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Integration of COVID 19 Vaccination into Routine Immunization Services in Belize

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Authors' contributions

This work was carried out in collaboration among all authors. Author OO conceived the manuscript documentation, analysed the data, drafted and finalized the manuscript. Authors NLB, AB and LM collected the data. All the authors read, reviewed, and approved the final draft of the manuscript.

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Case Study

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ABSTRACT

The study described the process and outcome of integration of COVID 19 vaccination into routine immunization services in Belize which was initiated in April 2022. The process was guided using the five components of the immunization system; program management and coordination; service delivery, vaccine supply and cold chain logistic, Surveillance and monitoring; and advocacy and social mobilization and communication as the implementation framework. Collaboration between COVID-19 vaccination and other existing immunization delivery platforms targeting different age groups was the service delivery approach adopted for the integration. Fixed health facilities, mobile clinics and home visits were used as the delivery strategies for integration. The fixed health facilities offered both routine and COVID19 vaccination daily and the same time while the mobile teams were deployed based on schedule to villages that are far to reach from the fixed health facilities and communities with lowest vaccination coverages were prioritized for both routine and COVID19 vaccination. The mobile and home visit teams also tracked and provided mop up

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vaccination for missed children to reduce the zero-dose children. The results showed that the integration of COVID 19 vaccination has no negative effect on the coverage of routine vaccination, with increase in the coverage of both routine immunization and COVID 19 vaccination following integration. The coverage of 1st dose and 3rd dose of Pentavalent vaccine increased by 7 percent and 10 percent respectively between April 2021- March 2022 (pre-integration) and April 2022-March 2023(post integration) though not statistically significant (p>0.5). The coverage of population who received at least one dose of COVID 19 vaccine and those fully vaccinated increased from 54.3 percent and 51 percent to 65 percent and 55.7percent respectively between 31st March 2022 and 31st March 2023.
The study contributes to the existing literature on integration of COVID 19 vaccination into routine immunization services which is essential to ensure sustained and equitable access to COVID-19 vaccine and improve uptake of other routine vaccines to address the continued backslide in routine vaccination due to the COVID 19 pandemic.

Keywords: COVID 19 vaccination; integration; routine immunization services.

1. INTRODUCTION

Vaccination has been one of the major strategies implemented to prevent and control the COVID 19 pandemic. The integration of COVID 19 vaccination with other primary health care services has been recognized as the way forward to ensure equitable access to the vaccine and other health services including routine immunization [1,2]. The integration has started in many countries but there has been limited documented evidence available on the outcome and success of the initiative [1,3].

Belize recorded the first case of COVID 19 on 23rd March 2020 and officially launched the rollout of COVID-19 vaccination on March 1, 2021, with mass vaccination campaigns used as the main delivery approach to reach targeted populations [4]. However, this negatively affected utilization of routine services because health workers and resources were diverted from providing essential health services, including routine immunization to COVID-19 vaccination efforts [5].

In line with the Strategic Advisory Group of Experts on Immunization recommendation that countries should leverage the COVID-19 vaccination roll-out as a transformative opportunity for building resilient immunization programmes and to strengthen primary health care [6], the government of Belize with support from partners which included PAHO,UNICEF, World Bank, Inter America Development Bank and Embassy of Japan commenced the integration of COVID 19 vaccination with the routine immunization services in April 2022.

Belize has a robust immunization program and ranks favorably in the Global Health Security Index (GHSI) regarding its immunization capacity and has successfully introduced vaccines against 12 communicable diseases in the routine vaccination schedule [7]. Thus, integrating COVID 19 vaccination into the routine immunization was considered to be feasible with adequate planning and effective implementation strategy and support from the partners.

The study described the process for the integration of COVID 19 vaccination into routine immunization services in Belize and outcome on immunization coverage.

2. MATERIALS AND METHODS

2.1 Design

The Case study used mix of both qualitative and quantitative methods.

2.2 Study Population and Setting

The study was conducted in Belize, located in Central America with a population of 430,191 and six administrative districts. Belize implements decentralized health system with four health regions and each region provides secondary and primary health care services. The rural population is served at the community level through health posts and health centers. Urban based regional hospitals provide secondary care while tertiary care is provided at the country's sole public referral hospital the Karl Heusner Memorial Hospital (KHMH), located in the Central Health Region [8].

2.3 Data Collection and Statistical Analysis

The qualitative data was collected from the review of documents produced and processes involved in the implementation of the initiative. The quantitative data was from retrospective review of COVID 19 vaccination and routine immunization data extracted from the Belize Health Information System. Descriptive data is presented in graph and table and univariate analysis was done by generating frequencies of the variables and test of association was done using paired t test to compare the mean change in annual immunization coverage before integration (2021) and after integration (2022) and p value was set at significant level of 5%.

3. RESULTS AND DISCUSSION

3.1 Results

This is organized and presented along two major themes:

1. The description of the process of integration of COVID 19 vaccination into routine immunization services.
2. Program Results: the analysis of immunization coverage for COVID 19 vaccine and routine vaccines before integration and after integration

3.1.1 The description of the process of integration of COVID 19 vaccine into routine immunization services

The integration process was guided using the five components of the immunization system; program management and coordination; service delivery, vaccine supply and cold chain logistic, Surveillance and monitoring; and advocacy and social mobilization and communication as implementation framework.

3.1.1.1 Program management and coordination

In close coordination with other partners, under the leadership of the Ministry of Health and Wellness (MOHW), partners' review meetings were held to take stock of the COVID 19 vaccination campaign and coverage of primary health care services. The outcome of the meetings showed that despite the geographic distribution of the COVID 19 vaccination campaign across the country, equitable access to vaccination particularly in remote, and rural areas remained a concern. In realization that the campaign strategy for COVID 19 vaccination cannot be sustained because of the impact on other primary health care services, the limited health workers and resources being diverted for the campaign it was agreed to commence integration of COVID 19 vaccination into the routine immunization services. Implementation team to guide and monitor the implementation of the integration was established and led by the maternal and child health unit of the Ministry of Health and Wellness at the national level and at the subnational level with support from all the health partners.

The implementation team reviewed the benefits and potential risks and challenges of integration of COVID-19 vaccination due to the disruption of the function of the health system by the pandemic. The five components of the Immunization operational system; program management and coordination; service delivery; vaccine supply and cold chain logistic; Surveillance and monitoring; and advocacy and social mobilization and communication was adapted as the framework for implementation [9,10]. This is to ensure equitable access to COVID-19 vaccines and routine vaccines through strengthening of the vaccine delivery system.

3.1.1.2 Services delivery

Collaboration between COVID-19 vaccination and other existing immunization delivery platforms targeting different age groups was adopted as the service delivery approach [3].Fixed health facilities, mobile clinics and home visits were used as the delivery strategies for integration.

The fixed health facilities offered both routine and COVID19 vaccination daily and the same time while the mobile teams were deployed based on schedule to villages that are far to reach from the fixed health facilities and the communities with lowest vaccination coverages prioritized for both routine and COVID19 vaccination. COVID 19 vaccine was provided to eligible individual including children above 12 years in line with the national guideline. The mobile teams and the home visit teams also tracked and provided mop up vaccination for missed children to help in the reduction of zero-dose children.

3.1.1.3 Surveillance and monitoring

The Belize Health Information System (BHIS) was updated to accommodate COVID-19

vaccines administration. The BHIS has an integrated module on immunization where data on vaccines administered including COVID 19 vaccine is entered into electronic medical records of the vaccinees. The data on COVID 19 vaccine and other routine vaccines administered are collected at every service delivery point and entered into the BHIS. The BHIS allows for real-time tracking of vaccination data. Some rural health facilities without access to the BHIS used paper-based system to collect vaccination data which are later entered into the BHIS at the nearest health facility with access to the BHIS.

The records of cases of adverse event following immunization (AEFI) from COVID 19 vaccination and other routine vaccination are also recorded into the BHIS.

3.1.1.4 Vaccine supply and cold chain logistic

COVID-19 vaccines were distributed along with the routine vaccines from the national vaccine storage facility directly to the health facilities at the district level based on requisitions placed via the BHIS supply chain management system. Additional cold chain equipment were procured to enhance vaccine storage and cold chain capacity in all the health facilities and for mobile teams to accommodate both COVID 19 vaccines and routine vaccines.

All primary care health workers involved in the immunization activities were trained in the management of the cold chain system for co-delivery of COVID 19 vaccine and routine vaccines.

3.1.1.5 Advocacy and social mobilization and communication

To improve on demand generation and reduce vaccine hesitancy, coordination and engagement with local leaders was enhanced and community health workers who were trained on interpersonal communication, conducted house-to-house health education visits 1-2 days before the vaccination exercise using culturally specific job aids. All the Social Behavioural Change Communication materials developed for COVID 19 vaccination campaign were updated to include messages on routine vaccines and other primary health care services and were disseminated through multiple media.

3.1.2 Programme results

Quantitative Analysis: The data on COVID 19 vaccines and routine vaccines was analysed to compare coverage a year before integration which started in April 2022 and a year after integration.

The results showed that the integration of COVID 19 vaccination has no negative effect on the coverage of routine vaccination, with increase in the coverage of both routine immunization and COVID 19 vaccination following integration.

Fig. 1 shows that the coverage of 1st dose of Pentavalent vaccine (Penta 1) increased from 72.9% pre integration (April 2021- March 2022) to 79.5% post integration (April 2022- March 2023). The coverage of the 3rd dose of Pentavalent vaccine (Penta 3) increased slightly from 83.4% pre integration (April 2021- March 2022) to 84.3% post integration (April 2022- March 2023). This shows a 7% increase in Penta 1 and about 10% increase in Penta 3 coverage between the period of integration.

The differences are however not statistically significant. Table 1 shows the bivariate analysis using paired t test of change in annual immunization coverage for pentavalent vaccines before and after integration. The mean number of children who received first dose of pentavalent vaccine (Penta 1) pre integration [April 2021- March 2022], mean= 816; SD= 245.94 compared to mean= 878.; SD= 253.19, post integration [April 2022- March 2023]. This difference is however not statistically significant, p=0.77.

The mean number of children who received third dose of pentavalent vaccine (Penta 3) pre integration (April 2021- March 2022), mean= 847; SD=246.62 compared to mean= 938.17; SD= 294.85. post integration (April 2022- March 2023). This difference is however not statistically significant, p=0.98.

Fig. 2 shows that as of March 31, 2022, a total of 212,480 persons (53.4 percent of the total population) were vaccinated with at least one dose of a COVID-19 vaccine, and 202,878 persons (51 percent of total population) were fully vaccinated. By March 2023, 258,418 (65% of total population) were vaccinated with at least one dose of a COVID-19 vaccine and 221,397 persons (55.7% of total population) were fully vaccinated. This shows an increase of 12% and 5% between the period of integration on the percentage of population vaccinated with at least one dose of COVD 19 vaccine and those fully vaccinated respectively.

Table 1. Bivariate analysis of change in annual Immunization coverage for pentavalent vaccines before and after integration

Variables	Mean ± SD	T-test value	95%CI		P-value
			Lower Limit	Upper Limit	
Children under one who received 1st dose of pentavalent vaccine (Penta 1) [April 2021-March 2022]	816.83±245.94	0.2996	277.91	364.25	0.77
Children under one who received 1st dose of pentavalent vaccine (Penta 1) [April 2022-March 2023]	878 ±253.19				
Children under one who received 3rd dose of pentavalent vaccine (Penta 3) [April 2021-March 2022]	847 ±246.62	0.0138	347.49	351.82	0.98
Children under one who received 1st dose of pentavalent vaccine (Penta 3) [April 2022-March 2023]	938.17±294.85				

Source: Belize health information system, epidemiology unit, MoHW

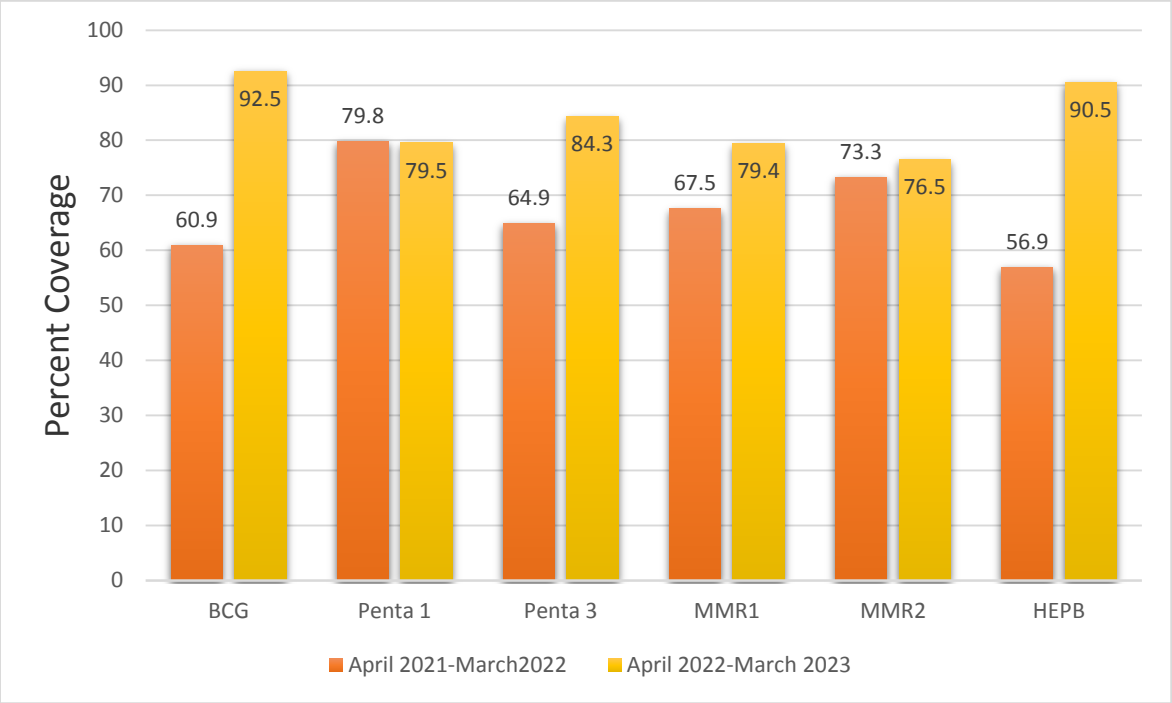

Fig. 1. Routine immunization coverage (April 2021-March 2022) vs April 2022-March 2023)
Source: BHIS, epidemiology unit, MoHW

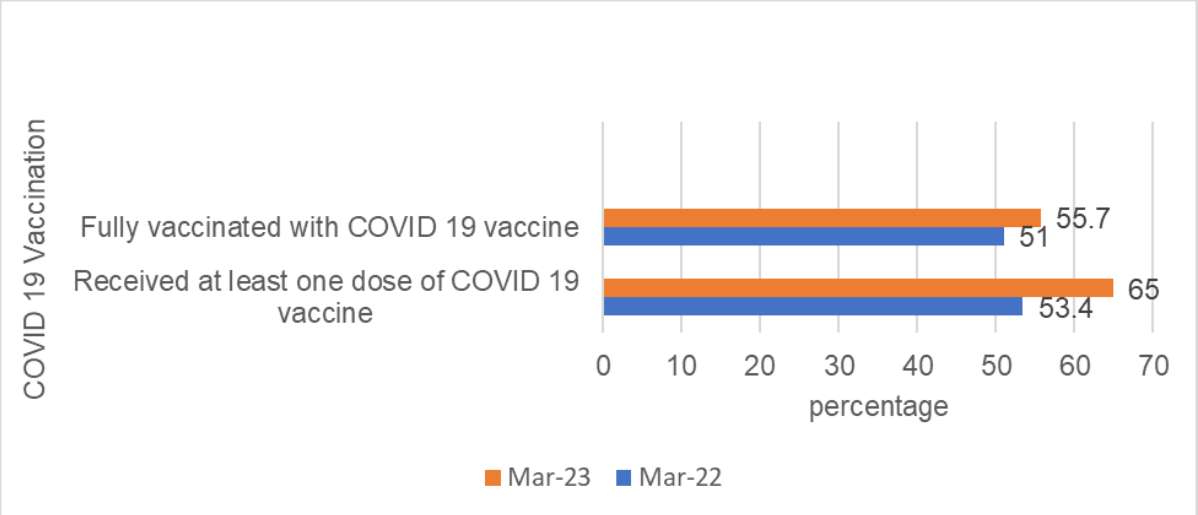

Fig. 2. Covid 19 vaccination coverage March 2022 vs March 2023
Source: *BHIS, epidemiology unit, MoHW*

3.2 Discussion

There is growing recognition of the potential for integration with other services as the way forward for ensuring sustainable and equitable COVID-19 vaccination [11,12]. Many countries have recently begun to integrate COVID 19 vaccination into other services. However very limited examples have so far been documented with little evidence available on the outcome or success of such integration [1,2,3]. Integration is one of the six fundamental principles of the Global Vaccine Action Plan (GVAP) framework endorsed at the World Health Assembly (WHA) in May 2012 to achieve the Decade of Vaccines' vision of delivering universal access to immunizations [13]. Integration into the routine immunization through the primary health care

system have consistently demonstrated to improve equity of access and diminished health disparity [14]. Immunization is prioritised in the global Immunisation Agenda 2030 as an essential platform for providing other priority public health interventions [15].

The study focused on the service delivery components of the health system building block for the integration of COVID 19 vaccination into immunization program. Various approaches and service delivery strategies have been adopted by countries that have started integrating COVID 19 vaccination into the primary health care system. The approaches include Co-delivering COVID-19 vaccination with other vaccines for the same target populations using existing delivery platforms; Collaboration between COVID-19 vaccination and other existing immunization delivery platforms targeting different age groups and Co-delivering COVID-19 vaccination with other health interventions (e.g., screening for NCDs,) for the same target population [3]. The various service delivery strategies include health facility based, mass campaign, periodic intensification of routine immunization and mobile /outreaches[1,2,3].

Belize adopted collaboration between COVID-19 vaccination and other existing immunization delivery platforms targeting different age groups as the service delivery approach using fixed health facilities, mobile clinics and home visits as the delivery strategies for integration. All the health facilities provided immunization services for COVID19 vaccine and routine vaccines daily at the same time while the mobile clinics are based on schedules. This is similar to the approach reported in Iraq, Honduras, Sri-Lanka, Bangladesh, India, Maldives and Yemen [1,3]. However, in Bangladesh and India, COVID 19 vaccination and routine immunization were provided different days while in Maldives, the services were provided same day but different times [3]. Collaboration with COVID 19 vaccination approach was implemented in Angola, Nigeria and Ethiopia using mass vaccination campaign as the delivery strategy during which COVID 19 vaccination was integrated with measles campaigns [3]. Co-administration of COVID-19 vaccination and influenza vaccination using health facilities and outreaches was implemented in Panama during the vaccination week in the Americas [9].

Co-delivering COVID-19 vaccination with other health interventions (e.g., screening for NCDs) for the same target population was another approach adopted by other countries. In Cambodia, Djibouti, and Nigeria, mass campaign delivery strategy was used to provide COVID 19 vaccines along with other health care services such as, screening and treatment for non-communicable diseases (NCDs) [3]. In Tanzania, COVID 19 vaccination was integrated with the HIV programme to vaccinate people living with HIV/AIDS with COVID 19 vaccine and collaboration was established with physicians treating chronic diseases (e.g. diabetes, hypertension) to provide COVID-19 vaccination on specialist clinic days [3].

There has been little evidence available as to the success of these integration initiatives to compare with our findings. In this study the annual coverage of most of the routine vaccines and COVID 19 vaccine increased following integration. The increase in the coverage of routine immunization was however lower than the large increase in coverage reported in a study in Iraq following Integration of COVID 19 vaccination into routine immunization delivered mostly through outreaches[1]. However, there was no remarkable change in the coverage of COVID 19 vaccination in the Iraq study following integration as a result of parents allowing their children to be vaccinated with routine immunizations but refused the COVID-19 vaccine [1].

Unlike the study in Iraq which used mobile outreaches for service delivery, our study used mostly fixed health facilities as the main service delivery strategy except in hard to reach areas where mobile clinics were used in view of the high financial cost and logistic challenges associated with mobile outreaches which are not sustainable [1,2].

The low coverage in COVID 19 vaccine uptake following the integration in our study and the study in Iraq could have been driven by low perception of COVID-19 risk and unavailability of preferred type of COVID 19 vaccines as reported in other study [1,2].

In Yemen, unlike the finding in this study, integrating COVID 19 vaccination into routine immunization was reported to have resulted in a reduction in uptake of routine vaccination from previous years in some localities [1]. However, a study in Northeast Syria region found that bundling routine immunisation with COVID-19 vaccination increased trust in COVID-19

vaccines since people were familiar with and largely trusted routine vaccination, having had experience with it since their childhood [1].

4. CONCLUSION

The study contributes to the existing literature on integration of COVID 19 vaccination into routine immunization services which is essential to ensure sustained and equitable access to COVID-19 vaccine and improve uptake of other routine vaccines to address the continued backslide in routine vaccination due to the COVID 19 pandemic.

DISCLAIMER

The view expressed in the articles are those of the authors and not that of the affiliated institutions.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors declared no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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