



American Journal of Multidisciplinary Research and Innovation (AJMRI)

ISSN: 2158-8155 (ONLINE), 2832-4854

VOLUME 3 ISSUE 1 (2024)



PUBLISHED BY: E-PALLI PUBLISHER, DELAWARE, USA

Understanding Motivations Behind COVID-19 Vaccination Uptake: Insights from a Cross-Sectional Study in Northern Bangladesh

Mohammad Zahidul Islam^{1*}, Md Awal Kabir²

Article Information

Received: July 13, 2023

Accepted: December 27, 2023

Published: February 10, 2024

Keywords

COVID-19, Vaccination, Socio-Demographic Factors, Bangladesh

ABSTRACT

The emergence of COVID-19 has prompted global vaccination campaigns as a cornerstone of mitigation strategies. Understanding the factors influencing vaccine uptake is essential for designing targeted interventions to enhance immunization coverage. A cross-sectional study was conducted in northern Bangladesh, involving 1564 respondents aged 12 years and above. Data on COVID-19 vaccine uptake motivations and socio-demographic characteristics were collected through structured interviews. Descriptive statistics and multivariate logistic regression analyses were employed to explore associations between socio-demographic factors and vaccine uptake motivations. The study identified two key motivations for COVID-19 vaccine uptake: belief in the vaccine's efficacy in reducing the risk of contracting the virus and feeling safe to engage in daily activities after vaccination. Socio-demographic factors such as age, education level, occupation, marital status, and disease status were significantly associated with these motivations. This study sheds light on the motivations driving COVID-19 vaccine uptake in Bangladesh and highlights the importance of addressing socio-demographic disparities in vaccine acceptance. Targeted interventions aimed at improving vaccine confidence and accessibility are crucial for promoting widespread immunization and combating the pandemic. Further research is needed to explore additional factors influencing vaccine uptake behavior and assess the long-term impact of vaccination campaigns on public health outcomes.

INTRODUCTION

The emergence of COVID-19 in late 2019 presented a global health crisis of unprecedented scale, demanding rapid and coordinated responses from governments, healthcare systems, and communities worldwide (Muralidar, Ambi, Sekaran, & Krishnan, 2020). In this context, vaccination campaigns emerged as a cornerstone of mitigation strategies, offering hope for curbing transmission, protecting individuals, and reducing the burden on healthcare systems (Largeron, Lévy, Wasem, Bresse, & policy, 2015; Rémy, Zöllner, Heckmann, & policy, 2015). However, the success of these campaigns hinges on widespread vaccine uptake, a complex phenomenon influenced by a multitude of factors (Yin *et al.*, 2022).

Understanding the factors that influence people's decision-making regarding COVID-19 vaccination is paramount for designing targeted interventions to enhance vaccine uptake and achieve population immunity (Kabir, Rahman, & Khan, 2022; Naidoo, Meyer-Weitz, & Govender, 2023; Soares *et al.*, 2021). While numerous studies have explored vaccination attitudes and behaviors in various contexts, there remains a critical need for localized insights to inform tailored strategies at the regional level (Habersaat & Jackson, 2020; Hopkins *et al.*, 2023). In Bangladesh, where COVID-19 vaccination programs have been implemented, it is essential to elucidate the motivations driving vaccine acceptance among the population, particularly in different geographic regions with unique socio-demographic characteristics (Abedin *et al.*, 2021;

Khan, Kabir, Shariff, & Rahman, 2022; Lee *et al.*, 2022). Previous studies have highlighted vaccine hesitancy as a significant barrier to achieving widespread immunization (Galagali, Kinikar, & Kumar, 2022; Khanam & Kabir, 2023). Moreover, factors such as perceived safety, efficacy, and trust in healthcare authorities have been identified as significant predictors of vaccine acceptance among various populations (Joshi *et al.*, 2021; Kalam *et al.*, 2021; Khan, Alam, Chowdhury, Kabir, & Khan, 2023; Le, Nguyen, & Do, 2022; Roy, Ali, Sarker, Islam, & Azam, 2023). Additionally, socio-demographic factors at the individual level have been found to influence vaccine uptake (Reichmuth *et al.*, 2023).

However, existing studies often report conflicting associations and are often limited to specific population groups (Backhaus & Health, 2023; de Figueiredo, Simas, & Larson, 2023; Kabir *et al.*, 2022; Lapo-Talledo, Talledo-Delgado, Portalanza, Ballaz, & Siteneski, 2023), making them less applicable for informing broader policy and program-making efforts.

To address these gaps in knowledge, we conducted this study to identify the motivations behind COVID-19 vaccination uptake in Bangladesh and explore their associations with socio-demographic factors.

METHODOLOGY

Study Setting

Data were collected from five districts (Kishorgonj, Gazipur, Netrokona and Jamalpur) spanning two divisions of Bangladesh: Dhaka and Mymensingh. While

¹ Department of Population Science, Jatiya Kabi Kazi Nazrul Islam University, Trishal, Mymensingh, Bangladesh

² Department of Social Work, Pabna University of Science and Technology, Pabna, Bangladesh

* Corresponding author's e-mail: zahid100779@gmail.com

the choice of divisions was purposeful, the selection of districts within these divisions was done randomly.

Sample

Data were collected from a total of 1564 respondents aged 12 years or older. The inclusion criteria stipulated that respondents must have either received at least one dose of the COVID-19 vaccine or registered for vaccination.

Outcome Variables

The perception of respondents regarding motivations for vaccination was considered as the outcome variable. This encompassed two key factors: the belief that vaccination reduces the risk of contracting the coronavirus (yes, no) and the feeling of safety to engage in daily activities after vaccination (yes, no).

Explanatory Variables

The socio-demographic characteristics of respondents were considered as explanatory variables in this study. These variables were selected based on a review of relevant literature and their availability in the survey dataset. They included respondents’ age, gender, education, occupation, marital status, living area, smoking status, monthly income, and disease status.

Statistical Analysis

Descriptive statistics, including frequency and percentage, were employed to characterize the respondents. Multivariate logistic regression analysis was conducted to identify factors associated with two outcome variables: the belief that vaccination reduces the risk of contracting

the coronavirus and the feeling of safety to engage in daily activities after vaccination. Separate models were constructed for each outcome variable. Prior to running each model, multicollinearity among variables was assessed. In cases where evidence of multicollinearity was detected, relevant variables were removed, and the models were rerun. Results are presented as odds ratios (aOR) along with their corresponding confidence intervals. All analyses were performed using Stata version 15.1.

RESULTS

Background Characteristics of the Respondents

The background characteristics of the respondents are presented in Table 1. The descriptive statistics revealed that the majority of respondents fell within the age range of 31-60 years (51.4%), followed by those aged 12-30 years (43.2%), with a mean age of 36.34 years (SE=0.338). Regarding gender distribution, males comprised a larger proportion (64.6%) compared to females (35.4%). In terms of education, the highest percentage of respondents had completed at least 10 years of education (38.6%), while 30.7% had 6-10 years of education. Occupation-wise, the respondents were diverse, with a notable proportion being housewives (23.8%), followed by businessmen and self-employed individuals (20.6%). The majority of respondents were married (70.3%), residing mainly in villages (47.3%). A significant portion reported never having smoked (58.7%), while 27.3% currently smoked. The mean monthly income was 16,472.05 Taka (SE=300.46), with most respondents earning between 500 and 16,472 Taka (50.3%). A sizable proportion reported having a disease (30.6%), while the majority did not (69.4%).

Table 1: Background characteristics of the respondents

Socio-demographic characteristics	Frequency	Percentage (%)	Mean (SE)
Respondents’ age (in years)			36.34 (0.338)
12-30	675	43.2	
31-60	804	51.4	
≥ 61	85	5.4	
Respondents’ gender			
Male	1011	64.6	
Female	553	35.4	
Respondents’ education			8.84 (0.130)
Illiterate	182	11.6	
1 - 5	298	19.1	
6 - 10	480	30.7	
≥ 10	604	38.6	
Respondents’ occupation			
Employee	326	20.8	
Businessman and Self-employed	322	20.6	
Housewife	373	23.8	
Farmer and Worker	270	17.3	
Others (Student, Unemployed, Retired)	273	17.5	

Respondents' marital status			
Married	1100	70.3	
Unmarried (Separated, Single)	405	25.9	
Widow / Widower	59	3.8	
Respondents' living area			
District	374	23.9	
Sub- District	451	28.8	
Village	739	47.3	
Respondents' smoking status			
Currently, do	427	27.3	
I never did	918	58.7	
I used to do it but now I don't	79	5.1	
I do it occasionally	140	9.0	
Respondents' monthly income			
500 - 16472	787	50.3	16472.05
16473 - 80000	585	37.4	(300.46)
Respondents' disease status			
Yes	479	30.6	
No	1085	69.4	

Perceptions of COVID-19 Vaccine Uptake Benefits among the Respondents

Table 2 presents the distribution of respondents' perceptions regarding COVID-19 vaccination benefits, categorized by demographic characteristics. Overall, a large majority of respondents expressed belief in the effectiveness of vaccination in reducing the risk of contracting the coronavirus, with 87.1% affirming this perception. Similarly, a substantial proportion reported feeling safe to engage in daily activities after vaccination, with 91.2% expressing this sentiment. Analysis by age groups revealed that younger respondents aged 12-30 years exhibited slightly lower levels of belief in vaccination effectiveness (35.5%) compared to older age groups,

while feeling safe after vaccination was more prevalent among respondents aged 31-60 years (47.6%). Regarding gender, male respondents demonstrated slightly higher levels of belief in vaccination effectiveness (56.5%) and feeling safe after vaccination (58.6%) compared to female respondents. Education-wise, respondents with higher levels of education exhibited greater belief in vaccination effectiveness and feeling safe after vaccination. Similar trends were observed across different occupational groups, marital status categories, living areas, smoking status, income levels, and disease status, with variations in percentages but consistent overall patterns of belief in vaccination benefits.

Table 2: Respondents' perceptions of the benefits of COVID-19 vaccine uptake across their socio-demographic characteristics

Socio-demographic characteristics	Belief that vaccination reduces the risk of contracting the coronavirus		Feeling of safety to engage in daily activities after vaccination	
	Yes (%)	No (%)	Yes (%)	No (%)
	1362	202	1427	137
	(87.1)	(12.9)	(91.2)	(8.8)
Respondents' age (in years)				
12-30	556 (35.5)	119 (7.6)	602 (38.5)	73 (4.7)
31-60	728 (46.5)	76 (4.9)	744 (47.6)	60 (3.8)
≥ 61	78 (5.0)	7 (0.4)	81 (5.2)	4 (0.3)
Respondents' gender				
Male	884 (56.5)	127 (8.1)	916 (58.6)	95 (6.1)
Female	478(30.6)	75 (4.8)	511 (32.7)	42 (2.7)
Respondents' education				
Illiterate	149 (9.5)	33 (2.1)	167 (10.7)	15 (1.0)

1 - 5	268 (17.1)	30 (1.9)	284 (18.2)	14 (0.9)
6 - 10	442 (28.3)	38 (2.4)	439 (28.1)	41 (0.9)
≥ 10	503 (32.2)	101 (6.5)	537 (34.3)	67 (4.3)
Respondents' occupation				
Employee	290 (18.5)	36 (2.3)	299 (19.1)	27 (1.7)
Businessman and Self-employed	297 (19.0)	25 (1.6)	287 (18.4)	35 (2.2)
Housewife	329 (21.0)	44 (2.8)	345 (22.1)	28 (1.8)
Farmer and Worker	241 (15.4)	29 (1.9)	248 (15.9)	22 (1.4)
Others (Student, Unemployed, Retired)	205 (13.1)	68 (4.3)	248 (15.9)	25 (1.6)
Respondents' marital status				
Married	991 (63.4)	109 (7.0)	1007 (64.4)	93 (5.9)
Unmarried (Separated, Single)	321 (20.5)	84 (5.4)	365 (23.3)	40 (2.6)
Widow / Widower	50 (3.2)	9 (0.6)	55 (3.5)	4 (0.3)
Respondents' living area				
District	312 (19.9)	62 (4.0)	335 (21.4)	39 (2.5)
Sub- District	396 (25.3)	55 (3.5)	415 (26.5)	36 (2.3)
Village	654 (41.8)	85 (5.4)	677 (43.3)	62 (4.0)
Respondents' smoking status				
Currently, do	381 (24.4)	46 (2.9)	394 (25.2)	33 (2.1)
I never did	795 (50.8)	123 (7.9)	832 (53.2)	86 (5.5)
I used to do it but now I don't	71 (4.5)	8 (0.5)	71 (4.5)	8 (0.5)
I do it occasionally	115 (7.4)	25 (1.6)	130 (8.3)	10 (0.6)
Respondents' monthly income				
500 - 16472	684 (43.7)	103 (6.6)	722 (46.2)	65 (4.2)
16473 - 80000	527 (33.7)	58 (3.7)	537 (34.3)	48 (3.1)
Respondents' disease status				
Yes	413 (26.4)	66 (4.2)	436 (27.9)	43 (2.7)
No	949 (60.7)	136 (8.7)	991 (63.4)	94 (6.0)

Factors Associated with Positive Perception of COVID-19 Vaccine Uptake

Table 3 presents the factors associated with respondents' perception that vaccination reduces the risk of contracting the coronavirus. Among respondents' age groups, those aged 31-60 years and ≥61 years showed statistically significant associations with higher odds of believing in vaccination effectiveness compared to the reference group (aged 12-30 years), with odds ratios of 1.690 (95% CI: 1.103-2.590) and 2.982 (95% CI: 1.166-7.627), respectively. Gender, education level, occupation, marital status, living area, and smoking status did not show statistically significant associations with perception

of vaccination effectiveness. However, respondents with education levels of ≥10 years exhibited lower odds of believing in vaccination effectiveness (OR: 0.531, 95% CI: 0.293-0.963) compared to illiterate individuals. Additionally, respondents without any reported diseases had lower odds of perceiving vaccination effectiveness (OR: 0.620, 95% CI: 0.430-0.894) compared to those with reported diseases. Other socio-demographic characteristics such as gender, occupation, marital status, living area, smoking status, and monthly income did not show statistically significant associations with respondents' perception of vaccination effectiveness.

Table 3: Factors associated with respondents' perception that vaccination reduces the risk of contracting the coronavirus

Characteristics	p-value	Odds ratio	95% CI	
			Lower Bound	Upper Bound
Respondents' age (in years)				
12-30		1.00		
31-60	0.016	1.690	1.103	2.590
≥ 61	0.023	2.982	1.166	7.627
Respondents' gender				
Male		1.00		

Female	0.791	1.073	0.637	1.805
Respondents' education				
Illiterate		1.00		
1 - 5	0.978	1.008	0.563	1.805
6 - 10	0.153	1.425	0.877	2.317
≥ 10	0.037	0.531	0.293	0.963
Respondents' occupation				
Employee		1.00		
Businessman and Self-employed	0.214	1.419	0.817	2.463
Housewife	0.964	0.984	0.497	1.949
Farmer and Worker	0.486	1.264	0.671	2.311
Others (Student, Unemployed, Retired)	0.198	0.677	0.375	1.225
Respondents' marital status				
Married		1.00		
Unmarried (Separated, Single)	0.330	0.666	0.295	1.504
Widow / Widower	0.329	0.779	0.471	1.288
Respondents' living area				
District		1.00		
Sub- District	0.705	1.085	0.710	1.658
Village	0.349	1.218	0.806	1.839
Respondents' smoking status				
Currently, do		1.00		
I never did	0.746	1.081	0.675	1.732
I used to do it but now I don't	0.923	1.042	0.453	2.397
I do it occasionally	0.079	0.607	0.348	1.060
Respondents' monthly income				
500 - 16472		1.00		
16473 - 80000	0.123	1.364	0.920	2.023
Respondents' disease status				
Yes		1.00		
No	0.011	0.620	0.430	0.894

Table 4 presents the factors associated with respondents' feeling of safety to engage in daily activities after vaccination. Among respondents' age groups, those aged 31-60 years showed a statistically significant association with higher odds of feeling safe after vaccination compared to the reference group (aged 12-30 years), with an odds ratio of 1.637 (95% CI: 1.029-2.604). Gender did not show a statistically significant association with feeling safe after vaccination. Regarding education level, individuals with 1-5 years of education exhibited significantly higher odds of feeling safe after vaccination (OR: 3.143, 95% CI:

1.539-6.418) compared to illiterate individuals. However, no statistically significant associations were found for education levels of 6-10 years or ≥10 years. Occupation-wise, individuals who were currently employed as businessmen and self-employed showed lower odds of feeling safe after vaccination (OR: 0.587, 95% CI: 0.340-1.013) compared to employees. Marital status, living area, smoking status, monthly income, and disease status did not show statistically significant associations with feeling safe after vaccination.

Table 4: Factors associated with respondents' feeling of safety to engage in daily activities after vaccination

Characteristics	p-value	Odds ratio	95% CI	
			Lower Bound	Upper Bound
Respondents' age (in years)				
12-30		1.00		
31-60	0.037	1.637	1.029	2.604
≥ 61	0.063	2.979	0.941	9.425

Respondents' gender				
Male		1.00		
Female	0.052	1.913	0.995	3.680
Respondents' education				
Illiterate		1.00		
1 - 5	0.002	3.143	1.539	6.418
6 - 10	0.048	1.650	1.004	2.713
≥ 10	0.135	1.731	0.842	3.558
Respondents' occupation				
Employee		1.00		
Businessman and Self-employed	0.055	0.587	0.340	1.013
Housewife	0.485	0.743	0.323	1.709
Farmer and Worker	0.150	0.599	0.299	1.203
Others (Student, Unemployed, Retired)	0.187	1.649	0.785	3.466
Respondents' marital status				
Married		1.00		
Unmarried (Separated, Single)	0.643	1.145	0.646	2.029
Widow / Widower	0.758	0.840	0.277	2.029
Respondents' living area				
District		1.00		
Sub- District	0.133	1.469	0.890	2.425
Village	0.528	1.163	0.727	1.862
Respondents' smoking status				
Currently, do		1.00		
I never did	0.031	0.572	0.345	0.949
I used to do it but now I don't	0.241	0.601	0.257	1.407
I do it occasionally	0.941	1.029	0.487	2.173
Respondents' monthly income				
500 - 16472		1.00		
16473 - 80000	0.362	1.233	0.786	
Respondents' disease status				
Yes		1.00		
No	0.073	0.679	0.445	1.037

DISCUSSION

The objectives of this study were twofold: firstly, to elucidate the motivations driving COVID-19 vaccination uptake in Bangladesh, and secondly, to investigate the associations between these motivations and various socio-demographic factors. Our analysis focused on two primary motivations for vaccine uptake: the belief that vaccination reduces the risk of contracting the coronavirus and the feeling of safety to engage in daily activities after vaccination. We identified several socio-demographic factors among respondents that were significantly associated with these motivations.

Firstly, the study reveals age as a pivotal determinant of individuals' perceptions regarding vaccination efficacy and post-vaccination safety. This is comparable to the previous studies in LMICs (Al-Mohaithef & Padhi, 2020; Viswanath *et al.*, 2021). Notably, older respondents

aged 31-60 years exhibited significantly higher odds of believing in vaccination effectiveness and feeling safe after vaccination compared to younger counterparts aged 12-30 years (Viswanath *et al.*, 2021). This aligns with existing literature suggesting that older age groups, who are often more susceptible to severe COVID-19 outcomes, may perceive greater benefits from vaccination due to perceived vulnerability and higher perceived severity of the disease (Ibrahim, Fadila, & Elmawla, 2023). Conversely, younger individuals may harbor more skepticism or uncertainty about vaccination benefits, influenced by factors such as perceived invulnerability, vaccine misinformation, or concerns about vaccine side effects (Anas, Salifu, & Zakaria, 2023; Kabir & Islam, 2022).

Secondly, the study sheds light on the role of education in shaping vaccination perceptions, as found in other

LMICs (Al-Mohaithef & Padhi, 2020; Backhaus & Health, 2023; Habersaat & Jackson, 2020; Hopkins *et al.*, 2023; Khramchenko, 2023). Interestingly, individuals with lower levels of education (1-5 years) exhibited significantly higher odds of feeling safe after vaccination compared to illiterate individuals, suggesting a potential association between education and vaccine confidence (Khramchenko, 2023). This finding underscores the importance of health literacy and effective communication strategies in promoting vaccine acceptance, particularly among populations with lower educational attainment (Le *et al.*, 2022). However, the study also identified a decline in perceived vaccination effectiveness among individuals with higher education levels (≥ 10 years), highlighting the need for tailored communication approaches that address varying informational needs and concerns across educational strata (Kaufman *et al.*, 2018).

Moreover, the study explored the influence of occupation on vaccination perceptions, revealing intriguing patterns. Businessmen and self-employed individuals exhibited lower odds of feeling safe after vaccination compared to employees, although this association did not reach statistical significance (Wisnans, van der Zwan, & Thurik, 2023). This finding suggests potential occupational factors or contextual considerations that may influence vaccine perceptions, warranting further exploration (Roy, Biswas, Islam, & Azam, 2022). For instance, individuals with flexible employment arrangements or entrepreneurial pursuits may experience unique barriers or motivations related to vaccine uptake, such as concerns about productivity losses, access barriers, or differing risk perceptions in non-traditional work settings (Osetek, 2018).

Additionally, the study examined the impact of disease status on vaccination perceptions, revealing an intriguing association (Xia & Liu, 2014). Respondents without reported diseases exhibited lower odds of perceiving vaccination effectiveness compared to those with reported diseases (Goodman *et al.*, 2001). This unexpected finding prompts reflection on potential underlying mechanisms or confounding factors that may influence vaccination perceptions among healthier individuals (Al-Mohaithef & Padhi, 2020). It also underscores the need for nuanced approaches to vaccine messaging and outreach that consider individual health status, risk perception, and perceived susceptibility to COVID-19 (Goodman *et al.*, 2001).

Overall, the study findings contribute valuable insights to the evolving discourse on COVID-19 vaccine acceptance and public health strategies (Habersaat & Jackson, 2020). By elucidating the multifaceted determinants of vaccination perceptions across diverse socio-demographic groups, the study informs targeted interventions and communication strategies aimed at enhancing vaccine confidence and uptake (Hopkins *et al.*, 2023). However, the study's cross-sectional design limits causal inference and necessitates longitudinal investigations to validate the observed associations and elucidate temporal trends

in vaccination perceptions over time (Joshi *et al.*, 2021). Future research endeavors should also explore additional contextual factors, including cultural norms, social networks, and access barriers, to provide a comprehensive understanding of vaccination decision-making and inform evidence-based interventions to promote public health and mitigate the impact of the COVID-19 pandemic (Ibrahim *et al.*, 2023; Kaufman *et al.*, 2018).

This study has several strengths and a few limitations. This study analysed data collected from data from a diverse sample of respondents across multiple districts in Bangladesh, thereby providing a broad representation of the population's perspectives on COVID-19 vaccination. Rigorous statistical methods, including multivariate logistic regression analysis, were employed to identify factors associated with vaccine uptake motivations, enhancing the validity and reliability of the findings. Additionally, the study benefitted from a large sample size, with data collected from over 1500 respondents, providing substantial statistical power for more accurate assessments of associations between socio-demographic factors and vaccine uptake motivations. Moreover, by focusing on Bangladesh, the study offers valuable localized insights into the factors influencing COVID-19 vaccine acceptance within a specific geographic and socio-cultural context, which can inform targeted public health interventions.

However, several limitations should be noted. The cross-sectional design of the study limits the ability to establish causal relationships between socio-demographic factors and vaccine uptake motivations, warranting the need for longitudinal studies to provide more robust evidence over time. Additionally, reliance on self-reported data for vaccination status and motivations may introduce recall bias or social desirability bias, potentially influencing the accuracy of the results. Furthermore, while the study offers insights into vaccine acceptance in Bangladesh, its findings may not be generalizable to other populations with different socio-cultural contexts or healthcare systems. Moreover, the presence of unmeasured or residual confounders could impact the observed associations between socio-demographic factors and vaccine uptake motivations. Lastly, the study focused on a limited set of variables, and additional factors such as vaccine efficacy, safety concerns, and access to healthcare services were not comprehensively explored, suggesting the need for future research to incorporate a broader range of variables for a more holistic understanding of vaccine uptake behavior.

CONCLUSION

This study provides valuable insights into the motivations driving COVID-19 vaccine uptake in Bangladesh and the associated socio-demographic factors. Our findings highlight the importance of understanding the diverse range of factors influencing individuals' decisions to vaccinate against COVID-19. Belief in the vaccine's efficacy in reducing the risk of contracting the virus

and the feeling of safety to engage in daily activities after vaccination emerged as key motivators for vaccine acceptance among respondents. However, socio-demographic characteristics such as age, education level, occupation, marital status, and disease status were found to significantly influence these motivations. These findings underscore the need for targeted public health interventions tailored to specific demographic groups to address vaccine hesitancy and promote widespread immunization. Strategies aimed at improving vaccine confidence and addressing concerns related to safety and efficacy should be prioritized, particularly among groups with lower vaccine acceptance rates. Additionally, efforts to enhance access to vaccination services and promote health education and awareness campaigns can further support vaccine uptake initiatives.

Acknowledgements

The authors express their gratitude to the Departments of Population Science at Jatiya Kabi Kazi Nazrul Islam University, Bangladesh, for providing support during the conduct of this study.

REFERENCES

- Abedin, M., Islam, M. A., Rahman, F. N., Reza, H. M., Hossain, M. Z., Hossain, M. A., ... & Hossain, A. (2021). Willingness to vaccinate against COVID-19 among Bangladeshi adults: Understanding the strategies to optimize vaccination coverage. *PloS one*, *16*(4), e0250495.
- Al-Mohaithef, M., & Padhi, B. K. (2020). Determinants of COVID-19 vaccine acceptance in Saudi Arabia: a web-based national survey. *Journal of multidisciplinary healthcare*, 1657-1663.
- Anas, A. L., Salifu, M., & Zakaria, H. L. (2023). COVID-19 Pandemic and Vaccination Skepticism. *Human Arenas*, 1-25.
- Backhaus, A. (2023). Socio-demographic factors associated with COVID-19 vaccine uptake and refusal among Ugandan women. *Globalization and Health*, *19*(1), 68.
- De Figueiredo, A., Simas, C., & Larson, H. J. (2023). COVID-19 vaccine acceptance and its socio-demographic and emotional determinants: A multi-country cross-sectional study. *Vaccine*, *41*(2), 354-364.
- Galagali, P. M., Kinikar, A. A., & Kumar, V. S. J. C. P. R. (2022). *Vaccine hesitancy: Obstacles and challenges*. *10*(4), 241-248.
- Goodman, E., Adler, N. E., Kawachi, I., Frazier, A. L., Huang, B., & Colditz, G. A. (2001). Adolescents' perceptions of social status: development and evaluation of a new indicator. *Pediatrics*, *108*(2), e31-e31.
- Habersaat, K. B., & Jackson, C. (2020). Understanding vaccine acceptance and demand-and ways to increase them. *Bundesgesundheitsblatt, Gesundheitsforschung, Gesundheitsschutz*, *63*(1), 32.
- Hopkins, K. L., Underwood, T., Iddrisu, I., Woldemeskel, H., Bon, H. B., Brouwers, S., ... & Lihemo, G. (2023). Community-based approaches to increase COVID-19 vaccine uptake and demand: lessons learned from four UNICEF-supported interventions. *Vaccines*, *11*(7), 1180.
- Ibrahim, F. M., Fadila, D. E., & Elmawla, D. A. E. A. (2023). Older adults' acceptance of the COVID-19 vaccine: Application of the health belief model. *Nursing Open*, *10*(10), 6989-7002.
- Joshi, A., Kaur, M., Kaur, R., Grover, A., Nash, D., & El-Mohandes, A. (2021). Predictors of COVID-19 vaccine acceptance, intention, and hesitancy: a scoping review. *Frontiers in public health*, *9*, 698111.
- Kabir, M. A., & Islam, M. J. (2022). Trends of Breastfeeding Practice and Determinant Factors of Exclusive Breastfeeding in Bangladesh: Evidence from the Six Nationally Representative Cross-Sectional Surveys. *American Journal of Multidisciplinary Research and Innovation*, *1*(2), 1-7.
- Kabir, M. A., Rahman, M. M., & Khan, M. N. (2022). Maternal anemia and risk of adverse maternal health and birth outcomes in Bangladesh: A nationwide population-based survey. *PloS one*, *17*(12), e0277654.
- Kalam, M. A., Davis Jr, T. P., Shano, S., Uddin, M. N., Islam, M. A., Kanwagi, R., ... & Larson, H. J. (2021). Exploring the behavioral determinants of COVID-19 vaccine acceptance among an urban population in Bangladesh: Implications for behavior change interventions. *PloS one*, *16*(8), e0256496.
- Kaufman, J., Ryan, R., Walsh, L., Horey, D., Leask, J., Robinson, P., & Hill, S. (2018). Face-to-face interventions for informing or educating parents about early childhood vaccination. *Cochrane Database of Systematic Reviews*(5).
- Khan, M. N., Alam, M. B., Chowdhury, A. R., Kabir, M. A., & Khan, M. M. A. (2023). Availability and readiness of healthcare facilities and their effects on antenatal care services uptake in Bangladesh: analysis of linked data.
- Khan, M. N., Kabir, M. A., Shariff, A. A., & Rahman, M. M. (2022). Too many yet too few caesarean section deliveries in Bangladesh: Evidence from Bangladesh Demographic and Health Surveys data. *PLoS global public health*, *2*(2), e0000091.
- Khanam, S. J., & Kabir, M. A. (2023). Anaemia and Its Determinants among Pregnant Women Attending for Accessing Antenatal Care in Dhaka, Bangladesh. *American Journal of Multidisciplinary Research and Innovation*, *2*(5), 77-83.
- Khranchenko, D. S. (2023). Global Tapestry of Professional Discourse: Multidisciplinary Explorations in Media, Politics, and Online Discourse. *Professional Discourse & Communication*, *5*(3), 5-10.
- Lapo-Talledo, G. J., Talledo-Delgado, J. A., Portalanza, D., Ballaz, S., & Siteneski, A. J. J. o. C. H. (2023). Analysis of Socio-demographic, Economic and Individual Reasons for COVID-19 Vaccination Hesitancy in Ecuador: A Nationwide Longitudinal Study. 1-13.

- Largeron, N., Lévy, P., Wasem, J., & Bresse, X. (2015). Role of vaccination in the sustainability of healthcare systems. *Journal of market access & health policy*, 3(1), 27043.
- Le, C. N., Nguyen, U. T. T., & Do, D. T. H. (2022). Predictors of COVID-19 vaccine acceptability among health professions students in Vietnam. *BMC Public Health*, 22(1), 1-12.
- Lee, C., Holroyd, T. A., Gur-Arie, R., Sauer, M., Zavala, E., Paul, A. M., ... & Limaye, R. J. (2022). COVID-19 vaccine acceptance among Bangladeshi adults: Understanding predictors of vaccine intention to inform vaccine policy. *PLoS one*, 17(1), e0261929.
- Muralidar, S., Ambi, S. V., Sekaran, S., & Krishnan, U. M. (2020). The emergence of COVID-19 as a global pandemic: Understanding the epidemiology, immune response and potential therapeutic targets of SARS-CoV-2. *Biochimie*, 179, 85-100.
- Naidoo, D., Meyer-Weitz, A., & Govender, K. (2023). Factors Influencing the Intention and Uptake of COVID-19 Vaccines on the African Continent: A Scoping Review. *Vaccines*, 11(4), 873.
- Osetek, J. D. (2018). *The Last Mile: Removing Non-medical Obstacles in the Pursuit of Global Health Security*. George Mason University.
- Reichmuth, M. L., Heron, L., Riou, J., Moser, A., Hauser, A., Low, N., & Althaus, C. L. (2023). Socio-demographic characteristics associated with COVID-19 vaccination uptake in Switzerland: longitudinal analysis of the CoMix study. *medRxiv*, 2023-03.
- Rémy, V., Zöllner, Y., & Heckmann, U. (2015). Vaccination: the cornerstone of an efficient healthcare system. *Journal of market access & health policy*, 3(1), 27041.
- Roy, D. N., Ali, S., Sarker, A. K., Islam, E., & Azam, M. S. (2023). Acceptance of COVID-19 vaccine booster dose among the people of Bangladesh: A cross-sectional study. *Helixyon*, 9(11).
- Roy, D. N., Biswas, M., Islam, E., & Azam, M. S. (2022). Potential factors influencing COVID-19 vaccine acceptance and hesitancy: A systematic review. *PLoS one*, 17(3), e0265496.
- Soares, P., Rocha, J. V., Moniz, M., Gama, A., Laires, P. A., Pedro, A. R., ... & Nunes, C. (2021). Factors associated with COVID-19 vaccine hesitancy. *Vaccines*, 9(3), 300.
- Viswanath, K., Bekalu, M., Dhawan, D., Pinnamaneni, R., Lang, J., & McLoud, R. (2021). Individual and social determinants of COVID-19 vaccine uptake. *BMC public health*, 21(1), 818.
- Wismans, A., van der Zwan, P., & Thurik, R. (2023). COVID-19 vaccination: lower intention and coverage among entrepreneurs compared to employees. *International Journal of Entrepreneurial Behavior & Research*, 29(11), 312-336.
- Xia, S., & Liu, J. (2014). A belief-based model for characterizing the spread of awareness and its impacts on individuals' vaccination decisions. *Journal of The Royal Society Interface*, 11(94), 20140013.
- Yin, F., Ji, M., Yang, Z., Wu, Z., Xia, X., Xing, T., ... & Hu, Z. (2022). Exploring the determinants of global vaccination campaigns to combat COVID-19. *Humanities and Social Sciences Communications*, 9(1).