



Effect of COVID-19 Pandemic on BCG Vaccination in a Selected Area of Bangladesh



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Abstract

Background: BCG vaccination is an essential EPI schedule among the neonates for the prevention of tuberculosis. **Objective:** The purpose of the present study was to assess the effect of COVID19 pandemic on the BCG vaccination as per EPI schedule among newborn infant in selected area of Dhaka city of Bangladesh. **Methodology:** This study employed a cross-sectional design, utilizing secondary data. This study was conducted from November 2021 to October, 2022. This study was conducted in Savar Municipality of Dhaka district, Bangladesh. Infants aged 0 to or 11 months and women aged 15 to 49 years as well as pregnant women, were included from the DHIS2 database sub-section Savar Municipality. All the secondary data of the infants and women of the selected DHIS2 database sub-section were considered to extract the vaccination coverage. To record the EPI vaccination-related data from data base, a data collection form was used. In case of infant immunization, it included the variables regarding the coverage of BCG. **Results:** The monthly average number of children vaccinated with BCG was 611 ± 8 (both sexes), 307.63 ± 6.37 (boys) and 303.63 ± 4.72 (girls) during the pre-pandemic period, while these numbers were 608.25 ± 68.67 , 304.13 ± 33.92 , and 304.13 ± 34.84 , respectively, for both sexes, boys, and girls during the pandemic period. The overall average number of children vaccinated with BCG is higher during the pre-pandemic period compared to the pandemic period. The more boys were vaccinated during the pandemic period, and more girls were vaccinated during the pandemic period. However, these differences were not statistically significant ($p = 0.906$, 0.782 , and 0.969 , respectively). **Conclusion:** In conclusion, the BCG vaccination is not similar during and before COVID-19 pandemic. [Bangladesh Journal of Infectious Diseases, June 2026;13(1):51-56]

Keywords: COVID-19 pandemic; EPI; vaccination coverage; children and women

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Introduction

Vaccination is a safe and effective way to prevent disease and save lives- now more than ever¹. Immunization is a global health and development success story, saving millions of lives every year.

Vaccines reduce risks of getting a disease by working with your body's natural defenses to build protection². When one gets a vaccine, his/her immune system responds. Vaccines train the immune system to create antibodies, just as it does

when it's exposed to a disease. However, because vaccines contain only killed or weakened forms of germs like viruses or bacteria, they do not cause the disease or put one at risk of its complications. We now have vaccines to prevent more than 20 life-threatening diseases, helping people of all ages live longer, healthier lives³. Immunization currently prevents 2 to 3 million deaths every year from diseases like diphtheria, tetanus, pertussis, influenza and measles⁴. Immunization is a key component of primary health care and an indisputable human right. It's also one of the best health investments money can buy⁵. Vaccines are also critical to the prevention and control of infectious-disease outbreaks. They underpin global health security and will be a vital tool in the battle against antimicrobial resistance⁶.

Moreover, the WHO and other institutions have given priority to maternal immunization as an innovative and effective way to address maternal and neonatal mortality⁷. It has become a priority platform on the global health agenda given its potential to decrease serious morbidity and mortality not only in the mother, but also in the fetus, the neonate, and the young infant who are not able to immunologically respond to most vaccines⁸. There is a growing body of research evidence regarding the potential benefits of maternal immunization, including safety and ethics⁹. Additionally, new evidence is being generated to explore the potential benefits of new vaccines for the woman and her infant, such as Group B Streptococcus and Respiratory Syncytial Virus vaccines¹⁰. However, during the COVID-19 pandemic, vaccination continues to be critically important¹¹. Unfortunately, the pandemic has caused a decline in the number of children and pregnant women receiving routine immunizations all over the world, which could lead to an increase in illness and death from preventable diseases¹². WHO has urged countries to ensure that essential immunization and health services continue, despite the challenges posed by COVID-19. According to the United Nations Children's Emergency Fund (UNICEF), almost a quarter of the world's unimmunized or partially immunized children- about 4.5 million children- live in South Asia. Almost all of them, or 97 per cent, live in India, Pakistan, Afghanistan and Bangladesh¹³.

With lockdowns in place as a part of the novel coronavirus (COVID-19) response, routine immunizations have been severely disrupted, and parents are increasingly reluctant to take their children to health centers for routine jabs. However,

a detailed figure about the disruption and reduction of EPI vaccination program in Bangladesh as a consequence of COVID-19 pandemic is still unknown clearly, based on the online published data¹⁴. And, though in a selected area, this study will be an attempt to explore this effect.

The current surge of COVID-19 pandemic sweeping over the whole world has created a catastrophic flaw in the smooth conduction of the successful EPI vaccination program, including in Bangladesh¹⁵. Due to this unfavorable situation, the government of Bangladesh had to impose lockdown period for several times since March of the year of 2020. These lockdown situation as well as the fear of getting the disease among the service receivers, led to a reduction in the uptake of different types of hospital services throughout the country, including the EPI vaccination program¹⁶. However, the exact statistics about the flaws of EPI vaccination program in this country haven't been explored yet. The exploration of this highly important information gap is the primary prerequisite for the strengthening of the health system of this country during the pandemic situation¹⁷. Therefore, the purpose of the present study was to assess the effect of COVID19 pandemic on the BCG vaccination as per EPI schedule among newborn infant in selected area of Dhaka city of Bangladesh.

Methodology

Study Settings and Population: This was an analytical cross-sectional study, utilizing secondary data. This study was conducted from November 2021 to October, 2022. This study was conducted in Savar Municipality of Dhaka district, Bangladesh. It is around 21 km away from Dhaka city. Its area is around 14sq. km and it occupies about 6 lakhs of population. Infants aged 0 to or 11 months and women aged 15 to 49 years as well as pregnant were included from the DHIS2 database sub-section Savar Municipality. All the eligible infants (aged 0 to 11months) and women aged 15 to 49 years as well as pregnant women of the selected DHIS2 database sub-section, were included in this study. Infants vaccinated for OPV-0, and Women either pregnant or at childbearing age vaccinated for TT were excluded from this study.

Sampling Technique: All the secondary data of the infants and women of the selected DHIS2 database sub-section were considered to extract the vaccination coverage.

Study Procedure: To record the EPI vaccination related data from data base, a data collection form was used. In case of infant immunization, it

included the variables regarding the coverage of BCG. Data were extracted from the selected DHIS2 database sub-section for the period from April to November, 2019 and 2020.



Figure I: Geographical location of the study area

Statistical Analysis: In the pre-pandemic situation, a total of 641 infants, 24 pregnant women, and 148 women at child bearing age were included, whereas in pandemic situation the numbers of these participants were 728, 28 and 173, respectively. SPSS software version 25.0 was used for data processing and statistical analysis. Descriptive statistics, means and standard deviations were analyzed for all the variables related to specific vaccines. The vaccinations coverages were presented the forms of multivariate tables (e.g., month-wise BCG vaccination of children by pandemic status and gender). An independent sample t-test was done to see the statistical difference of mean vaccination coverage before and during the COVID-19 pandemic.

Quality assurance: Quality control was assured by the researcher through a close eye sight in all the steps of this study. For example, collected data were checked before entering into computer, and after entry the data were checked again and cleaned.

Ethical Consideration: Ethical approval was taken from the Ethical Review Committee of Bangladesh University of Health Sciences and permission for using secondary data from DHIS2 database was taken from the Honorable Mayor of Savar Municipality, Savar, Dhaka. Data confidentiality was ensured.

Results

This analytical cross-sectional study was done in Savar Municipality under Dhaka district to analyze the effect of COVID-19 pandemic on vaccination of children and women under EPI program of Bangladesh. The vaccination period covered in this study is April –November 2019 (as pre pandemic period) and April –November 2020 (pandemic period). Secondary data were extracted from the selected DHIS2 database (Savar sub-section) of

Table 1: Month-Wise BCG Vaccination of Children by Pandemic Status and Gender

Month	Pre-pandemic Period		Pandemic Period	
	Male	Female	Male	Female
April	317	303	272	273
May	312	306	274	274
June	307	297	284	288
July	305	303	278	273
August	301	300	306	300
September	315	305	311	314
October	300	302	354	355
November	304	313	354	356

DGHS. Monthly average number of children vaccinated with BCG was 611 ± 8 (both sexes), 307.63 ± 6.37 (boys) and 303.63 ± 4.72 (girls) during the pre-pandemic period, while these numbers were 608.25 ± 68.67 , 304.13 ± 33.92 and 304.13 ± 34.84 , respectively for both sexes, boys, and girls during pandemic period (Table 1).

Table 2: Average of Monthly Number of Children Vaccinated for BCG, Penta, and PCV during Pre-Pandemic and Pandemic Situation (Mean $\pm$ SD)

BCG	Pre-pandemic	Pandemic	P value
Boys	307.63 ± 6.37	304.13 ± 33.92	0.782
Girls	303.63 ± 4.72	304.13 ± 34.84	0.969
Total	611.25 ± 8.33	608.25 ± 68.67	0.906

Independent Sample t-test was done.

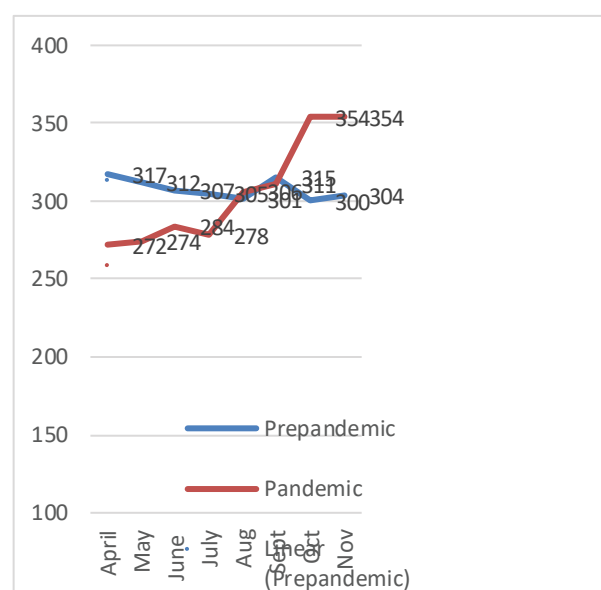


Figure 1a: Month-wise BCG Vaccination of Male Children by Pandemic Status

The overall average number of children vaccinated with BCG is higher during the pre-pandemic period compared to the pandemic period. But gender disaggregated data shows that more boys were vaccinated during the pandemic period, and more girls were vaccinated during the pandemic period. However, these differences are not statistically significant ($p = 0.906$, 0.782 , and 0.969 , respectively) (Table 2).

Trend analysis of this vaccination reveals that the impact of the pandemic was more during April–July, 2020, while there was a recovery during October–November, 2020 (Figure 1a, 1b, 1c).

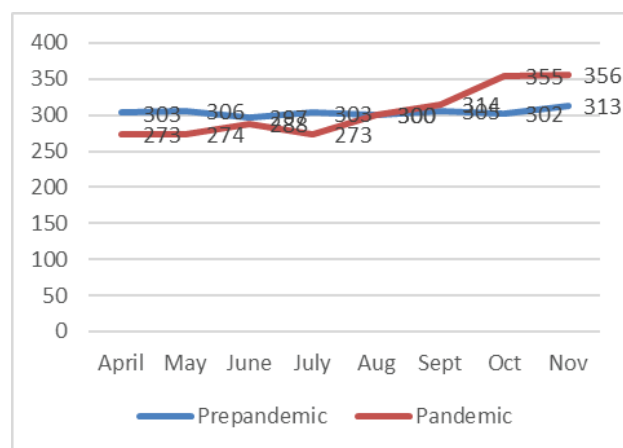


Figure 1b: Month-wise BCG vaccination of female children by pandemic status

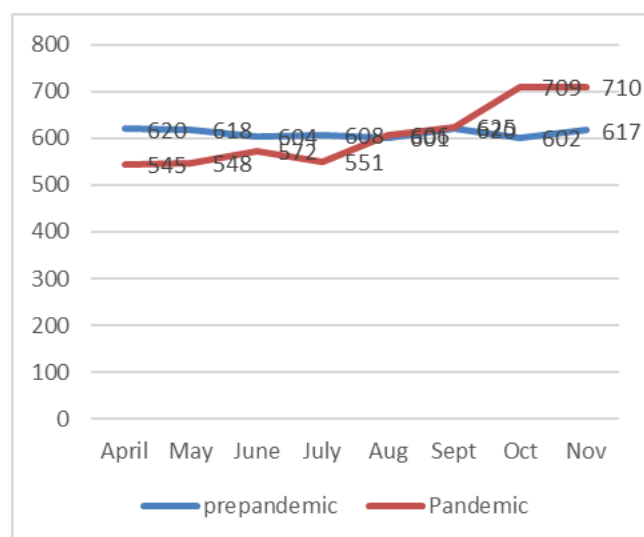


Figure 1c: Month-wise BCG vaccination of children of both sexes by pandemic status

Discussion

This study assessed the impact of the COVID-19 pandemic on BCG vaccination coverage under the

EPI program in Savar Municipality by comparing pre-pandemic (April–November 2019) and pandemic (April–November 2020) periods¹¹. Overall, the findings indicate that although the average number of children vaccinated with BCG declined slightly during the pandemic, the difference was not statistically significant, suggesting relative resilience of the routine immunization system in this urban setting⁹.

In the pre-pandemic period, BCG vaccination showed remarkable consistency across months, with a low standard deviation for both boys (307.63 ± 6.37) and girls (303.63 ± 4.72). This stability reflects the well-established EPI service delivery mechanism in Bangladesh prior to COVID-19, characterized by fixed and outreach sessions, regular community mobilization, and strong supervision. Similar steady pre-pandemic trends have been reported in other national and international studies^{13–15}, where routine childhood immunization remained largely uninterrupted before the onset of COVID-19.

During the pandemic period, however, a marked increase in variability was observed, as reflected by the substantially higher standard deviations for boys (304.13 ± 33.92) and girls (304.13 ± 34.84). This indicates that while the mean coverage remained comparable, service utilization fluctuated considerably from month to month. Such variability has also been reported in studies from other low- and middle-income countries^{11,13}, where lockdowns, transport restrictions, fear of infection, and redeployment of health workers disrupted routine health services.

Trend analysis further highlights both similarities and dissimilarities between the two periods. A key dissimilarity was the sharp decline in BCG vaccination during April to July 2020, coinciding with the early and most restrictive phase of the COVID-19 pandemic in Bangladesh. This early decline mirrors findings from studies in South Asia and Sub-Saharan Africa, which documented immediate drops in immunization coverage following the declaration of lockdowns and movement restrictions¹⁵. Caregivers' fear of exposure to COVID-19 at health facilities and temporary suspension of outreach sessions likely contributed to reduced attendance during these months.

In contrast, a notable recovery phase was observed during August to November 2020, with vaccination numbers exceeding or closely matching pre-pandemic levels, particularly in October and November. This recovery demonstrates a similarity with experiences reported in several countries where immunization

services rebounded following adaptation measures such as revised session planning, infection prevention protocols, community communication, and catch-up vaccination strategies¹⁶. The strong rebound suggests effective mitigation efforts by the Bangladeshi health system, reinforcing its capacity to restore essential services despite ongoing pandemic challenges⁷.

Gender-wise analysis reveals another important aspect. Although the overall average number of children vaccinated was marginally higher in the pre-pandemic period, boys showed a slightly higher mean during the pandemic, while girls had marginally higher coverage in the pandemic compared to pre-pandemic¹⁷. However, none of these differences were statistically significant. This similarity across genders indicates that gender equity in access to BCG vaccination was largely maintained, even during the disruptive pandemic period¹⁶. This finding contrasts with some studies from other settings that reported gender-based disparities in immunization during crises, often disadvantaging female children¹¹.

The absence of statistically significant differences between pre-pandemic and pandemic periods ($p = 0.906$ for total, $p = 0.782$ for boys, and $p = 0.969$ for girls) suggests that, despite short-term disruptions, the overall delivery of BCG vaccination was not severely compromised in Savar Municipality. This is somewhat dissimilar to findings from regions with weaker health infrastructure, where sustained declines in routine immunization were documented throughout the pandemic period.

Conclusion

In conclusion, this study demonstrates that while the COVID-19 pandemic caused temporary disruptions and increased variability in BCG vaccination coverage—particularly during the early months—it did not result in a sustained or statistically significant decline in overall coverage. The observed recovery in later months and the maintenance of gender equity highlight the resilience and adaptability of the EPI program in this setting. These findings underscore the importance of maintaining flexible service delivery models and rapid recovery strategies to safeguard routine immunization during public health emergencies. Provision of planning to catchup any deficiencies in performance during any future epidemics like COVID-19 or any other natural calamities should be managed properly. Further large-scale studies with other DHIS2 databases of the country, emphasizing on the perspective of rural areas may be considered.

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Conflict of interest:

The authors have no conflicts of interest to disclose.

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Authors' contributions

Conceptualization, methods and literature reviews: Nurunnabi M, and Dutta TK; Data collection: Dutta TK; Statistical analysis: Nurunnabi M, Dutta TK, and Nahar KM; Preparation of draft manuscript: Nurunnabi M, Nahar KM, Rahman KMH, Islam MD, and Jahan T; and Finalization of manuscript: Nurunnabi M, Dutta TK, Nahar KM, Rahman KMH, Islam MD, and Jahan T. All the authors approved the final manuscript.

Data Availability

Any questions regarding the availability of the study's supporting data should be addressed to the corresponding author, who can provide it upon justifiable request.

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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