Short communication

Impact of COVID-19 Pandemic on Childhood Immunization in a Tertiary Health-Care Center

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Abstract

Background: After the emergence of COVID-19 pandemic, health facilities nationwide became the battleground for COVID-19. Many hospitals are designated as COVID-19 hospitals and various measures taken by the government to contain the spread of infection have disrupted the provision of routine health-care services including immunization. The aim of this study is to describe the impact of COVID-19 pandemic on immunization in a tertiary level health-care facility. **Materials and Methodology:** Data of children vaccinated as per the Universal immunization program (UIP) schedule were retrieved from immunizations records for a 7 month (January to July) period for the years 2019 and 2020. The trends of vaccination during COVID-19 pandemic are studied and are compared with the date matched data of the previous year. **Results:** There was a significant drop in the vaccine counts after emergence of COVID-19 pandemic. Maximum drop (−87%) was seen during the month of April (76.52% ± 43.62% vs. 16.95% ± 42.55%; $P < 0.001$) followed by May and June when it was −67% and −33%, respectively. **Conclusion:** COVID-19 pandemic has created the gaps in immunization which requires immediate attention. Further failure in sustaining the vaccination services and weak catch-up plans can lead to the emergence of vaccine-preventable diseases which may result in increased childhood morbidity and mortality.

Keywords: COVID-19, immunization, pediatrics

Introduction

Emergence of COVID-19 pandemic and nationwide lockdown has adversely affected the provision of all essential health services including immunization. The WHO has warned that with the surge in COVID-19 cases, more than 117 million children are at risk of missing out on measles vaccine.[1] On March 26, 2020, the WHO issued guidelines to support the immunization services during COVID-19 pandemic.[2]

Childhood immunization is one of the largest and most effective public health interventions to reduce the mortality and morbidity of vaccine-preventable diseases (VPDs).[3,4]

Universal immunization program (UIP) provides the immunization against 12 VPDs (diphtheria, pertussis, tetanus, polio, measles, rubella, severe forms of childhood tuberculosis, hepatitis B, meningitis and pneumonia caused by *Haemophilus influenza* type B, rotavirus diarrhea, pneumococcal pneumonia, and Japanese encephalitis). A child is said to be fully immunized when he receives all the vaccines as per the National Immunization Schedule within the first year of life.

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Although the immunization program in India has partially succeeded in reducing the burden of VPDs over the last two decades, still, a significant proportion of VPDs exist for the reason of being suboptimal coverage.[5] According to NFHS 2015–2016 data, only 62% of children between 12 and 23 months of age in India and 68.8% in Delhi have received all basic UIP antigens.[6] There are many inequities between urban and rural population. Even the data from urban areas are aggregates of slum and nonslum areas which masks the socioeconomic inequities.[7]

Any disruption in the immunization services will further widen these preexisting gaps and inequities in immunization coverage and could lead to secondary outbreaks of VPDs.

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Our study aimed to study the impact of COVID-19 pandemic on immunization in a busy immunization center located in a tertiary health-care center in Southeast Delhi.

Materials and Methodology

This is a retrospective observational study conducted in the Immunization Center, HIMSR and HAHC Hospital, New Delhi. All the children vaccinated as per the UPI between 0 and 18 years of age were included.

All the data was retrieved from the records of Immunization Center for a period of 7 months from January 1, 2020, to July 31, 2020. Since we intended to compare the pandemic period with prepandemic period, the same data for the matched date of previous year (January 1, 2019–July 31, 2019) were collected.

All the data were entered into the Excel sheet and cumulative vaccine counts for individual vaccines were calculated. The trends were studied and compared.

Data for number of COVID 19 cases were collected from the official website of the Government of Delhi (health.delhigovt.nic.in-Corona Updates).

Statistical analysis

Data were coded and recorded in MS Excel spreadsheet program. SPSS v23 (IBM Corp.) (SPSS v 23 IBM Corp;Armonk, New York, USA) was used for the data analysis. Descriptive statistics were elaborated in the form of means/standard deviations and medians/interquartile ranges for continuous variables and frequencies and percentages for categorical variables. Group comparisons for continuously distributed data were made using independent sample "*t*" when comparing the two groups. If the data were found to be nonnormally distributed, appropriate nonparametric tests in the form of Wilcoxon test were used. Chi-square test was used for group comparisons for categorical data. In case the expected frequency in the contingency tables was found to be <5% for >25% of the cells, Fisher's exact test was used instead. Linear correlation between two continuous variables was explored using Pearson's correlation (if the data were normally distributed) and Spearman's correlation (for nonnormally distributed data). Statistical significance was kept at $P < 0.05$.

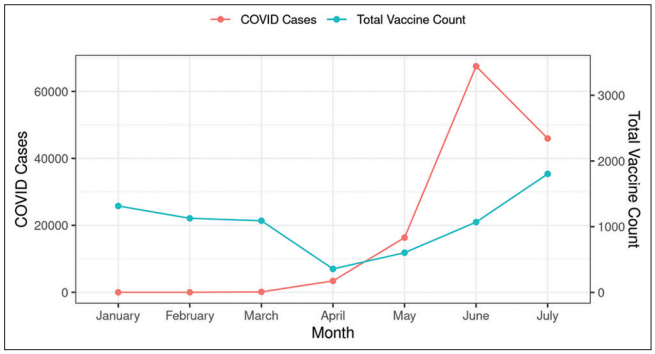

Figure 1: Timeline of COVID cases and total vaccine counts over time in the year 2020

Results

Following the detection of first COVID case in Delhi during the 1st week of March, there has been a steady rise in the number of cases with maximum cases (67516) diagnosed in the month of June [Figure 1]. The vaccination count during this period showed a significant decrease [Figure 1]. In April, only immunization at birth (hepatitis B 0, oral polio vaccine OPV 0, and BCG) was carried out.

As compared to the matched time period in 2019, there has been a significant fall in vaccination. The mean total vaccine count was 1311.14(range = 932–1480) in 2019 as compared to 1051 (range = 356–1803) in 2020 [Figure 2]. Maximum drop in vaccine count percentage (−87%) was seen during the month of April (76.52% ± 43.62% vs. 16.95% ± 42.55%; $P < 0.001$). The percentage change in immunization coverage during May and June was −67% and −33%, respectively. However, in July 2020, there had been a 27% increase ($P = 0.228$) in percentage of vaccination as compared to the previous year. There was a weak negative correlation between percent change in total vaccine counts and number of COVID cases, and this correlation was not statistically significant ($\rho = -0.09$, $P = 0.848$) [Figure 3].

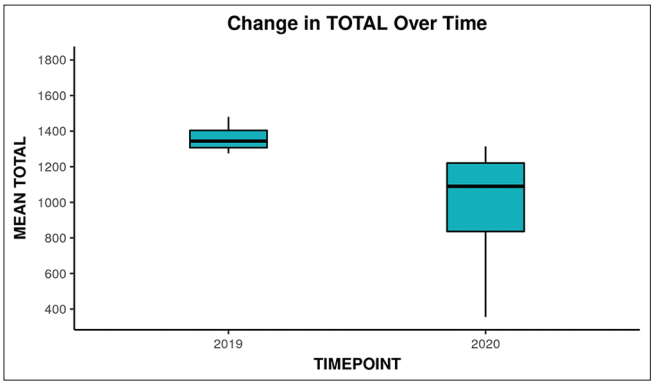

Figure 2: The Box- and Whisker plot depicts the distribution of total vaccine counts over different time points

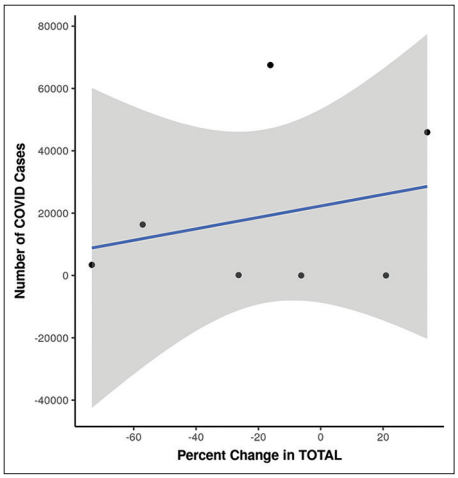

Figure 3: The above scatterplot depicts the correlation between percent change in total vaccine counts and number of COVID cases

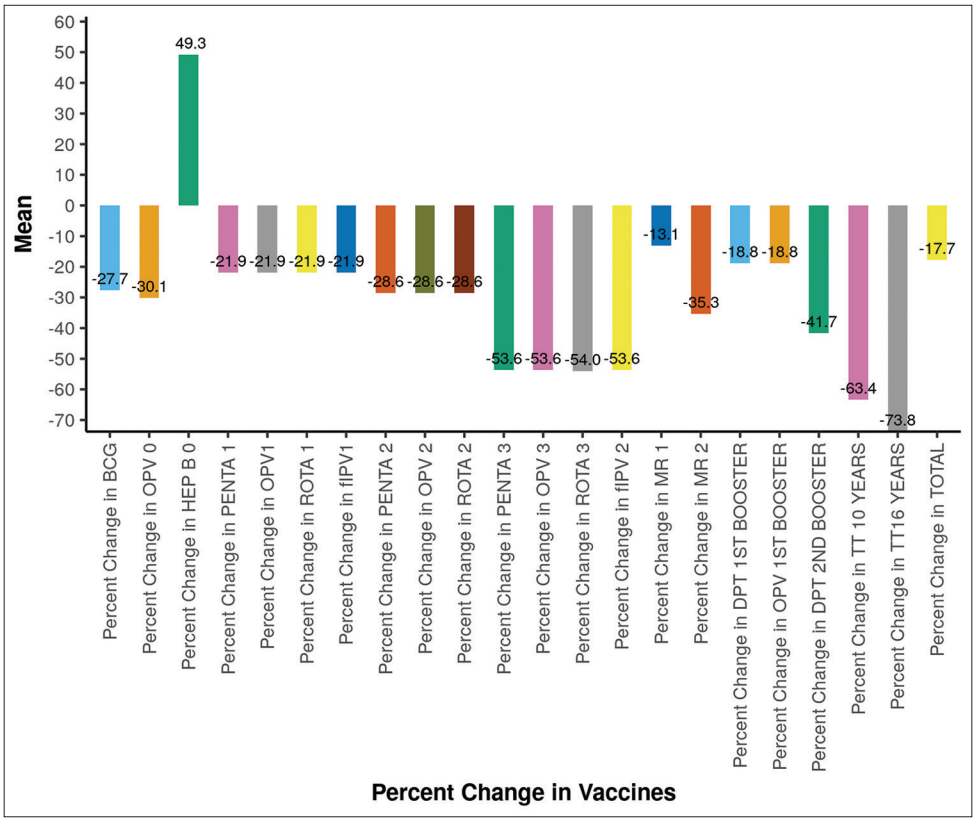

Figure 4: Percent change observed in each vaccine

The immunization coverage for zero dose of hepatitis B and measles–rubella antigen was less affected as compared to other antigens [Figure 4].

Discussion

The COVID-19 pandemic is caused by severe acute respiratory syndrome coronavirus-2. In India, the first case of COVID-19 was reported on January 30, 2020.[8] India has currently the largest number of confirmed cases (by August 21, 2020) in Asia and has third highest number of confirmed cases in the world.[9]

The COVID-19 pandemic is inimical to the whole world. The emergence of this pandemic and implementation of social distancing and lockdown measures to curb its spread has destabilized the functioning of world. Public health system has been facing a major challenge during the COVID-19 pandemic due to high preexisting vulnerability from the limited public health infrastructure combined with diversion of essential medical resources for the provision of dedicated resources for provision of care and management of COVID-19 cases.[10-12]

Garg *et al*. conducted a cross-sectional study across the country to determine the preparedness of primary health-care sites in India during COVID-19 pandemic and reported a significant disruption in the outpatient services with maximum reduction in operation of clinics for immunization and noncommunicable diseases ($P < 0.0001$).[13]

We also observed a significant drop in percentage of vaccination counts (maximum of 87.7%) after the emergence of COVID-19 pandemic. Moreover, in the month of April, there was complete suspension of immunization services and only the birth dose of hepatitis B, BCG, and OPV were administered. A significant decline in vaccination counts was observed for all the UIP antigens administered under 5 years of age except zero dose of hepatitis B vaccine which is administered at birth. From these data, we can predict that large proportion of children who are born after July 2019 had missed their primary immunization which is vital. Similar interruptions were reported by other countries. In Vietnam, the immunization rate dropped by 74.7% in children <5 years of age and was suspended temporarily, leaving 4.2 lakhs children <1 year of age at risk of being unimmunized against DPT-Hep B-HiB.[14,15] This all has led to emergence of measles and diphtheria cases in some of its provinces. In Karachi, the daily immunization visits were <50% of the baseline.[16] COVID pandemic has not only crippled the health facilities of low- and middle-income countries but it has also shaken the health infrastructure of high-income developed countries like England, who reported a change of − 19.8% in measles-mumps-rubella vaccination counts from February 2020 to April 2020 on comparison with the same period in 2019.[17]

In India, the routine immunization remains suspended in the month of April. The immunization rate improved in May and June despite persistent increase in the number of

COVID cases. The cause for this sudden decline in the rate of immunization is multifactorial. COVID pandemic has encumbered the health services. The diversion of health-care staff from routine services to COVID 19-related duties, suspension of immunization campaigns, disruption of public transport services, parental concern of contracting the infection while visiting the immunization clinics, and exodus of large populations to their hometowns may be the few factors to enumerate. During Ebola outbreak in 2014–2015, the health system was severely compromised and the vaccination coverage fell substantially leading to an increased number of deaths caused by measles, malaria, tuberculosis, and HIV AIDS attributable to health system failures exceeding the deaths from Ebola.[18,19] To calculate the benefit–risk ratio for routine childhood immunization, Abbas *et al*. performed a probabilistic sensitivity analysis and suggested that the deaths prevented by sustained routine childhood immunization in Africa outweigh the excess risk of COVID-19 deaths associated with vaccination clinic visits.[20] All these findings reinforce the guidance issued by the WHO and MOHFW, India, which assert that routine childhood immunization programs should be sustained.[21]

CONCLUSION

The impact of COVID pandemic on immunization could have devastating affects on under 5 years of age mortality and morbidity. To face the challenges, our country needs a multifaceted approach. It is of utmost importance to strengthen the supply chain to establish the catch-up immunization campaigns; we are in dire need of having strong recovery plans focusing on tracing of all babies born after June 2019 who might have missed their primary immunization.

We should adapt and promote new innovative ideas to cover up the gaps like mobile vaccination centers and vaccinating directly in home by trained health-care professionals.

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Conflicts of interest

There are no conflicts of interest.

References

1. WHO. Measles & Rubella Initiative. More than 117 Million Children at Risk of Missing out on Measles Vaccines, as COVID-19 Surges. Geneva: WHO; 2020. Available from: https://measlesrubellainitiativeorg/measles-news/more-than-117-million-children-at-risk-of-missing-out-on-measles-vaccines-as-covid-19-surges. [Last accessed on 2020 Sep 24].
2. WHO. Guiding Principles for Immunization Activities during the COVID-19 Pandemic. Geneva: WHO; 2020. Available from: https://apps.who.int/iris/bitstream/handle/10665/331590/WHO-2019-nCoV-immunization_services-2020.1-eng.pdf. [Last accessed on 2020 Sep 21].
3. Ozawa S, Mirelman A, Stack ML, Walker DG, Levine OS. Cost-effectiveness and economic benefits of vaccines in low- and middle-income countries: A systematic review. Vaccine 2012;31:96-108.
4. Andre FE, Booy R, Bock HL, Clemens J, Datta SK, John TJ, *et al*. Vaccination greatly reduces disease, disability, death and inequity worldwide. Bull World Health Organ 2008;86:140-6.
5. Lahariya C. A brief history of vaccines & vaccination in India. Indian J Med Res 2014;139:491-511.
6. Available from: http://www indiaenvironmentportal.org.in/content/424110/national-family-health-survey-2015-16-nfhs-4-states-fact-sheets/. [Last accessed on 2020 Sep 17].
7. Devasenapathy N, Jerath SG, Sharma S, Allen E, Shankar AH, Zodpey S. Determinants of childhood immunisation coverage in urban poor settlements of Delhi, India: A cross-sectional study. BMJ Open 2016;6:e013015.
8. Available from: http://dhs.kerala.gov.in/category/daily-bulletin/. [Last accessed on 2020 Sep 25].
9. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. Geneva: World Health Organization; 2020. Available from: https://covid19.who.int/. [Last accessed on 2020 Sep 12].
10. World Health Organization. WHO Releases Guidelines to Help Countries Maintain Essential Health Services during the COVID-19 Pandemic. Geneva: World Health Organization; 2020. Available from: https://www. who.int/news-room/detail/30-03-2020-who-releases-guidelines-to-help-countries-maintain-essential-health-services-during-the-covid-19-pandemic. [Last accessed on 2020 Sep 13].
11. Gilbert M, Pullano G, Pinotti F, Valdano E, Poletto C, Boëlle PY, *et al*. Preparedness and vulnerability of African countries against importations of COVID-19: A modelling study. Lancet 2020;395:871-7.
12. Kretchy IA, Asiedu-Danso M, Kretchy J. Medication management and adherence during the COVID-19 pandemic: Perspectives and experiences from low-and middle-income countries. Res Social Adm Pharm 2021;17:2023-6. [doi: 10.1016/j.sapharm.2020.04.007].
13. Garg S, Basu S, Rustagi R, Borle A. Primary health care facility preparedness for outpatient service provision during the COVID-19 pandemic in India: Cross-sectional study. JMIR Public Health Surveill 2020;6:e19927.
14. UNICEF. Rapid Assessment on Secondary Impacts of the COVID-19 Outbreak on the Routine Services of Health, Nutrition and WASH at Commune Level. Vietnam: UNICEF; 2020. Available from: https://www.unicef.org/appeals/files/UNICEF_Viet_Nam_COVID19_Situation_Report_No4__14_May_4_June_2020. [Last accessed on 2020 Sep 16].
15. UNICEF. COVID 19 Situation Report. Vietnam: UNICEF; 2020. Available from: https://www.unicef.org/appeals/files/UNICEF_Vietnam_COVID_SitRep_7_April_2020. [Last accessed on 2020 Sep 24].
16. Chandir S, Siddiqi DA, Setayesh H, Khan AJ. Impact of COVID-19 lockdown on routine immunisation in Karachi, Pakistan. Lancet Glob Health 2020;8:e1118-20.
17. McDonald HI, Tessier E, White JM, Woodruff M, Knowles C, Bates C, *et al*. Early impact of the coronavirus disease (COVID-19) pandemic and physical distancing measures on routine childhood vaccinations in England, January to April 2020. Euro Surveill 2020;25:2000848.
18. Takahashi S, Metcalf CJ, Ferrari MJ, Moss WJ, Truelove SA, Tatem AJ, *et al*. Reduced vaccination and the risk of measles and other childhood infections post-Ebola. Science 2015;347:1240-2.
19. Elston JW, Cartwright C, Ndumbi P, Wright J. The health impact of the 2014-15 Ebola outbreak. Public Health 2017;143:60-70.
20. Abbas K, Procter SR, van Zandvoort K, Clark A, Funk S, Mengistu T, *et al*. Routine childhood immunisation during the COVID-19 pandemic in Africa: A benefit-risk analysis of health benefits versus excess risk of SARS-CoV-2 infection. Lancet Glob Health 2020;70:e1264-72.
21. MOHFW. Enabling Delivery of Essential Health Services during the COVID 19 Outbreak: Guidance Note. New Delhi: MOHFW; 2020. Available from: https://www.mohfw.gov.in/pdf/EssentialservicesduringCOVID19updated0411201.pdf. [Last accessed on 2020 Sep 25].