07 in model 2 (95% CI = 1.00-1.15; $p < 0.1$).

Discussion

Since the outbreak of COVID-19, an effective vaccine has been an urgent need for fighting against the deadly virus. With the necessity to invent the vaccine, the socio-psychological and behavioral aspects of vaccine have also gained important research appeal. From this importance, the main purpose of this study was set to explore the vaccine demand, hesitancy, and nationalism and to understand the association of these variables with vaccine acceptance and domestic vaccine preference. Current study findings explore that the individuals who have more vaccine demand and vaccine nationalism have higher chances of accepting vaccine and more likelihood of preferring domestic vaccine, respectively. On the contrary, the persons with more vaccine hesitancy were less prone to accept vaccine against coronavirus. Likewise, the study remains accordant to the theoretical and conceptual framework that the threat appraisal (vaccine hesitancy) and coping appraisal (vaccine demand and vaccine nationalism) affect the protection motivation behaviors (vaccine acceptance and domestic vaccine preference) of the individuals.

The findings of this study divulge that the level of vaccine demand is robustly associated with vaccine acceptance. More specifically, the persons who have more vaccine demand are highly prone to accept vaccine against coronavirus. In further detail, vaccine demand, as a coping appraisal, which is a gross of vaccine response efficacy and vaccine self-efficacy, motivates individuals to receive a vaccine and thus to make them safe and sound during the pandemic [21]. On one side, the vaccine response efficacy entails that the coping response, the corona vaccine, is safe and effective and thus creates intention to act. On another side, the vaccine self-efficacy of individuals turns them able to perform the coping response to the vaccine [22]. Likewise, the vaccine demand works as a coping appraisal, raises protection motivation of the individuals, and makes them intended and motivated to accept the vaccine. Similarly, prior studies also found the same association between vaccine demand and vaccine acceptance [23,26–28].

In this study, vaccine hesitancy has been found to have negative association with vaccine acceptance. The findings demonstrate that those who had more hesitancy are less likely to accept the vaccine compared to those who had less hesitancy. This happens due to the threat appraisal that the corona vaccine may be

threatening for its newness, quick arrival, and other issues. Vaccine hesitancy, as a threat appraisal, emerges from perceived vaccine severity and perceived vaccine vulnerability among the individuals [21,29]. On one hand, perceived vaccine vulnerability shows that the individuals are severely vulnerable to the rush invention and outer organic nature of vaccine [25,30]. On another hand, the perceived vaccine severity influences the individuals that the side effects, unorganized distribution process, and very new nature create disbeliefs about its effectiveness among the individuals [25,31,32]. Thus, vaccine hesitancy provides an adverse protection motivation and keeps individuals aloof from engaging in vaccination behavior. The antecedent studies also collected various evidence between vaccine hesitancy and vaccine acceptance [26,33,34].

Interestingly, vaccine nationalism has been found robustly related to domestic vaccine preference. In more detail, the persons who possess higher vaccine nationalism are more likely to prefer and accept the domestic vaccine. Considering vaccine nationalism as a determinant of domestic vaccine preference and thus as a coping appraisal may be effective in the sense that national sentiment creates fondness, fascination, and interest for domesticity, domestic products, ethnicity, and other domestic belongings [35]. From the sense of protective and coping appraisal, the persons who have more vaccine nationalism may consider the domestic vaccine to be environment, weather, and biological-feature friendly. These create protection motivations that cause them to accept and prefer domestic vaccine against coronavirus [36]. Earlier studies also showed vaccine nationalism as a crisis for low-income settings [11,14,15] and thus preferred domestic vaccine production and fair distribution.

This study holds some limitations. The findings of the study should be generalized cautiously, as it was conducted only on a single cohort of the population (young adults). Since random sampling was not possible, a non-random sampling procedure (snowball) was used. Face-to-face data collection was not possible due to the chance and fear of COVID-19 infection and hence the data were collected using online social media platforms.

Conclusions

Effective vaccines have been urgent global need for preventing the coronavirus pandemic. Likewise, attitudes related to the demand, hesitancy, and nationalism of vaccine have gained alike need for investigation. Hence, this study explored the fact that the individuals who have more vaccine demand are

highly prone to accept vaccine compared to those who have less vaccine demand. Similarly, the persons with higher vaccine nationalism were also more likely to prefer domestic vaccine than those who had lower vaccine nationalism. On the contrary, the people with more vaccine hesitancy had less likelihood of accepting any of the vaccines. However, for ensuring vaccine acceptance, as a protection motivation behavior, policymakers may take initiatives for making people aware and knowledgeable about the severity and vulnerability to specific health threats. Perception and efficacy-increasing programs may also take part in increasing protection motivation behaviors like vaccine acceptance and (domestic) vaccine preference.

References

- Baud D, Qi X, Nielsen-Saines K, Musso D, Pomar L, Favre G (2020) Real estimates of mortality following COVID-19 infection. *Lancet Infect Dis* 20: 773.
- Mehra MR, Desai SS, Kuy S, Henry TD, Patel AN (2020) Cardiovascular disease, drug therapy, and mortality in Covid-19. *N Engl J Med* 382: e102.
- Thanh Le T, Andreadakis Z, Kumar A, Gómez Román R, Tollefsen S, Saville M, Mayhew S (2020) The COVID-19 vaccine development landscape. *Nat Rev Drug Discov* 19: 305–306.
- World Health Organization (WHO) (2021) COVID-19 vaccine tracker and landscape. Available: <https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines>. Accessed: 28 September 2021.
- Corum J, Zimmer C (The New York Times) (2021) How nine Covid-19 vaccines work. Available: <https://www.nytimes.com/interactive/2021/health/how-covid-19-vaccines-work.html>. Accessed: 29 September 2021.
- Harapan H, Wagner AL, Yufika A, Winardi W, Anwar S, Gan AK, Setiawan AM, Rajamoorthy Y, Sofyan H, Mudatsir M (2020) Acceptance of a COVID-19 vaccine in Southeast Asia: a cross-sectional study in Indonesia. *Front Public Health* 8: 381.
- Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll MD, Fang H (2020) Acceptance of covid-19 vaccination during the covid-19 pandemic in China. *Vaccines (Basel)* 8: 482.
- Xiao X, Wong RM (2020) Vaccine hesitancy and perceived behavioral control: a meta-analysis. *Vaccine* 38: 5131–5138.
- Ali M, Hossain A (2021) What is the extent of COVID-19 vaccine hesitancy in Bangladesh? A cross-sectional rapid national survey. *BMJ Open* 11: e050303.
- Gidengil CA, Parker AM, Zikmund-Fisher BJ (2012) Trends in risk perceptions and vaccination intentions: a longitudinal study of the first year of the H1N1 pandemic. *Am J Public Health* 102: 672–679.
- Fidl DP (2020) Vaccine nationalism's politics. *Science* 369: 749.
- World Health Organization (WHO) (2019) Ten threats to global health in 2019. Available: <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>. Accessed: 28 September 2021.
- Setbon M, Raude J (2010) Factors in vaccination intention against the pandemic influenza A/H1N1. *Eur J Public Health* 20: 490–494.
- Bollyky TJ, Bown CP (2020) The tragedy of vaccine nationalism: only cooperation can end the pandemic. *Foreign Affairs* 99: 96.
- Santos Rutschman A (2020) The reemergence of vaccine nationalism. *Georgetown Journal of International Affairs*, Forthcoming. Saint Louis U. Legal Studies Research Paper No. 2020-16.
- United News of Bangladesh (UNB) (2020) Covid-19 vaccines: Bangladesh has 'limited choices'. Available: <https://unb.com.bd/category/Special/covid-19-vaccines-bangladesh-has-limited-choices/61441>. Accessed: 24 September 2021.
- The Daily Star (2020) Is Bangladesh ready to distribute a Covid-19 vaccine? Available: <https://www.thedailystar.net/coronavirus-deadly-new-threat/news/bangladesh-ready-distribute-covid-19-vaccine-2008605>. Accessed: 24 September 2021.
- The Financial Express (2020) Vaccine still a challenge for Bangladesh, many others, says Dr Friedman. Available: <https://thefinancialexpress.com.bd/health/vaccine-still-a-challenge-for-bangladesh-many-others-says-dr-friedman-1607078183>. Accessed: 25 September 2021.
- Li L, Wang J, Nicholas S, Maitland E, Leng A, Liu R (2021) The intention to receive the covid-19 vaccine in China: insights from protection motivation theory. *Vaccines (Basel)* 9: 445.
- Chen YL, Lin YJ, Chang YP, Chou WJ, Yen CF (2021) Differences in the protection motivation theory constructs between people with various latent classes of motivation for vaccination and preventive behaviors against COVID-19 in Taiwan. *Int J Environ Res Public Health* 18: 7042.
- Rogers RW (1975) A protection motivation theory of fear appeals and attitude change I. *J Psychol* 91: 93-114.
- Plotnikoff RC, Trinh L (2010) Protection motivation theory: Is this a worthwhile theory for physical activity promotion? *Exerc Sport Sci Rev* 38: 91-98.
- Magadmi, R. M., Kamel FO (2020) Beliefs and barriers associated with COVID-19 vaccination among the general population in Saudi Arabia. *BMC Public Health* 21: 1438.
- Melovic B, Stojanovic AJ, Vulic TB, Dudic B, Benova E (2020) The impact of online media on parents' attitudes toward vaccination of children—social marketing and public health. *Int J Environ Res Public Health* 17: 5816.
- World Health Organization (WHO) (2014) Report of the SAGE Working Group on Vaccine Hesitancy. Available: https://www.who.int/immunization/sage/meetings/2014/october/1_Report_WORKING_GROUP_vaccine_hesitancy_final.pdf. Accessed: 25 September 2021.
- Otieno NA, Otiato F, Nyawanda B, Adero M, Wairimu WN, Ouma D, Atito R, Wilson A, Gonzalez-Casanova I, Malik FA, Widdowson MA, Omer SB, Chaves SS, Verani JR (2020) Drivers and barriers of vaccine acceptance among pregnant women in Kenya. *Hum Vaccines Immunother* 16: 2429-2437.
- Fu, C., Wei, Z., Pei, S., Li, S., Sun, X., Liu P (2020) Acceptance and preference for COVID-19 vaccination in health-care workers (HCWs). *MedRxiv Preprint* 2020.04.09.20060103.
- Lehmann BA, Ruitter RAC, Wicker S, Chapman G, Kok G (2015) Medical students' attitude towards influenza vaccination. *BMC Infect Dis* 15: 185.

29. Milne S, Sheeran P, Orbell S (2000) Prediction and intervention in health-related behavior: A meta-analytic review of protection motivation theory. *J Appl Soc Psychol* 30: 106-143.
30. Stangier U, Kananian S, Schüller J (2021) Perceived vulnerability to disease, knowledge about COVID-19, and changes in preventive behavior during lockdown in a German convenience sample. *Curr Psychol* 2021: 1-9.
31. Chohan UW (2021) Coronavirus and vaccine nationalism. CASS working papers on economics and national affairs. SSRN Preprint 3767610.
32. Kathiravan S, Singhanian N, Pannu AK (2021) Perceived susceptibility, severity, and reinfection of COVID-19 may influence vaccine acceptance. *Asian Pac J Trop Med* 14: 238.
33. Al-Mohaithef M, Padhi BK (2020) Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia: a web-based national survey. *J Multidiscip Healthc* 13: 1657.
34. Fisher KA, Bloomstone SJ, Walder J, Crawford S, Fouayzi H, Mazor KM (2020) Attitudes toward a potential SARS-CoV-2 vaccine: a survey of U.S. adults. *Ann Intern Med* 173: 964-973.
35. Balabanis G, Diamantopoulos A, Mueller RD, Melewar TC (2001) The impact of nationalism, patriotism and internationalism on consumer ethnocentric tendencies. *J Int Bus Stud* 32: 157-175.
36. Barceló J, Sheen G, Tung H, Wu W-C (2021) The nation of vaccine development influences vaccine acceptance. SocArXiv Preprint 10.31235.

Corresponding author

Mostafizur Rahman, MSS
Lecturer of Sociology
Department of Science and Humanities
Bangabandhu Sheikh Mujibur Rahman Aviation and Aerospace
University
Old Airport, Tejgaon, Dhaka 1215, Bangladesh
ORCID: 0000-0001-9354-5613
Phone: +880 1850-091702
Email: mostafizur.r@hotmail.com

Conflict of interests: No conflict of interests is declared.