

Estimating the Effects of COVID-19 on Immunization Services Use in Bangladesh

Using information available through routine health information systems (RHIS), Data for Impact (D4I) assessed the effects of COVID-19 on health service use in Bangladesh more than a year into the pandemic. The study examined national usage patterns for selected child immunization services, before and during the COVID-19 pandemic. We used data from the pre-pandemic period to develop models to replicate the trajectories of total and average health service utilization, as well as the number of facilities reporting such services, over time. These models were then used to estimate what the child immunization service utilization would have been in the absence of COVID-19 during the first full year of the pandemic (from March 2020 to April 2021).

Methodology

The study sought to investigate two key questions:

- 1) Did COVID-19 affect reporting of child immunization services over time?
- 2) Did COVID-19 affect the utilization of immunization services?

To answer these questions, we examined monthly data from the Expanded Program on Immunization (EPI) information system, available from January 2017 to April 2021. EPI data covered immunization services at the upazila (i.e., sub-district) health complex level and affiliated outreach sites, and it had national coverage (424 sites).

Using data from January 2017 through February 2020, the team developed national time trends models aiming to replicate observed trajectories before COVID-19, including seasonal (monthly) and annual controls. Using these models, we obtained predictions for the COVID-19 period to illustrate what levels would have been had COVID-19 not occurred from March 2020 onward. The difference between observed and predicted values is the estimated “COVID-19 effect.” Four types of outcomes were modeled for each service: 1) the number

of sites reporting; 2) the total number of service visits reported; 3) the adjusted visit total, accounting for COVID-19 effects on reporting; and 4) the average number of visits per upazila. EPI indicators included the number of vaccinations for measles and rubella (MR) 1–2, Pentavalent (Penta) 1–3, and tuberculosis (Bacille Calmette-Guérin—BCG).

COVID-19 and other system disruptions in Bangladesh during the pandemic period

The first COVID-19 case in Bangladesh was confirmed on March 8, 2020, and the first COVID-19 death was on March 18, 2020. The Government of Bangladesh declared a 10-day national shutdown of businesses and offices on March 26, 2020, which was extended to May 30, 2020. The government permitted ‘limited’ restart of business from June 2020, and the final set of restrictions on public movement were officially lifted on September 01, 2020. Educational institutions were closed on March 16, 2020; in-person classes and standardized school examinations have been suspended to date.

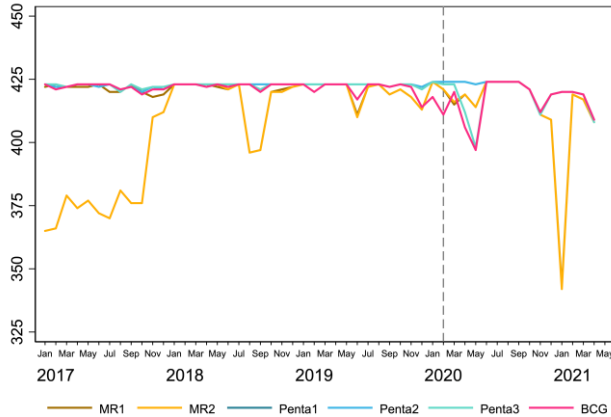
In addition to COVID-19, there were other nationwide disruptions to the healthcare system. From November 26 to December 14, 2020, 26,000 government health workers (Health Inspectors, Assistant Health Inspectors, and Health Assistants) went on strike over their demands on salary increase, recruitment, and promotion. A key responsibility of these frontline health workers is to administer routine vaccines and implement vaccination programs, such as EPI. This strike hampered already planned vaccination sessions at fixed health facilities and outreach sites in the country. On December 12, Bangladesh rolled out a national MR immunization campaign that extended through January 2021, which reached over 36 million children.



The Effects of COVID-19 on Vaccine Reporting ([Figure 1](#) and [Figure 2](#), column 1)

The number of vaccination sites reporting vaccine services dropped at multiple time points during the pandemic period. COVID-19 negatively affected BCG and Penta3 reporting in May 2020. Estimates from our models indicate that BCG and Penta3 reporting was more than five percent lower than predicted. In January 2021, the national MR vaccination campaign had drastic effects on MR site reporting. The number of sites reporting MR1 and MR2 was 19 percent below predictions.

Figure 1. COVID-19 effects: Number of EPI sites reporting vaccinations over time by type ([view larger image](#))



The Effects of COVID-19 on Vaccination Service Utilization ([Figure 2](#), columns 2-4)

MR vaccinations

MR vaccination levels were severely affected by COVID-19. COVID-19 negatively affected MR1 and MR2 in March–May 2020 with lowest levels falling 43–45 percent below predictions in April. There was a steep compensation in June 2020 that was slightly stronger for MR2 than MR1. This recovery was sustained until November 2020. From November 2020 through January 2021, MR vaccinations were lower than predictions by as much as 46 percent, coinciding with the steep drop in EPI site reporting of MR vaccination services. Vaccines administered through the MR campaign that occurred during this time were recorded in a separate reporting system. Therefore, this analysis does not include MR vaccinations given through the campaign. In February

2021, there was a recovery similar to that of June 2020, where vaccination levels exceed model predictions by about 25 percent.

Pentavalent Vaccinations

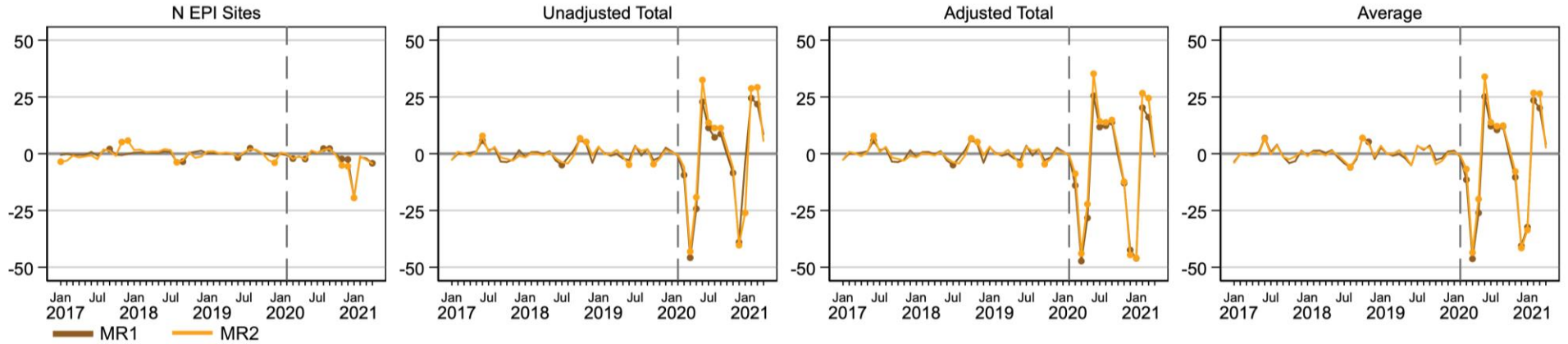
Across all three vaccinations in the pentavalent series, there were significant negative COVID-19 effects in March–May 2020 according to all three models. Observed levels were about 50 percent below predictions at the lowest point in April 2020. However, in June 2020, there was an immediate recovery and compensation, with observed values exceeding predictions by over 35 percent for Penta1. The steep recovery was next reflected in Penta2 in July and then in Penta3 in August, both achieving levels more than 30 percent higher than predictions for all three models. A similar pattern was seen again in December 2020 during the health worker strike, when all three vaccinations in the pentavalent series dropped again. This time, Penta1 was the least affected by COVID-19, falling about 18 percent below predictions, while Penta2 and Penta3 were closer to 30 percent below predictions. Recovery occurred immediately after the strike ended, following patterns similar to recovery occurring in June 2020. Penta1 was the first to achieve peak recovery in January, followed by Penta2 in February, and then Penta3 in March 2021.

BCG vaccinations

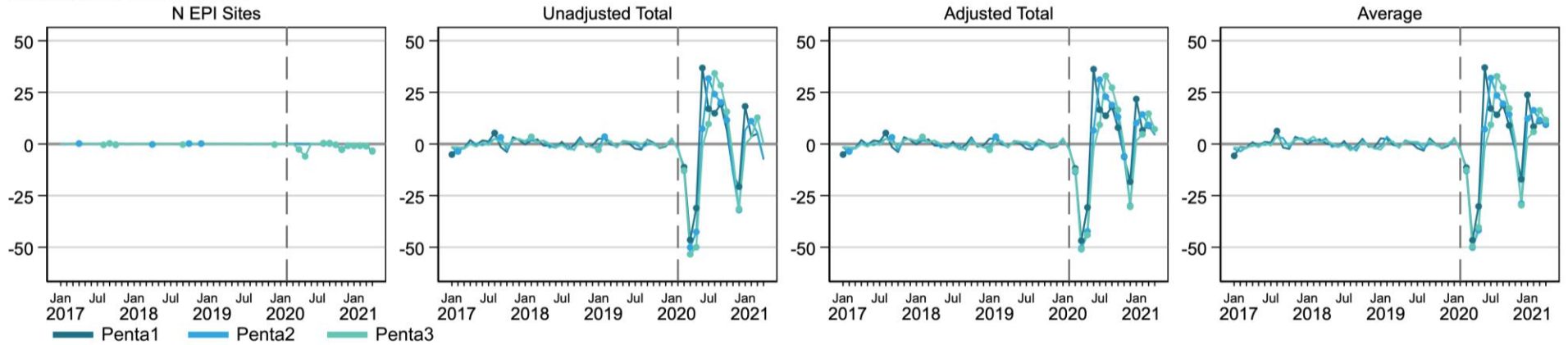
BCG followed a pattern similar to those of MR and pentavalent vaccinations at the beginning of the pandemic. There were severe negative COVID-19 effects, reducing BCG vaccination levels by as much as 45 percent and 20 percent in April and May 2020, respectively. In June 2020, BCG vaccinations made an immediate recovery. Unlike MR and pentavalent, the BCG vaccination recovery was almost symmetric to the negative effects experienced two months prior, achieving levels in June that were more than 40 percent higher than predicted. BCG vaccinations remain above predicted levels through November 2020. There was a single month drop in December 2020 that coincided with the health worker strike. This drop was followed by an immediate recovery in January 2021 that exceeded predictions for the remainder of the time series.

Figure 2. COVID effects: Percent difference gap between reported and predicted levels for immunization services during 2017-2021 ([view larger image](#))

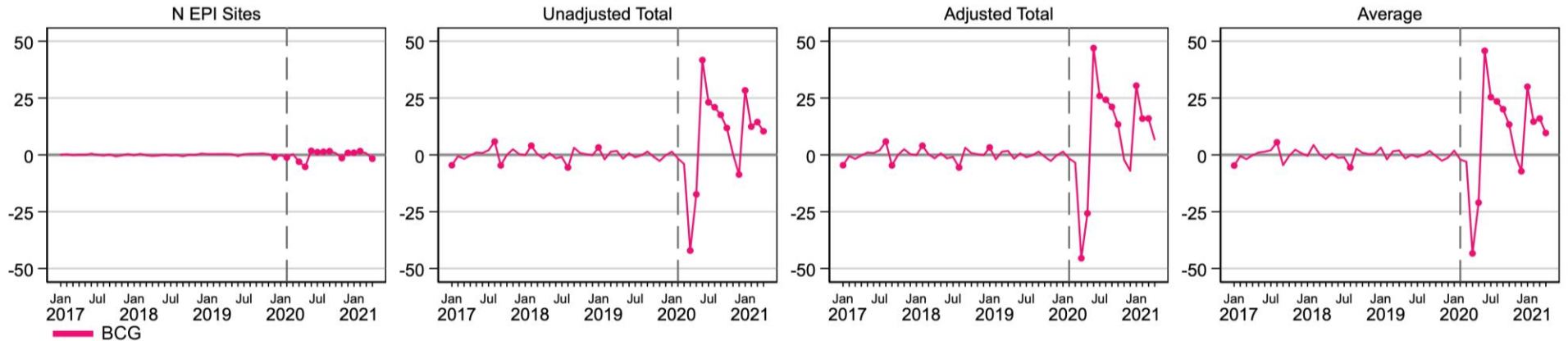
MR vaccinations



Pentavalent vaccinations



BCG vaccinations



Solid circles in the graphs indicate months where the observed value is significantly different from the predicted value at $p < 0.05$.



Conclusions

COVID-19 affected all three vaccinations similarly, in that negative effects occurred in waves during the early months. There were negative COVID-19 effects on pentavalent, MR, and BCG levels through May 2020. This was followed by an immediate June 2020 recovery exceeding predicted levels, and likely compensated for the negative effects felt in the months prior. Sometime between November and December, a considerable drop in immunization was observed for all three vaccine types. The significantly lower-than-predicted levels across these three vaccines likely reflect the effects of the health worker strike on immunization services and programming. This dip, however, was sustained a month longer for the MR vaccine, which most likely reflects the national MR vaccination campaign and respective separate reporting

system. Despite the disruptions to vaccination services caused by the initial closures in March and the strike in December 2020, vaccination levels improved swiftly, quickly exceeding the predicted levels. Our trend analysis showed that there were effects on delivery and utilization of child immunization-related services that extended beyond initial shutdowns in March through May 2020.

We are grateful to the Directorate General of Health Services (DGHS) and, in particular, Dr. Md. Shamsul Haque, Line Director of Maternal, Newborn, Child and Adolescent Health (MNCAH), and Dr. Md. Tanvir Hossen, Deputy Program Manager, EPI & Surveillance. We also thank Bill Weiss at USAID for providing suggestions and technical support to this work.

For more information

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