

# Lessons from Yemen: Diphtheria and Polio Campaign in the Context of COVID-19

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Received: September 1, 2020 Accepted: October 25, 2020 Online Published: October 30, 2020

doi:10.5539/gjhs.v12n12p141

URL: <https://doi.org/10.5539/gjhs.v12n12p141>

## Abstract

Yemen conducted a diphtheria campaign in five governorates between 4 July and 19 July 2020, followed by a polio campaign in 13 governorates between 25 July and 17 August 2020. The study aimed at documenting lessons from conducting the campaigns within the context of COVID-19 pandemic in Yemen after their initial suspension in March 2020. The lessons could contribute to the evidence on the feasibility of maintaining and continuing vaccination campaigns in the context of COVID-19. The descriptive study relied on key informants and content analysis of planning and budgeting documents and daily monitoring reports as data sources. The COVID-19 precautions, including masks, gloves, hand sanitizers, and reduced crowding and social distancing, were applied during the campaigns. These measures minimized concerns over COVID-19, enabling the campaigns to go on, achieving 75% of its target for diphtheria and 96% of the polio campaign's target. The provision of personal protective equipment increased the campaign's perceived safety, leading to its smooth implementation. The measures constituted only about 4 percent of the entire cost of the campaign. The lessons learned will inform the planning and implementation of other upcoming vaccination-related activities in Yemen. This is also a good case study and experience for sharing with other countries.

**Keywords:** campaign, COVID-19, vaccination, governorate, health

## 1. Introduction

The COVID-19 pandemic that broke out in 2019 in Wuhan, China, reached pandemic levels in February 2020. A month later, in April 2020, the first case was announced in Yemen (JHU, 2020; Walker et al., 2020). As of 3 August 2020, 1738 confirmed COVID-19 cases, with 498 deaths, and 864 recoveries were reported in Yemen (WHO, 2020). Most of the reported cases were affecting men (73%) compared with females at 27%. Children less than the age of 15 formed about 2% of the infected population. The weak capacities undermined the effectiveness of contact tracing, isolation of suspected patients, and testing for COVID-19 in the country. The collective and individual social distancing, use of masks, hand washing, hand sanitation, and appropriate cough etiquette was suboptimal (UNICEF, 2020a).

The virus may have caused further collapse of the health care systems in a country at war since 2015. An estimated 85% of the 4,966 health facilities are open but with only about 50% fully functional, and the remaining 35% partially so (WHO, 2019). Only 3 of the 22 governorates in the country met minimum WHO health facility staffing standards (WHO, 2019). The impact is expected to be dire in Yemen, where an outbreak of vaccine-preventable diseases, including diphtheria is ongoing since 2017, with an estimated 5,343 reported cases by the end of July 2020. In 2017, an estimated 556 cases were reported, increasing to 2,601 in 2018 and reducing to 1,385 in 2019. By July 2020, 801 cases had been reported for 2020 alone. The cases were reported from all the 22 governorates in Yemen (Figure 1). In June 2020, 16 vaccine-derived poliovirus type 1 (cVDPV1) cases had been detected from six districts in Saada Governorate, northwest of the country. These genetically linked cases had onset of paralysis from 31 January to 18 June 2020. There is also one acute flaccid paralysis case from 2019, confirmed from Saada Governorate in 2020. There is a significant risk of a widespread cVDPV1 outbreak in the country with low routine

vaccination coverage. In 2013, childhood immunization coverage was only 43% for children 12-23 months (MOPHP, CSO, PAPFAM & ICF, 2015) and remained suboptimal with Diphtheria Pertussis Tetanus 3 (DPT3) coverage in 2019 put at 73% (WHO & UNICEF, 2019).

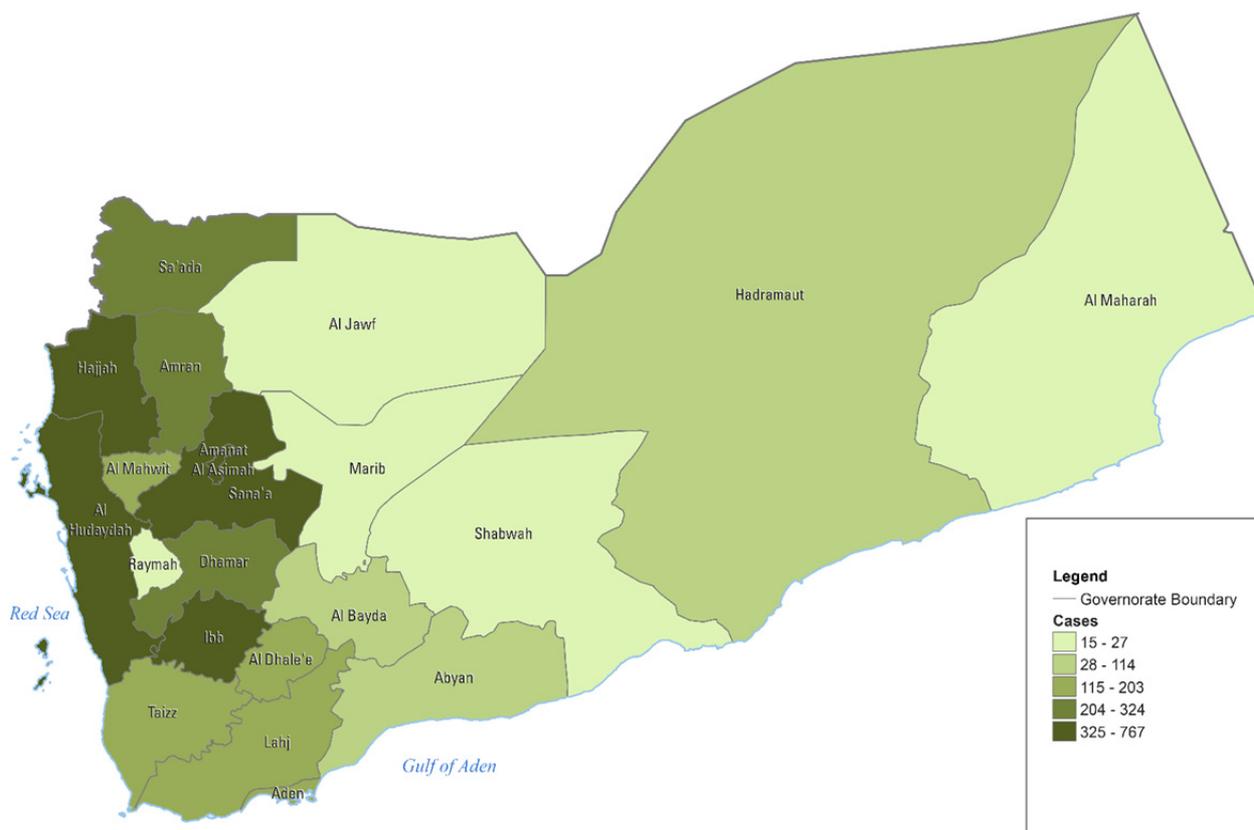


Figure 1. Map of reported cases of a diphtheria outbreak in Yemen 2017-2020

With the advent of COVID-19 in Yemen, all immunization campaigns, integrated community outreach, and mobile team activities were stopped in March 2020. The suspension of live-saving vaccination campaigns due to COVID-19, directly and indirectly, affects children's survival (Robertson et al., 2020). We seek to document the lessons learned from jumpstarting the continuity of services in Yemen through this study. Reverting to campaigns and integrated outreach methods requires addressing misinformation, fear, and stigma to restore trust in the safety and quality of vaccination services and measures to protect the children, families, and health workers from COVID-19 infection risks. The study documents the first fixed post and house to house campaigns conducted in Yemen within the COVID-19 context. The hypothesis made was that the provision of Personal Protective Equipment (PPE) to the campaign teams, coupled with risk communication and community engagement, will provide health workers confidence to undertake the campaign and the communities will be assured of the safety of their children while being vaccinated. The hypothesis is in line with the theory of change underlying the UNICEF jumpstart package (UNICEF, 2020b). Therefore, the study was designed to establish lessons learned at each of the stages of the campaigns. The findings are expected to inform subsequent immunization activities and other health and nutrition interventions in Yemen and beyond.

## 2. Method

The study adopted a descriptive design focusing on the key steps involved in the campaign, including advocacy for approval of the campaign, planning and budgeting, supply and logistics, training, and implementation of the vaccinations. The first four of these steps involved key actors enlisted for key informant interviews based on informed consent (Figure 2). The last step was vaccinations.

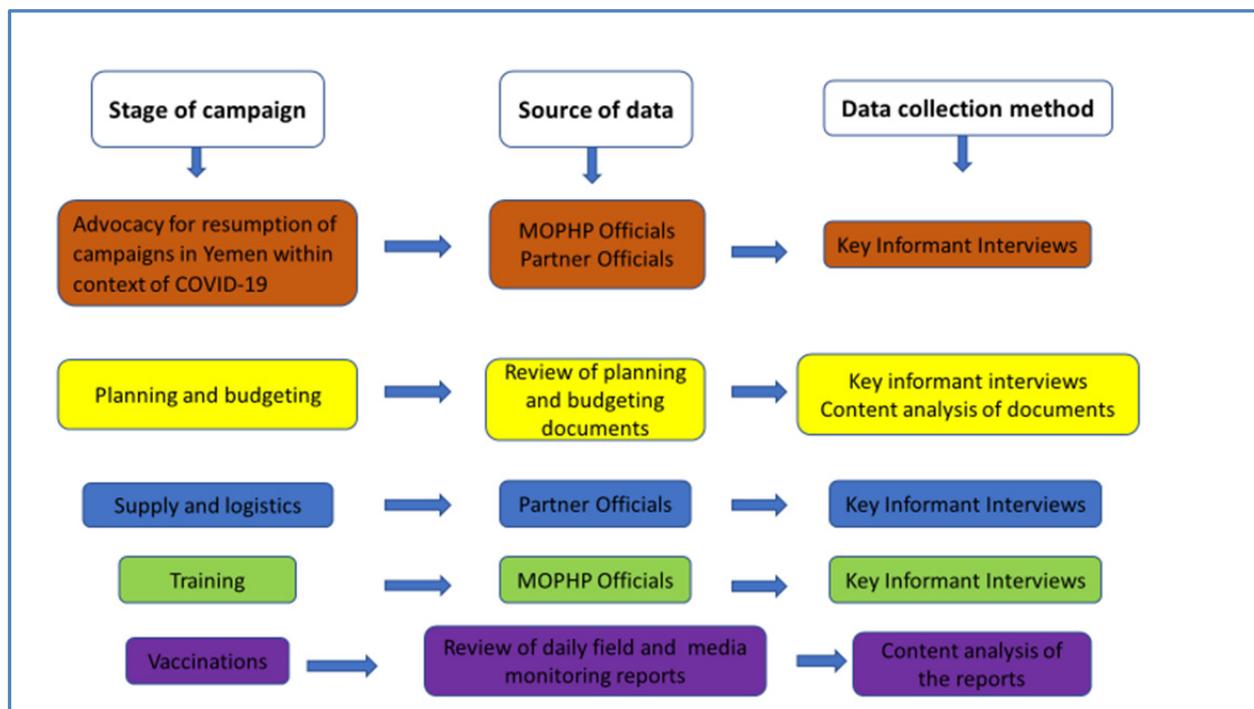


Figure 2. Steps of the diphtheria campaign with the respective source of data and method of data collection

The implementation of the vaccination activities was captured in the daily monitoring reports and daily media monitoring reports. A content analysis of both the daily monitoring and media reports was done. The analysis focused on aspects of the campaign that worked well and others that did not work as expected and the reasons and corrective actions.

### 3. Results

The diphtheria campaign was the first to be implemented for six days in each of the five Governorates of Aden, Almarah, Taiz, Al-dhalea, and Lahj between 4 July and 19 July 2020. It targeted 1,453,912 children aged six weeks to 15 years. The campaign reached 1,091,590 children in the five governorates representing 75 percent of the target. The global guiding principles for immunization activities during the COVID-19 pandemic developed by WHO were received in March 2020. The guidance was adapted to Yemen context by developing a specific concept note and a risk mitigation matrix. The concept note and risk mitigation matrix were used to advocate with the authorities in South Yemen to approve the diphtheria campaign.

A specially adapted micro-plan for the campaign showed a need for a total of 100,778 masks and 100,778 pairs of gloves, 313 hand sanitizers of 1000ml, and 97 hand sanitizers of 97mls as additional supplies required for the campaign. The PPE's total cost was USD 57,944, representing 4 percent of the campaign's total cost. The PPE was sourced and procured locally because of the limited time and the lengthy offshore procurement occasioned by the global pandemic's impact on offshore supply chains. The social mobilizers received their training and commenced community engagement and mobilization a week before the campaign's planned start date and continued throughout the implementation period. The vaccination teams were trained on conducting the campaign, infection prevention, and control with a focus on COVID-19 and the appropriate use of PPE during the vaccination activities. A total of 1,177 vaccination teams made up of 5,139 team members completed the training and were willingly deployed for the campaign.

The Ministry of Health launched the diphtheria campaign in the south within the context of COVID-19, on day one of the campaign on 4 July 2020. The launch was a result of successful advocacy with the authorities. However, the launch of the campaign only happened in Aden Governorate on 4 July 2020. The campaign could not be launched in the other four governorates on the same date as Aden due to delays in delivering supplies, including PPEs (Figure 3). Active political conflicts also caused a delay in Tiaz and Al Dalea Governorates. Lahj and Al Marah Governorates faced other access constraints. The delays resulted in different start dates in the different governorates.

The findings from the content analysis of the daily monitoring reports by governorate are summarized in figure 3. Day one of the campaign went well for four governorates except in Al Dalea Governorate, where the campaign could not commence in three districts at the frontline because of the ongoing political conflict in the country. On day 2, a shortage of vaccination records and vaccines was reported in Taiz Governorate, while the campaign remained on hold in the three contested districts in Al Dalae Governorate. On day three, the campaign’s implementation was faced with constraints in three of the Governorates-Aden, Al-Marah, and Al-Dhalea. Weak social mobilization was reported from one of the districts in Aden Governorate. The campaign was stopped in "Mashra'a Wa Hadnan" district of Taiz following suspected active transmission of COVID-19 in the district. The action followed the fear of escalating COVID-19 following suspicion of a high number of cases in the district. This action was just about the only significant COVID-19 issue reported amid the campaign. The campaign stayed on hold in the three contested districts in Al Dalea Governorate during day three. There was also delayed submission of data from districts implementing the campaign in the governorate.

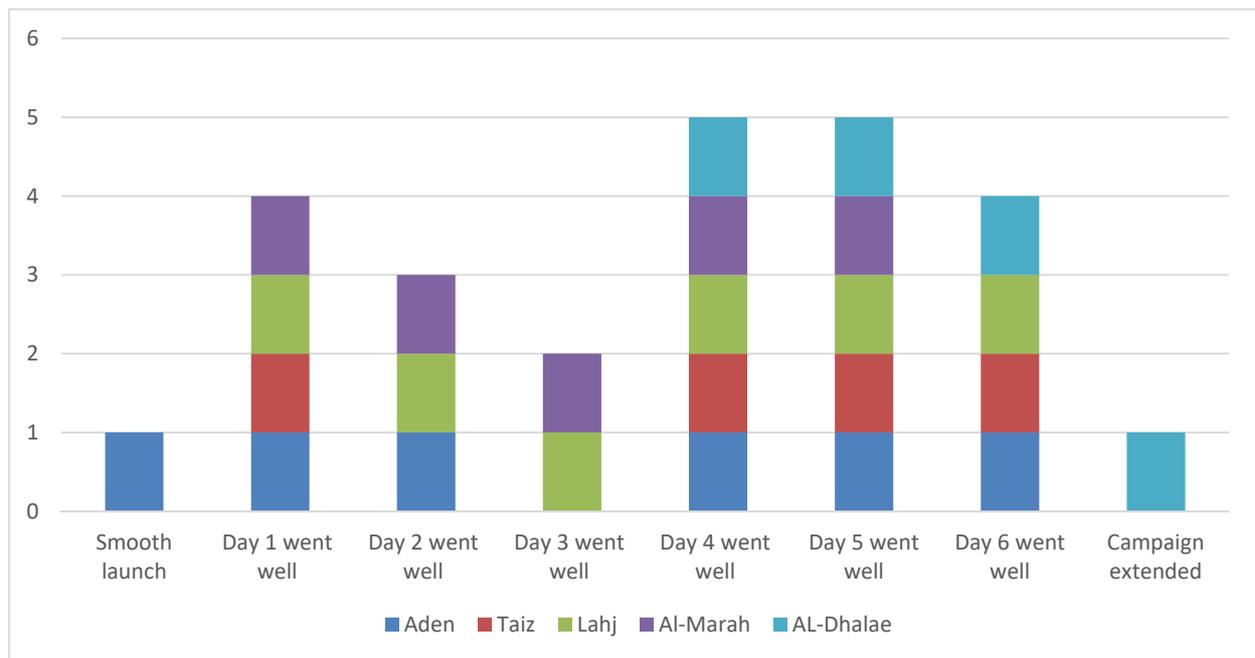


Figure 3. Performance of the diphtheria campaign by governorates assessed as having gone well in the absence of significant reported constraints

The bottlenecks identified during day one to day three of the campaign in the Governorates were timely addressed, resulting in improved daily coverage in the subsequent days and overall coverage against the target. The implementation of the campaign in all the five Governorates went well on day four and day five. The vaccination teams were reported adhering to COVID-19 precautions. Day 6 went well for four of the governorates except for Al Marah Governorate, which experienced delays in submitting data from the field due to challenges with internet connectivity. Following successful advocacy with the North’s authorities, the three districts previously suspended from implementing the campaign in Al Dalea resumed implementation on day four and subsequently had three days extension after day 6.

Daily content analysis of the media during all the Diptheria campaign days revealed positive reporting and mentions about the campaign. One hundred fifty-three online media outlets featured the campaign. Most of these outlets (83 percent) are operated by local media houses based in Aden, Yemen, and the other (17%) by regional and international Arabic media houses. The campaign was further discussed and highlighted in 81 online social media outlets, mostly on Twitter (47 percent) and Facebook (44 percent), and to a lesser extent, YouTube videos (9%). The media’s interaction with the content was positive, displaying the public’s perception to be welcoming and its implementation to have been a success. The media coverage showed the interaction of officials from the Ministry of Health as positively cooperative and contributory.

The integrated Polio and vitamin A campaign in 13 governorates followed between 25 July and 17 August 2020,

six days after completing the diphtheria campaign. As shown in figure 4, the campaign was launched as planned in 7 governorates -Aden, Lahj, Al Dhale'e, Al Mukkala, Al Hodaidah, Abyan, and Shabwah. It was delayed for one day in 4 governorates because of a delay in delivering PPEs (Taiz, Al Maharah, Al Bayda, and Marib). The campaign was delayed for several more days in Seyun and Socotra due to bad weather conditions. Irrespective of whether the campaign was launched on the planned day or not, the campaign went well without any adverse events in 12 of the 13 governorates. Content analysis of daily media reports concerning the polio campaign spanned across (278) online media outlets. Most of the coverage was detected on the Local Media (77%) links, compared to (24%) links in regional and international Arabic Media. The campaign was aired on (13) local TV channels, (2) regional TV channels, and was seen in (5) articles published in Newspapers. The campaign was further discussed and highlighted through (105) online content circulated by Social media users, mostly on Twitter (44%) compared to (41%) on Facebook and (15%) uploaded videos on YouTube. The only adverse media event took place in the Aden governorate, where day 3 of the campaign was canceled after spreading of wrong facts about the campaign in Al-Shaikh Othman District in the governorate. The polio campaign attained 96 percent of its target coverage, representing 1.2 million children under five years. Over 900,000 of these children were also reached with vitamin A.

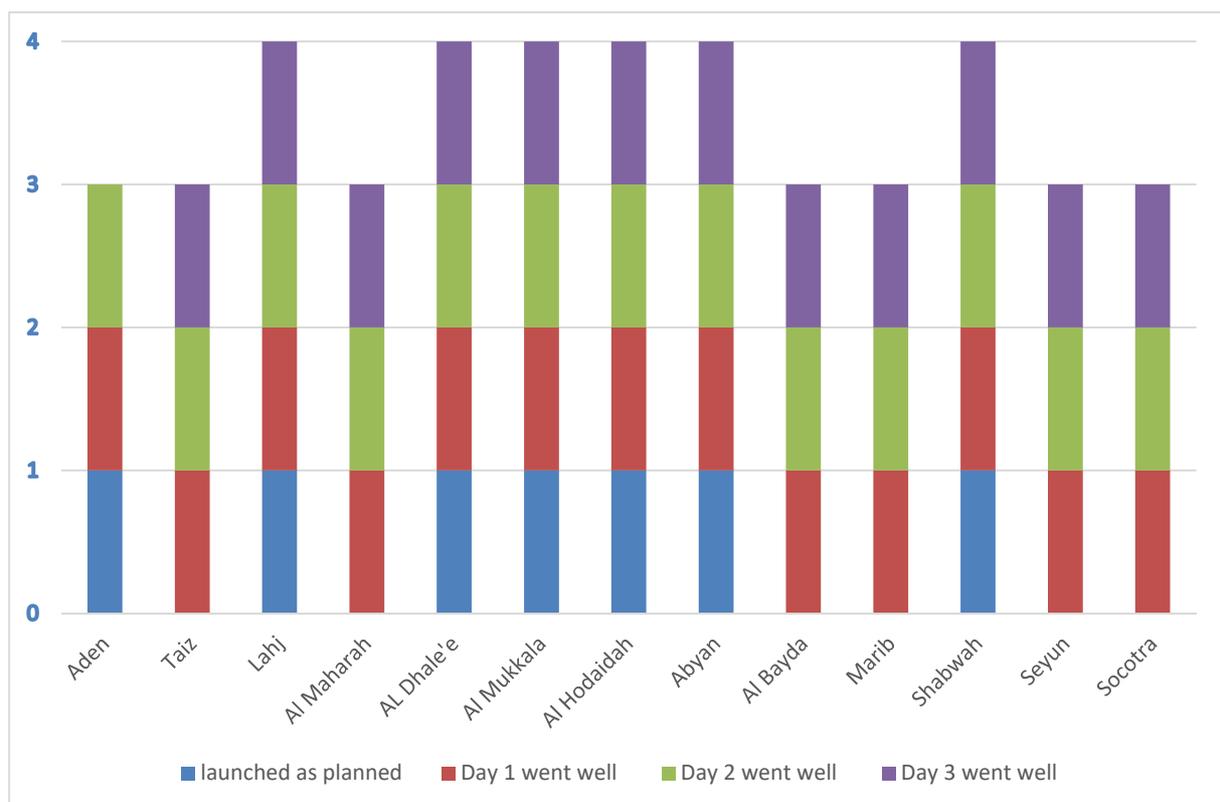


Figure 4. Performance of the polio campaign by governorates assessed as having gone well in the absence of significant reported constraints

#### 4. Discussion

The study assumed that the provision of personnel protective equipment (PPE) to the campaign teams coupled with risk communication and community engagement provided the health workers with the confidence needed to undertake the campaign and the communities were assured of their safety and that of their children while receiving vaccinations within the context of COVID-19. By reaching 1,091,590 children out of a target of 1,495,911 children six weeks to 15 years old (75%) with diphtheria containing vaccine, 1.2 million under-five years children with polio vaccines (96%), and over 900,000 children with Vitamin A, high demand for the interventions was demonstrated. A similar diphtheria campaign conducted in 12 governorates in Northern Yemen, before COVID-19, in 2019 reached 60% of the target of 5.7 million children, lower than that reached during the last campaign conducted within COVID-19 (MOPHP, 2019). None of the previous polio campaigns had reached such high coverage as 96%. The events are akin to the situation following the Ebola outbreak in West Africa during which vaccination activities and other health services suffered massive disruptions. Calls for aggressive vaccination

across West Africa quickly followed (Takahashi et al., 2015; Maestad & Shumbullo, 2020). Cancedda et al. (2016) documented lessons learned post-Ebola while calling for strengthening the health system and emergency preparedness mechanism if another disease outbreak occurred. Cancedda predicted possible outbreak but not to the COVID-19 pandemic scale that caught global health systems unprepared. In the West African Ebola-affected countries, as a measure of the quality of health and nutrition care services, Infection Prevention and Control measures were at best basic pre-Ebola and were at the same basic state or worse when COVID-19 struck in 2019 (Cooper et al., 2016). The lessons learned from Ebola do not seem to have been followed post-Ebola. Similarly, in this study, delays in delivery of PPEs to the governorates witnessed during the diphtheria campaign were replayed in the follow-up polio campaign; maybe the one-week period between the two campaigns was too short for making appropriate adjustments. However, the polio campaign went well and with better outcomes compared with the earlier diphtheria campaign.

The issue of COVID-19 was overcome as an impediment in both campaigns once the decision was taken by the MOPHP and partners of providing the required PPEs to the campaign teams, and the communities were convinced about the safety of the campaign and the benefits of getting their children vaccinated. The PPEs were mainly procured locally in the country. The cost of the PPEs was only about 4 percent of the campaign's total cost, and many children reached represented good value for the money spent. However, the local procurement and delivery took place too close to the actual campaign dates resulting in delayed delivery, which then affected the start dates-launch- of the affected governorates' campaign. The delays highlighted the need for long lead time for the planning, procurement, and delivery of the supplies. The mobilization activities were commenced at least a week to the actual commencement of the vaccination activities. The absence of adverse events-outright refusals, teams without PPE, threats to the campaign teams, and negative media following the campaigns' implementation validated the effectiveness of the risk communication and community engagement activities. Other issues on supplies and logistics and security challenges then took more of the center stage of the campaign noting delay in the commencement of the campaign in three contested districts in Al Dalea governorate and the access issues that hindered the delivery of vaccines to Taiz governorate. However, these issues were swiftly addressed, leading to successful campaigns. COVID-19 seemed to serve as a perfect wake-up call to take seriously prior and thorough preparations and advocacy and introduction of PPE and other measures, which subsequently will remain part of universal infection prevention and control measures. The provision and use of PPEs seemed to play an influential reassuring role in the success of the campaigns.

We reviewed available literature for similar studies reporting on the resumption of immunization campaigns and other health services during the COVID-19 context. Except for Mæstad & Shumbullo (2020), we could not find any others. In the article by Mæstad & Shumbullo, an 18 percent reduction in health services during the Ebola outbreak was documented. There was no total collapse of the health systems; hence the recommendation was to consider both the supply and demand side while maintaining health and nutrition services during an epidemic. Our article documented findings from the implementation of all stages of the campaigns transcending both supply and demand sides. Findings from this study are, therefore, expected to contribute to the body of knowledge and evidence on the continuity of services within the COVID-19 context.

## 5. Conclusions

The key lessons from the campaign could be summarized as follows:

- Advocacy is needed at the highest level in the Ministry of Public Health and Population or its equivalent to secure acceptance and approval of the global guidelines on the resumption of immunization campaigns within the context of COVID-19.
- Provision and sensitization on the use of PPE helped reinforce confidence and assurance on the campaign's safety and services among the authorities, the health workers, communities, and families.
- The cost of the PPE was low compared with the total cost of the campaign and far outweighed by effectiveness against COVID-19 transmission and other infection Prevention and control benefits.
- Early planning, procurement, and distribution of campaign materials and PPEs ensure planned start and smooth implementation. This is not a new lesson, but worth re-learning given the COVID-19 induced constraints affecting offshore and local procurement and logistics pipelines.
- Advance community engagement and mobilization are desirable, given the additional need to address COVID-19 concerns.
- The resumption of immunization campaigns is an opportunity for integration and reaching the beneficiaries with multiple interventions at the same time and limiting contacts.

- Including health workers and beneficiary communities as part of research participants could enrich the lessons learned from studies resumption of services within the COVID-19 context.

In this article, we documented the lessons and experiences learned from the first initiatives of resuming vaccination campaigns in Yemen within the context of COVID-19 with appropriate precautions. We have argued for the need to ensure advocacy at the right level towards decision making, planning, implementation, participation, and ownership of activities. Given the unpredictable nature of COVID-19, the planning and preparations for the campaigns during the COVID-19 context need to start early and have all requirements for vaccines and non-vaccine supplies in place before commencement dates. The risk communication and community engagement activities need to commence at least a week in advance of the vaccination activities, leading to enhanced community confidence and participation.

The provision of the PPE requirements for the campaign ensured support from the Ministry, and during implementation, the vaccination teams and communities were also assured of safety from COVID-19. The assurance through PPE provision calls for introducing and maintaining PPE and other precautionary measures as a norm in all subsequent campaigns and related interventions as universal infection prevention and control measures.

The delivery of a successful first campaign in Yemen during the COVID-19 implies that resumption of health and nutrition services is possible within COVID-19 and in a fragile situation like that of Yemen. The resumption opened a window to reach the children who have missed their vaccinations following the outbreak of COVID-19 and preventing future outbreaks of vaccine-preventable diseases and associated childhood mortality. The immunization campaigns could also be used as an entry point to deliver other suspended health and nutrition interventions to avoid multiple interactions of the same child with the health care system.

The campaign included a real-time feedback loop by learning from daily implementation challenges followed by a response to overcome the bottlenecks leading to a desirable outcome. Robust Risk communication and community engagement (RCCE) strategy was deployed during the campaign harmonizing the messages on COVID-19 prevention measures, diphtheria, and polio vaccination campaigns. These RCCE messages were deployed before and sustained throughout the implementation and have contributed to the decent coverage achieved at the end of the campaign. Overall, the campaign only attracted an additional cost of only 4 percent of the total cost. There were no adjustments needed on workload per vaccinator nor the number of campaign days. Crowds were discouraged from around the fixed posts. These measures should be maintained for subsequent polio, maternal, and neonatal tetanus elimination, oral cholera vaccination campaigns, and the country's integrated outreach activities.

Despite the provision and use of PPE during the vaccination activities and the provision of appropriate information, we cannot rule out residue risks associated with the conduct of the vaccination activities within the context of COVID-19. Despite the limitations in follow-ups and determining the residual risks given that a lot is still not known about COVID-19, including its transmission, there would be value in including communities and beneficiaries of the campaigns, the campaign supervisors, and vaccinators as study subjects in order to generate additional insights, lessons, and best practices for informing future programmes.

## 6. Limitations

The study findings were informed through key informant interviews with content analysis of daily campaign implementation reports, and content analysis of daily media reports for any mentions on the campaign. These sources are all internally managed by the partners and not independent. The daily reporting did not follow a strict format hence likely to have missed important observations to bias the study. The coverage reported by the study is based on administrative data sources and not independent sources. We did not include communities, campaign beneficiaries, campaign supervisors, and vaccinators as direct targets for the study. The non-inclusion of these critical constituents in the study is a potential limitation. Given these limitations, we cannot confirm the campaign teams' confidence and safety while conducting the campaign. For similar reasons, we cannot confirm the level of assurance among the communities on the safety measures applied during the campaign except indirectly through the high turnout of children for vaccination.

## Acknowledgments

Deputy Minister MOPHP Aden, Partners, donors-WB-EHNP, GAVI, FCDO, KSA for supporting to the campaign.

All authors have contributed to this manuscript in ways that comply with the ICMJE authorship criteria and have read and approved the manuscript's final version.

### Financial support

None.

### Sponsorship

None.

### Competing Interests Statement

All authors: No reported conflicts. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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