Mid-term evaluation of the Global Strategy to Eliminate Yellow Fever Epidemics (EYE) 2017–2026

Lessons learned and best practices on the planning and implementation of yellow fever vaccination campaigns: Ghana country case study
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## ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>COVID-19</td>
<td>Coronavirus disease 2019</td>
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<td>CSO</td>
<td>Civil society organization</td>
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<td>EPI</td>
<td>Expanded Programme on Immunization</td>
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<td>EYE</td>
<td>The global strategy to Eliminate Yellow fever Epidemics 2017–2016</td>
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<td>GHS</td>
<td>Ghana Health Service</td>
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<td>IgM</td>
<td>Immunoglobin M</td>
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<td>PMVC</td>
<td>Preventive mass vaccination campaign</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WUENIC</td>
<td>WHO/UNICEF estimates of national immunization coverage</td>
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1 INTRODUCTION

1.1 Purpose of the case study

Two country case studies (in Brazil and Ghana) were conducted as part of a mid-term evaluation (MTE) of the global strategy to Eliminate Yellow fever Epidemics (EYE) 2017–2026 (1) to provide lessons learned and document best practices on the implementation of various key EYE actions in different contexts.

The main objectives of the country case studies under the mid-term evaluation were to:

- document learning and best practices in the implementation of various activities in line with the components of the EYE strategy in relation to the yellow fever response;
- identify critical factors and key enablers for the successful implementation of specific components of the EYE strategy;
- identify the potential for scale-up and replication.

Ghana adopted the global EYE strategy in 2017 which aims to protect at-risk populations, prevent international spread, and contain yellow fever outbreaks rapidly (2). This case study focused on specific EYE learning points in Ghana during the implementation period 2017–2022 and related particularly to the first specific objective of EYE, namely, to protect at-risk populations. The specific themes were agreed upon through a collaborative process involving key country-level stakeholders and concentrate on the planning and implementation of yellow fever vaccination campaigns, including:

1. community engagement in the planning and implementation of yellow fever vaccination campaigns;
2. tailored and targeted approaches to reach underserved populations with yellow fever vaccination; and
3. integration of coronavirus disease 2019 (COVID-19) vaccination with a reactive yellow fever vaccination campaign.

2 METHODS AND APPROACH

2.1 Data collection and analysis

The case study used a mixed-methods approach combining qualitative and quantitative methods for data collection and analysis. An initial document and data review was supplemented by primary data collection through key informant interviews and focus group discussions undertaken during the period from 20 September to 5 October 2022 with key stakeholders from the national and subnational levels involved in yellow fever prevention and response.

From the national to the subdistrict levels, key stakeholders were specifically selected to take part in key informant interviews and focus group discussions in order to collect relevant information and encourage the sharing of experiences and knowledge. Representatives from the Ghana Health Service (GHS) at national and subnational levels, including senior-level officials and health-care workers such as nurses, vaccinators and supervisors, representatives from the country offices of the World Health Organization (WHO) and United Nations Children’s Fund (UNICEF) participated in one-on-one interviews and focus group discussions. The case study included field visits to Bosome Freho District in the Ashanti Region and Ga South Municipality in the Greater Accra Region.
Altogether, 14 key informant one-on-one interviews and two focus group discussions (with four and eight participants respectively) were conducted through which a total of 26 key stakeholders shared their experiences. Additional information on key informants is available upon request to the WHO Evaluation Office.

Key informant interviews were conducted using a semi-structured interview guide that listed a predetermined set of questions related to the case study themes. Informants in the focus group discussions were asked to reflect on the interviewer’s questions, provide comments, listen to what others in the group had to say and react to their observations. The interview guide and focus group discussion guide is provided in Annex 2.

Data from key informant interviews and focus group discussions were noted, analysed and organized according to themes and content. The best practices and learnings were explored with emphasis on key enablers, critical factors, specific results and their potential for replication, scale-up and sustainability.

2.2 Limitations

The Ghana country case study was restricted by time and scope and included relatively few informants. However, key informants were carefully selected to bring out perceptions from a variety of stakeholders on the selected themes and lessons to be documented. Competing priorities of key stakeholders was a limitation to this country case study. Many key informants were occupied with assignments in and outside the country during data collection, which delayed the process and extended the set timeframe for collection. Due to this limitation, some planned interviews were conducted virtually instead of face-to-face.

In addition, data were not available for review in a few instances. For example, administrative yellow fever vaccination coverage by region was described in a post-campaign survey report, but the corresponding post-campaign coverage rates were not provided. Similarly, overall administrative vaccination coverage was reported for dual-antigen campaigns in selected subdistricts, but community-specific coverage rates were not available for analysis.

Interpretation of this report’s findings should take into consideration these limitations. Nevertheless, important learnings, opportunities and gaps are presented in this report, while considering the potential for scale-up and replication.

3 FINDINGS

The section below presents best practices and lessons learned from the Ghana case study along three themes: (1) civil society and community engagement in yellow fever vaccination campaigns; (2) tailored and targeted approaches to reach underserved populations with yellow fever vaccination; and (3) integration of a yellow fever vaccination campaign with a COVID-19 vaccination campaign.

3.1 Involving civil society and community structures in the planning and implementation of yellow fever preventive mass vaccination campaigns

Background

The highly effective yellow fever vaccine was introduced into Ghana’s routine immunization programme nearly three decades ago with consistent high coverage rates above 80% since 2004, and reaching 94% coverage in 2021 according to WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) data (3). To further increase population immunity in Ghana, yellow fever preventive mass vaccination campaigns (PMVCs) were introduced in Ghana in 2005 to complement
routine immunization efforts. Following a yellow fever risk assessment in 2010, PMVCs were repeated in 2011 and 2012 to protect at-risk populations in targeted districts. After Ghana adopted the EYE strategy, two additional PMVCs were carried out in 2018 and 2020 to include districts that were not covered in earlier campaigns. Over the years Ghana has intensified the engagement of civil society and communities in yellow fever vaccination campaigns to improve vaccination coverage.

Engaging civil society and communities in PMVCs – lessons learned

Civil society organizations (CSOs) have played a significant role in promoting yellow fever vaccination campaigns in Ghana with intensified engagement during the campaigns in 2018 and 2020. CSOs assisted with social mobilization efforts from national to local levels. Their representatives served on the national committee providing technical support for planning and implementation, while their members, who are well known in the communities in which they live and work, organized residents for vaccination campaigns.

Civil society was an integrated key player in the initial planning of PMVCs in 2018 and 2020 at national, regional, and district levels. PMVCs were planned through collaborative efforts by multiple key partners, including GHS, WHO, UNICEF, the Centres for Disease Control and Prevention, the Ghana Coalition of NGOs in Health (GCNH), and other partners such as district assemblies, the Food and Drugs Authority, John Snow Inc., and PATH. A national intersectoral committee chaired by the Director of Public Health of the Ghana Health Service (GHS), including CSOs, oversaw every aspect of the campaign, while subcommittees organized the technical aspects, such as planning and coordination, communication and social mobilization, training, vaccine logistics, and monitoring and evaluation. This structure was adopted, to a large extent, by the relevant government and nongovernmental stakeholders at regional and district levels. The key partners, WHO and UNICEF, provided support to various aspects of the planning, including International Coordination Group (ICG) applications, budgeting, funding sourcing, vaccine availability, communication and social mobilization, logistics and technical support.

GHS and its partners made extensive use of the expertise and support of CSOs which are active at all levels of the health-care system to successfully mobilize communities for campaigns. WHO and UNICEF have supported GHS to build the capacity of CSOs to promote and create demand for vaccination campaigns. Community entry was facilitated by community leaders such as “ Chiefs” and “Queen Mothers”. Durbars (ceremonial community meetings) were held to inform community stakeholders about the campaigns. Information about campaigns was further disseminated through community information centres, churches, mosques, local radio stations and through “village criers” and gong-gong beaters. Religious leaders allowed vaccination teams to use their premises as vaccination posts. For each locality, context-specific factors were considered before selecting the best community engagement approach. Community members were also utilized to address rumours relating to the PMVCs in the 2020 presidential elections.

Selected quotes from key informants on the importance of community engagement in achieving a high coverage rate of yellow fever vaccination campaigns are provided below:

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2 Ibid.
5 Ibid.
If you want to deliver any intervention in the community, and you fail to engage community structures, then you are planning to fail.

I think over the years Ghana has been quite successful in our campaigns, and our coverages have been quite impressive. Apart from for COVID-19. ... I think that the [sic] there’s a lot of trust between government and the indigenes because we use the local people in our health programmes.

We shouldn’t assume that communities do not have capacity to, or they do not have trusted voices to be able to lead their own communication. When you build their capacities and leave the communication to them, they will ensure that every other person in the community get vaccinated. That was one of the strongest lessons.

Engaging [community] stakeholders should be our number one priority.

**Results of PMVCs conducted in 2018 and 2020**

The PMVCs implemented in 2018 and 2020 aimed at reaching low-performing and yet-to-be-reached districts after the first and second phases of PMVCs in Ghana, which targeted populations between 10–60 years of age (in the expectation that 0–9-year-old children had been reached by routine immunization). In 2018, a total of 5.5 million people were vaccinated across nine regions, and in 2020, 5.3 million people were vaccinated across 14 regions.

Ghana achieved a high reported coverage of the PMVCs in both 2018 and 2020. Fig. 1 displays administrative coverage and post-campaign survey findings for the 2018 PMVC. The administrative coverage results and the post-campaign survey had different coverage rates, 107% and 84%, respectively. The administrative coverage calculations are affected by data quality issues and should be interpreted with caution because the denominator was estimated using old census data. Except for two regions, all the implementing regions had post-campaign survey coverage rates above 80%. The lowest coverage rate was reported in the post-campaign survey from the Greater Accra Region at 58%.

Fig. 1. Administrative versus survey coverage rates for the YF PMVC, Ghana, 2018

YF: yellow fever; PMVC: preventive mass vaccination campaign.

Source: Sub-national yellow fever preventive mass vaccination campaign (PMVC) coverage survey report, 2018.

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For PMVCs implemented in November 2020, the overall administrative coverage rate was reported as 94% with regional administrative coverage differences as presented in Fig. 2. According to post-campaign surveys the overall coverage was 83% (85% in urban areas and 80% in rural areas – disaggregated post-campaign survey data were not available by region for 2020 PMVCs). The PMVCs in 2020 were thus considered successful despite the ongoing COVID-19 pandemic and the necessary strict precautionary measures. The main reasons reported for non-vaccination were absence of targeted populations during the vaccination campaign (35%), not being informed about the vaccination campaign (24%) and being too busy during the vaccination campaign (12%). Fig. 2 presents only administrative coverage rates per region (post-coverage survey data per region were not available). Coverage data from earlier PMVCs conducted in 2011 and 2012 were also not available for comparison.

Fig. 2. Administrative coverage rate data for YF PMVC, Ghana, 2020

![Administrative coverage rate data](image)

YF: yellow fever; PMVC: preventive mass vaccination campaign.
Source: Report on yellow fever mass vaccination campaign in Ghana (phase B), 12–18 November 2020. Expanded Programme on Immunization, Ghana Health Service, [2021?]. (See footnote 1.)

### Key enablers, gaps, and challenges

The strong multi-partner collaboration, wide engagement of CSOs and communities, and the detailed planning efforts were identified as key enablers for success of the PMVCs in 2018 and 2020. The GHS and its partners, including civil society, collaborated well, played different roles in a coordinated manner to plan and implement the campaigns effectively. The planning for the PMVCs started at least six months before implementation and consideration was given to involve CSOs and community structures to address context-specific problems that could hamper vaccination efforts (for example, potential community reluctance due to lack of a clear public health threat, as well as remote settlements and areas with security risks).

Ghana has a well-organized health system which further facilitated the planning of public health interventions. The planning of campaigns was informed by applying lessons learned from earlier campaigns. The implementation of the PMVCs, however, required considerable financial support from Gavi for both operational costs (amounting to US$3.5 million for the PMVC in 2018) and the vaccines.

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11 Ghana YF preventive campaign budget phase A. Ghana Health Service, unpublished, [n.d.].
(fully covered by Gavi) as well as technical support from other collaborating partners such as WHO and UNICEF.

Despite the successful large-scale campaigns achieving overall high coverage rates, and a continued high coverage of routine immunization over almost two decades, a large disruptive yellow fever outbreak was reported in October 2021 with 60 confirmed cases. The first cases were reported in the Savannah Region among nomadic populations, but with sporadic spread across several regions and districts of Ghana. National authorities as well as WHO concluded that the yellow fever outbreak in 2021 in Ghana was possible because of pockets of unreached populations during PMVCs and routine immunization roll-out. This aspect is further explored in the next section.

During the implementation of the PMVCs, the following four challenges and lessons learned were noted.12,13

1. The lack of an obvious public health threat during a PMVC, as opposed to a reactive campaign that is carried out in response to an outbreak, thus requiring substantial health education.
2. The occurrence of a public health crisis, such as COVID-19, which may deter attention and requires additional planning efforts and resources to ensure adherence to preventive measures.
3. Hard-to-reach populations such as those living in places affected by conflict and in remote settlements that are difficult to access. In urban areas, challenges in reaching certain populations such as those who live in high-security gated communities and in urban slums were documented.
4. Data quality and accuracy of denominators where administrative coverage denominators rely on population estimates that may be outdated. Several key informants questioned the reliability of administrative coverage data. High-quality post-campaign coverage surveys are necessary to validate administrative data from PMVCs which requires adequate financial and human resources.

3.2 Tailored and targeted approaches to reaching underserved populations with yellow fever vaccination

Background
Despite Ghana's generally high routine immunization coverage and concluded nationwide PMVCs, segments of the population remained at risk which led to the continued silent transmission of the yellow fever virus and outbreaks observed in 2021. During the period from 15 October to 27 November 2021, Ghana reported a total of 60 confirmed cases of yellow fever with 12 deaths (20%).14 This represented about one third of all confirmed yellow fever cases recorded in African countries in 2021 (4). Cases were identified across 14 districts in five regions (Bono, Eastern, Northern, Savannah and Upper West regions) with most cases reported from the Savannah Region. At the time of writing this report in 2022, one confirmed case has been reported from the eastern region of Ghana.15 Further analysis undertaken found that the 2021 yellow fever outbreak in Ghana began in members of a nomadic community (5) who were predominantly unvaccinated and assumed to have entered the country after the last PMVC (5). Nomadic populations reportedly had moved from Nigeria into a forest reserve in Ghana’s Savannah Region (5).

15 Ibid.
Implementing targeted reactive vaccination campaigns

Ghana Health Service and its partners, such as WHO, UNICEF, Centres for Disease Control and Prevention, and CSOs implemented reactive yellow fever vaccination campaigns in Ghana mainly across subdistricts with yellow fever cases in December 2021 and February 2022 but also in adjacent high-risk districts, targeting populations between 9 months and 60 years of age. Fig. 3 shows a map of targeted areas of the two reactive campaigns in Ghana. The risk of transmission was assessed based on field epidemiological links, entomology, and vaccination coverage to determine areas which required response.\textsuperscript{16} The main criteria delineated subdistricts in which at least one laboratory-confirmed case (Immunoglobulin M (IgM) or polymerase chain reaction had been reported. The criteria excluded district-wide vaccination because all the affected regions had been covered previously through PMVCs.

In total, 32 subdistricts from 19 districts across seven regions organized a reactive yellow fever vaccination campaign from 17 to 21 December 2021.\textsuperscript{17} The Savannah Region started a “local” response campaign in early November 2021 using in-country Expanded Programme on Immunization (EPI) yellow fever vaccines, before the approval and arrival of the vaccines supported by the International Coordination Group (ICG). The reactive campaign in December 2021 reached a total of 535 562 people out of 568 467 targeted (between 9 months and 60 years of age) corresponding to a coverage rate of 93%. Of the reached populations, 37% (n=196 986) had already been vaccinated as evidenced by a yellow fever vaccination card. In total 338 757 people did not present proof of previous yellow fever vaccination (in the form of a vaccination card) and were vaccinated. High coverage, above 80% (either vaccinated during the campaign or with proof of a previous vaccination), was reported from all regions except one (Upper West Region) where only 54% of the targeted population was vaccinated during the campaign or had previously been vaccinated. There was no further information available on the reasons for the lower performance in the Upper West Region.

Updated laboratory data from December 2021 showed additional positive yellow fever cases from new subdistricts not covered in the first phase of the reactive campaign, including those from Savannah Region and across subdistricts of three additional regions with new cases. A second (phase 2) reactive vaccination campaign was thus initiated in February 2022 targeting all remaining subdistricts in the Savannah Region (n=24) and all subdistricts with new confirmed yellow fever cases since December 2021 reaching a total of 538 905 people (more than 300 000 in Savannah Region alone) across 43 subdistricts in February 2022 with a coverage rate of 89% of the targeted population (603 394).\textsuperscript{18} Of the reached population during the reactive phase 2 vaccination campaign, 37% (199 345) had previously been vaccinated as evidenced by a yellow fever vaccination card and 63% (339 560) were vaccinated during the campaign.

As part of the preparations for the targeted reactive campaigns, districts conducted rapid assessments on barriers to communication and mapped stakeholders and channels. This helped teams to formulate appropriate messages and channels of risk communication. Vaccination sessions in both reactive campaigns took place in health centres and provisional vaccination posts in markets, transportation hubs and stations, schools, churches, and municipal and district assemblies. Some teams also travelled to island and riverine communities to ensure target communities received vaccines. The reactive campaigns built on the good experience of engaging communities as described under the PMVCs section above. Subdistrict teams organized advocacy and sensitization meetings with traditional, religious leaders and other community leaders (for example, local assembly leaders, school managers,


\textsuperscript{17} Ibid.

youth leaders and women’s groups). In addition to these groups, Savannah Region teams also engaged with butchers and nomadic herdsmen to reach nomadic populations.

Through the implementation of the reactive campaigns, Ghana managed to rapidly contain the outbreak with one additional confirmed case reported in 2022.

Fig. 3. Map of reactive YF vaccination campaigns in Ghana, Dec. 2021* and Feb. 2022**

Gaps and challenges

Lessons learned from the reactive campaigns include the fact that areas considered as hot spots, such as the Savannah Region, should have responded with a large-scale and comprehensive campaign during the first reactive campaign. The first reactive vaccination campaign implemented in December 2021 covered only 16 out of 40 subdistricts of the Savannah Region because the target criteria relied on the previous PMVCs having covered the population sufficiently. Yet, the newly confirmed cases discovered during December 2021 and beyond were from subdistricts of the Savannah Region that had not been covered in the first phase of the reactive campaign. This was subsequently addressed by a reactive vaccination phase in February 2022 but exemplifies the need for quality coverage data.
obtained through post-campaign surveys and comprehensive targeting approaches in hot-spot areas during reactive campaigns.

Furthermore, a large proportion (63%) of the reached population during both reactive campaigns presented without proof of a previous yellow fever vaccination. This may be caused by several factors:

1. people had previously been vaccinated for yellow fever but had lost/forgotten/never received a yellow fever vaccination card;
2. concerns relating to the quality of the coverage data from previous PMVCs and routine immunization data;
3. the effective reach of under-immunized populations during the reactive campaigns.

Most likely, a combination of all three factors has attributed to this finding. Nevertheless, there is scope to strengthen coverage data and analysis from PMVC and routine immunization. The report from the latest reactive campaign recommended conducting post-coverage surveys and printing out yellow fever vaccination cards as there were no stocks available at national level stores.¹⁹

The COVID-19 pandemic was less of a challenge in rolling out the reactive campaigns than one might have expected. Effective planning, procurement of personal protective equipment and training of staff in operational manuals on how to conduct vaccination sessions during the pandemic were initiated building on previous vaccinations campaigns implemented in 2020 (yellow fever PMVC and polio campaigns). Less information was available on how to potentially co-administer yellow fever vaccine with COVID-19 vaccination campaigns which were running simultaneously with overlapping target populations. Some districts opted for an integrated approach which is further explored in detail under Section 3.3.

The 2021 outbreak was, as previously mentioned, traced to have started in nomadic populations. Nomadic communities are often untraceable by service providers, and porous borders and extensive cross-border movements of these populations exacerbate the risks of international spread. Apart from their migratory lifestyle, nomadic communities tend to settle in remote, forested areas of the country that are largely unknown or underserved by health-care providers, making it difficult to include them in vaccination campaigns even during periods of settlement. Learning from the 2021 outbreak epidemiology, gaps and challenges during the PMVC and reactive campaigns, Ghana has since embarked on the development of a framework and tailored approaches to increase vaccination coverage among nomadic populations based on implementation research. This is explored further below as a “best practice” example.

Developing a framework and tailored approaches to guide vaccination campaigns among nomadic populations

Studying nomadic populations to guide implementation is key

UNICEF requested and funded research to establish the movement patterns of nomadic populations in Ghana, identify and map their locations, and determine their health-seeking behaviours and context-appropriate social and behaviour change approaches. The research was conducted by the GHS Kintampo Health Centre in selected districts in the Upper West, Savannah, Bono East, and Ashanti regions of Ghana and the results were recently disseminated to key stakeholders (6). Evidence is currently being used to develop a framework to guide vaccination campaigns in Ghana among this specific population for yellow fever as well as for other vaccine-preventable diseases.

Using the right points of entry and platforms

Key informants, who had done research in this area, generally said that nomadic populations had no objections to immunization as such. However, how well they are integrated into their larger communities may affect their trust in health authorities and their readiness to use the health services available. Furthermore, the migratory nature of nomadic populations is seasonal and can be predicted and mapped. For example, certain days are more appropriate for offering vaccination services (that is Fridays) (6).

In the early phases of the reactive vaccination campaign, nomadic communities generally tended to avoid the health authorities. Using community leaders and key respected locals as entry points to these communities and involving their leaders in the campaign and social mobilization, won their trust and support. The GHS, WHO, UNICEF and other partners relied on local stakeholders such as butchers, proprietors of community pharmacies and chemical stores, as well as cattle owners to inform and mobilize the nomadic community to yellow fever vaccination services. Leaders of nomadic communities were engaged, and their capacities were built in order to support both the planning and implementation of the reactive vaccination campaign.

Examples of quotes from key informants are presented below:

You can have a good message, but if you have a bad [the wrong] messenger you will not succeed in communicating.

The use of the nomadic leadership in reaching out to them in every facet of their life remains important. If we do away with the leadership, we run into trouble...When we were commencing this, we thought it was a very dangerous ground to tread, because it had security implications. But, at the end of the day, when we mapped out strategies and started using their community leaders you would be surprised that before you get to one community and start talking to them, the leader has already called [informed] them... The leaders were happy that for the first time a group was coming to them to talk to them about issues around their health. So, it remains important that we use their leaders...

Health education and attention to possible gender bias

The research study among nomadic communities found that the uptake of vaccination services depended on the risks of the disease and how common/widespread it is perceived. It recommended the use of radio and information centres for health education (6). Some key informants reported that men of the nomadic community often excluded women and children from campaign-related discussions. The women acknowledged in a separate meeting how they were ignored in similar matters and reported not having their husbands’ support in other areas, including antenatal care. According to key informants, women were often more knowledgeable about yellow fever than the men, and many of their children had received the yellow fever vaccine as documented by review of their vaccination records or cards. It is important to address any practices that can result in gender disparities in access to health-related information or services and ensure that women are involved.

Reaching nomadic populations requires additional resources

Due to the remoteness of nomadic populations’ settlements, health workers need additional resources to cover transportation and logistics to enable them to reach out to members of the nomadic communities. It was recommended that vaccination centres or vaccination points be established at strategic locations closer to the settlements.

Potential of replication, scale up and sustainability

The examples above demonstrate how vital it is to “know your epidemic”, have reliable data systems in place and conduct studies into the way of life of vulnerable populations such as nomadic communities to inform the planning and implementation of context-appropriate and tailored strategies.
Implementation research efforts on yellow fever vaccination among nomadic populations conducted by the GHS, UNICEF and its partners can be adopted in various settings and among various vulnerable, high-risk and hard-to-reach populations to improve access to vaccination services. Other yellow fever high-risk groups beyond nomads in Ghana, include workers in farming, lumbering and mining businesses who are at increased risk for sylvatic transmission (5).

Tailored approaches for service delivery to nomadic populations can be expanded further in order to increase the use of other health-care services (other vaccine preventable diseases, antenatal care, etc.). Using the appropriate community entry points and engaging local stakeholders is a sustainable way to bring vaccinations and health services closer to the population.

However, tailored outreach approaches to nomadic populations are generally more costly as they imply the need for research on migration patterns, health-seeking behaviours, and appropriate social and behaviour change approaches. Equally, the delivery of services in remote areas is more costly. It is expensive and tedious to undertake immunization campaigns utilizing a mobile team strategy in settings with geographically hard-to-reach areas. This is in part due to the lack of accessible public transportation to remote settlements. An effective mobility strategy should be put in place for vaccination teams, and funds set aside for the supply of suitable transportation logistics such as motorbikes. Personal protective equipment, such as wellington boots, should be provided for vaccination teams who work in wet or flood-prone areas. Furthermore, the possibility of assigning more vaccination teams to these locations should be considered. Partners should work together to identify sources of funding for research activities and for follow-up on research findings and recommendations. Thus, when preparing for similar efforts, proper transportation and security procedures should be considered as well as adequate financial arrangements.

### 3.3 Integration of COVID-19 vaccination with yellow fever reactive vaccination campaigns

**Background**

Since March 2021, Ghana has had access to COVID-19 vaccines, which have so far been distributed in phases (7). As previously mentioned, a yellow fever outbreak began in the Savannah Region in October 2021, extending into several other regions and the GHS and its partners launched reactive subnational vaccination campaigns in November and December 2021 and in February 2022. Some regional and district-level health teams used the opportunity to offer COVID-19 vaccinations during the roll-out of the yellow fever reactive campaigns. Bosome Freho district is one of the Ashanti Region’s most deprived districts with a number of remote settlements that are difficult to access due to poor road networks. A reactive yellow fever campaign was required following an outbreak in its Nsuaem subdistrict. The district implemented the yellow fever reactive campaign from 26 February to 2 March 2022 while simultaneously offering COVID-19 vaccines to benefit the eligible target population aged 16 years and above. A similar approach was employed during the same period in the Amanfro subdistrict of the predominantly urban Ga South Municipality in the Greater Accra Region.

**Implementing the integrated campaign**

The initiative of the dual-antigen campaign was led by regional and district health authorities of the target subdistricts. The simultaneous administration of the two life-saving vaccines benefited the

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population, while also saving on operational costs by using the same personnel, logistics and cold chains, among other resources, as expressed by a key informant:

There were gains in terms of also ensuring that people also had COVID-19 [vaccination]. We were experiencing multiple public health emergencies. Aside protecting them from yellow fever, they were also at risk of dying from COVID. So, it was a good initiative.

The regional and district health teams worked collaboratively to plan the campaign, train vaccinators and supervisors, and monitor campaign activities. Vaccination teams comprised a health-care worker and two community volunteers. They were stationed at strategic locations within the communities or travelled from home-to-home, stopping at social gatherings, places of work, schools, and other venues to provide vaccines to beneficiaries. COVID-19 and yellow fever vaccines were stored in separate vaccine carriers. Health authorities from the national, regional, district and subdistrict levels held daily review meetings with vaccination teams and supervisors to discuss the campaign’s progress, identify gaps and agree on next steps to ensure that targets were met. District assemblies, CSOs, local chiefs, religious leaders, community-based volunteers, and other community stakeholders were involved throughout every stage of the campaign. Technical assistance was provided by national representatives (for instance, from the EPI office) as well as partner organizations (such as UNICEF) who had originally visited the sites to supervise the reactive vaccination campaigns.

**Results of the dual-antigen vaccination campaign**

In Nsuaem, 11 638 persons aged from 9 months to 60 years received a yellow fever vaccination during the implementation of the dual-antigen campaign. The overall subdistrict administrative coverage was 105% when the 3730 people who had previous yellow fever vaccination records were taken into account. The yellow fever vaccination coverage is thus slightly higher than the 97.5% recorded in the same subdistrict during the 2018 PMVC\(^{23}\) and comparable to single-antigen yellow fever reactive campaigns implemented in other subdistricts of Ghana during the same period.\(^{24}\) The administrative coverage rates for each community, however, varied from 71% to 147%\(^{25}\) (Fig. 4). A regional health authority ascribed the wide-ranging community-specific coverages to population fluctuations resulting in inaccuracies in the denominators used to compute administrative coverages. The denominators used to calculate yellow fever vaccination coverages were estimated from often outdated census data, such as for PMVCs, as described in Section 3.1.

In contrast to the yellow fever vaccination, which targeted 90% of the population, only 5% (814) of the subdistrict’s population were targeted for COVID-19 vaccination during the dual vaccination campaign. The COVID-19 vaccination target of 5% was established based on the quantity of vaccines allotted to the district during a recently ended COVID-19 vaccination campaign. During the integrated campaign roll-out, 495 people (60.8%) received the COVID-19 vaccine, including 203 for the first time, 163 for the second time, and 129 for the third time (booster dose).\(^{26}\) The previous single-antigen COVID-19 mass vaccination campaign that took place from 2 to 6 February 2022 in the same subdistrict had targeted 814 persons but reached 1000.\(^{27}\) District health authorities deemed the COVID-19 vaccination reach during the dual campaign to be good, given that the recent single-antigen COVID-19 campaign


\(^{25}\) Bosome Freho District Health Directorate: Ghana reactive yellow fever vaccination campaign. Ghana Health Service, unpublished, [2022].


\(^{27}\) Ibid.
had already exceeded its target and the integrated campaign was implemented to use remaining vaccine supplies and reach even more people.

Fig. 4. Community-specific administrative YF vaccination coverage rates, Nsuaem subdistrict, Feb–Mar 2022

In the Amanfro subdistrict, the administrative yellow fever coverage was 80.3%, 84,588 out of 105,305 people were vaccinated, which is also comparable to coverage rates of single-antigen yellow fever reactive vaccination campaigns implemented in other subdistricts during the same period.

**Gaps and challenges**

One of the major challenges that health teams perceived, and vaccination teams reported in relation to this dual-antigen campaign was COVID-19 vaccine hesitancy. A focus group participant had this to say:

> I was afraid of people, the community members. Because during the COVID (vaccination campaign) alone it wasn’t easy. Now, we’re adding another thing. It wasn’t an oral one. Another injection. I really thought about it before stepping out.

According to the health authorities and vaccinators interviewed, some community members had the misconception that COVID-19 vaccines were administered under the guise of yellow fever vaccines. Vaccinators said they spent a lot of time educating some community members and, in some cases, making several home visits to inform people about the benefits of getting both vaccines. They were not always successful, and some refused the yellow fever vaccine. Another focus group participant said: “For you to be talking, talking [and] talking. [Yet], at the long run the person will not even take it [the vaccine] and will be insulting you [made the work tedious].”

Concerns were also raised regarding COVID-19 vaccine side effects. To address this, vaccinations were given in the late afternoons in some cases, when recipients were finished with most of the day’s activities.

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However, the dual-antigen campaign appeared in some cases to increase community trust in COVID-19 vaccines as expressed by another key informant:

> Although there were a lot of conspiracies around COVID-19, there isn’t any conspiracy when it came to yellow fever because the disease is known. The vaccines have been in existence for long and for that matter, they were ready for the yellow fever vaccine. By having yellow fever and COVID vaccines on the same desk, being administered by a vaccinator or a nurse they could trust, gave them confidence.

**Key enablers and lessons learned**

The key enablers and lessons learned from delivering the dual-antigen campaign included: the need for comprehensive training while ensuring staff motivation and commitment; clear communication strategies; effective community engagement and outreach activities; uninterrupted vaccine supply and separation of vials; and robust monitoring of campaign activities.

**Comprehensive training while ensuring staff motivation and commitment**

Teams that administered vaccinations were thoroughly instructed on their roles and responsibilities. Role-playing exercises and practical lessons on how to distinguish between a COVID-19 vaccine vial and a vial for the yellow fever vaccine, as well as on how to use the appropriate recording tools for each vaccination, were carried out. Even though health teams were exhausted following a recent mass immunization campaign for COVID-19, they committed to making the campaign a success once they understood its importance. In this campaign, vaccination and health teams had to work twice as hard, for example, by communicating risks for two different diseases, mobilizing communities for two different vaccines, and entering vaccination records using several recording tools. However, because the funds allocated to the district from the national level were intended for a yellow fever vaccination campaign and not an integrated campaign, the personnel did not receive extra remuneration. Staff demotivation could emerge from using the integrated model without addressing this challenge, which could negatively affect the quality of results obtained during such campaigns.

**Clear communication strategy**

The campaign’s communication strategy attempted to make a clear distinction between the vaccines it offered as well as the advantages of getting both shots. Due to COVID-19 vaccine hesitancy, messages were framed to ease COVID-19-vaccine concerns. Additionally, adequate information was provided on how and where to report adverse events following immunization. To allay beneficiaries’ doubts or concerns regarding the vaccinations, some vaccination teams showed their personal vaccination cards to them. It is noteworthy, however, that despite efforts to communicate risks and benefits effectively and clearly, some recipients initially refused the yellow fever vaccine because they thought it was a COVID-19 shot. Some refusers subsequently consented after learning from locals that the yellow fever vaccine was required not only for protection against yellow fever but also for international travel.

**Effective community engagement and outreach activities**

Another key enabler was to utilize community structures and key community stakeholders such as chiefs, assembly members, religious leaders and community-based volunteers to lead the mobilization (as described also in Section 3.1 and 3.2). These respected community members were involved in educating communities about the campaign and in mobilizing them. This helped win the trust and support of the community members for the dual campaign. Volunteers were also selected from the beneficiary communities for vaccination teams. By using both mobile and static vaccination teams, those who would have missed their vaccinations owing to their work schedules, vaccine hesitancy, or lack of knowledge about the campaign were reached. A focus group participant noted: “The moment we brought the vaccines to them at their homes, they were very grateful”.

**Uninterrupted vaccine supply and separation of vials**
Mobile teams had to cover significant distances on foot to reach recipients in remote areas. It was important to ensure that teams had access to a steady supply of vaccines to prevent shortages. Team supervisors frequently provided ice packs to maintain the vaccines at proper temperatures. Also, clearly labelling the vials and keeping the two antigens separate was essential.

**Robust monitoring of campaign activities**

The daily review meetings held by regional, district and subdistrict supervisory teams helped the health authorities to track the progress of the campaign, identify gaps and address them in a timely manner. Regional, district and subdistrict teams monitored the campaign daily while officials from the national EPI office and partner organizations provided additional technical support when they visited the subdistrict during the campaign period.

**Potential for replication, scale up and sustainability**

The dual-antigen vaccination campaign described above was an innovative strategy to protect the overlapping target population from two outbreak diseases using the same logistics and personnel. It reduced the time and funds that would have been required if the vaccines had been distributed using two different single-antigen campaigns. Additionally, it was convenient for those beneficiaries who wished to have both vaccinations.

However, replicating this strategy should only be considered after careful examination of the lessons learned and specific circumstances. It is crucial to consider contextual factors that could affect the delivery or uptake of the dual-antigen campaign, such as community buy-in and staff readiness as well as the types of vaccines to be combined, their mode of administration, and target populations.

Experience from integrating COVID-19 and yellow fever vaccination campaigns in Ghana showed the risk of a lower uptake of the vaccinations if precautionary measures are not implemented with clear communication strategies. In the case presented above, the yellow fever vaccination coverage was high and comparable to other single-antigen reactive campaigns implemented in other subdistricts in the country, despite vaccine hesitancy and disinformation and rumours related to the COVID-19 vaccine.

In selecting the best intervention combinations and delivery strategies, it is essential to carefully evaluate lessons learned from other contexts that have implemented dual- or multi-antigen vaccination campaigns. Furthermore, additional financial resources should be earmarked to compensate personnel who deliver integrated campaigns.
BIBLIOGRAPHY


ANNEXES

ANNEX 1. INTERVIEW AND FOCUS GROUP DISCUSSION GUIDE

Introduction
Euro Health Group was commissioned by the WHO Evaluation Office to conduct a midterm evaluation of the EYE strategy 2017–2026. The evaluation has both a summative component, which will assess progress of strategy implementation to date and a formative component, which will focus on the way forward. The temporal scope covers the period 2017 to mid-2022, and the geographic scope includes global, regional and country level (country level includes 40 high-risk countries across Africa and the Americas). As part of the mid-term evaluation, two country cases studies will be undertaken (in Ghana and Brazil) to generate learnings and best practices on implementing interventions of the EYE strategy.

The main objectives of the country case study in Ghana are to:
1. Document key learning points and best practices in the implementation of the EYE strategy
2. Identify critical factors and key enablers for successful implementation of specific components of the EYE strategy
3. Identify potential for scale-up and replication.

Please note that all information shared for this evaluation, will be treated with confidentiality and anonymized. Any citations and quotes will not be traceable to individuals nor their titles/positions.

Interview guide for key informant interviews/ Focus group discussion guide

1. Introductory question
   Please introduce yourself and your role and engagement in yellow fever (YF) prevention/response in Ghana

2. Experience with the COVID-19 and yellow fever integrated dual-antigen vaccination campaign in Ghana
   • Can you please explain the background of this specific dual-antigen vaccination campaign (why was it decided to use this approach) and how was it practically implemented?
   • From your perspective, what were the benefits (actual, not expected) of this approach (compared to separate single antigen vaccination campaigns?)
   • In your view, what were the potential risks of delivering this dual-antigen vaccination campaign? And how were these risks addressed?
   • How did the vaccinators, health care workers, district health teams and communities/beneficiaries receive this COVID-19 and YF dual-antigen vaccination campaign (any concerns, any hesitation, gratefulness etc)?
   • What were the specific results of this dual-antigen vaccination campaign? Do you have disaggregated data on the reach (sex, age, vulnerable communities etc)
• To your knowledge, what are the key enablers and critical factors that need to be in place for a successful dual-antigen vaccination campaign which includes YF vaccine (factors that facilitated successful implementation of the intervention)?

• In your view, should this approach be applied more often? and why/why not?

• To what extent was gender, equity and human rights concerns addressed during the delivery of the dual-antigen vaccination campaign?

• Do you have any costing data on the dual-antigen vaccination campaign?

3. Experience with the planning and implementation of yellow fever preventive mass vaccination campaigns in Ghana – including reaching vulnerable populations (e.g., nomadic populations and others?)

• Can you please explain the background of the YF preventive mass vaccination campaigns (why was it decided to use this approach, what were the targets etc?)

• How was the YF preventive mass vaccination campaign planned for? – who was involved in the planning (agencies, national health authorities, CSOs?) And what were their respective roles? how did this collaboration work? How long did it take to plan for this?

• Were subnational YF risk assessments used to guide the planning of target areas for the campaign? – if so, who led this process, did they use a specific tool, etc?

• Was Ghana supported by the WHO regional office or WHO headquarters during the process of planning for the campaign? If so how (did they use toolkits, direct support, country calls etc?)

• Which potential challenges did you perceive in regard to the planning and implementation of the YF mass preventive vaccination campaigns and how were these challenges overcome?

• Who are the key vulnerable groups for YF in Ghana- where are the immunity gaps? and how do you know this - which data exist on this? Which data are missing? What has been done so far in respect to this? Including reaching nomadic populations? How can data for YF vaccination coverage among vulnerable groups be improved?

• Which specific strategies were used to reach vulnerable populations, including nomadic populations? What are the main lessons learned in regard to reaching vulnerable communities?

• How were CSOs and communities engaged for the YF preventive mass vaccination campaigns? What are the lessons learned on this aspect?

• In your view, what are the key enablers and critical factors that need to be in place for a successful YF mass preventive vaccination campaign (factors that facilitated successful implementation of the intervention)?

• What were the specific results of this preventive mass vaccination campaign? Do you have disaggregated data on the reach (sex, age, vulnerable communities etc)
• To what extent and how was gender, equity and human rights concerns addressed during the delivery of the YF preventive mass vaccination campaign?

• Going forward, what do you think are the opportunities for reaching high coverage of vulnerable populations with YF vaccination?

• Do you have any costing data on this preventive mass vaccination campaign and reaching vulnerable communities, including nomadic populations?

4. Research to explore potential opportunities to improve vaccination coverages among nomadic populations.

• How did the research come about? Who requested it? Who funded it?
• Who are the collaborating partners, if any? What is the nature of the collaboration?
• What are the objectives of the research?
• How is the evidence from the research expected to be used?
• Do you have any preliminary results to share/discuss?
• What are the timelines for the research?

5. Are there other key informants you would recommend we talk to?

6. Do you wish to add anything further? / Any comments or question to us?
Any enquiries about this evaluation should be addressed to:
Evaluation Office, World Health Organization
Email: evaluation@who.int
Website: Evaluation (who.int)