DESIGNING AND SUSTAINING INNOVATIONS IN HEALTH WORKER CAPACITY BUILDING

Landscape Analysis from COVID-19 Vaccine Introduction

MOMENTUM Routine Immunization Transformation and Equity

USAID FROM THE AMERICAN PEOPLE

MOMENTUM A Global Partnership for Health and Resilience

MAY, 2023

MOMENTUM works alongside governments, local and international private and civil society organizations, and other stakeholders to accelerate improvements in maternal, newborn, and child health services. Building on existing evidence and experience implementing global health programs and interventions, we help foster new ideas, partnerships, and approaches and strengthen the resiliency of health systems.

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Introduction

The United States Agency for International Development (USAID)-funded MOMENTUM (Moving Integrated, Quality Maternal, Newborn, and Child Health and Family Planning and Reproductive Health Services to Scale) Routine Immunization Transformation and Equity project (the project) has been USAID's major vehicle for providing technical assistance to countries for COVID-19 vaccine roll-out. As part of this support, the project conducted a landscape analysis to analyze emerging practices for health worker training and capacity building associated with the pandemic, particularly for COVID-19 vaccine introduction. The aim of this analysis was to assess managerial aspects of alternative, or innovative approaches to training and their applicability to routine immunization over the longer term. Capacity building activities included training and non-training interventions, such as supervisory practices, tools, and process improvements. Lessons from this analysis can inform the expansion and sustainability of innovations for health worker capacity building in immunization.

The landscape analysis consisted of three major phases, and data were collected May–October 2022:

Phase 1: Brief online survey to in-country project staff related to training and non-training methods to equip staff for COVID-19 vaccine introduction.

Phase 2: Key informant interviews with in-country project staff who were familiar with COVID-19 capacity building.

Phase 3: An online survey to the global immunization community to capture trends in capacity building strategies. The design of this survey was built on findings from Phases 1 and 2.

Most of this report describes the global online survey, including major findings and implications for routine immunization. However, notable findings from the earlier phases inform the interpretation of data from the global survey and recommendations for the future.

Methods

Two research questions defined the scope of the landscape analysis.

1. How has health worker capacity building for COVID-19 immunization been delivered in selected countries since the beginning of the pandemic, and what factors have influenced its implementation?
2. What factors affect the applicability of these new or modified methods to routine immunization over the long term?

A five-question framework guided the development of research questions:

1. What drove the decision to adapt?
2. What did it take to implement?
3. How well did it work?
4. What contextual factors contributed to success?
5. To adapt or continue, what would be needed?

"Health worker" was defined as any individual employed at any level within a ministry of health who held immunization program responsibilities, as well as individuals in partner agencies (ex-Nongovernmental institutions,

academia) who participated in the introduction of the COVID-19 vaccine. The Phase 3 survey was designed to seek input from immunization staff at all administrative levels, representing ministries of health, nongovernmental organizations, and academia. The survey was developed in English and translated into French. Surveys in both languages were pre- tested by project staff and revised before distributing via email to all project country leads and JSI's internal Immunization Center listserv. It was also posted in French and English to the online immunization community through three platforms that are widely used in global immunization. Data were analyzed using Google Forms tools and MS Excel. Quantitative analysis was conducted using Excel pivot tables. Qualitative analysis was done using keyword coding by two project team members.

Results

One hundred responses were received from individuals in 35 countries. Seventy-one responded to the English language survey and 29 to the French. The greatest number of English-speaking respondents were from Nigeria (13), and the greatest number of French-speaking respondents were from the Democratic Republic of Congo (12). Fifty-eight reported holding a master's degree, and the median level of immunization experience was 6–10 years. There were 31 female and 69 male respondents. All had some type of immunization program responsibility, including 80 supervisors, 24 program managers, 6 community health workers, 5 logisticians, and 2 primary care nurses/vaccinators.

When provided a choice of training delivery methods, 77 percent reported taking part in virtual webinars with participant interactions. Respondents also took part in informal learning via internet searches (72 percent) and discussions with colleagues (70 percent). Sixty-nine respondents reported that at least one method was a new way for them to learn; of these, 58 percent reported that learning virtually was new, and 23 percent specified webinars as a new method for learning.

When reflecting on their perceived training needs, almost all (82 percent) reported needing information (knowledge) such as guidelines and protocols. The second-most frequent training need (60 percent) involved knowledge and possibly skill acquisition to enable the worker to converse with colleagues and the community in a constructive way. A sizeable minority (43 percent) reported having concerns about COVID-19 and/or the vaccine. This is an example of an attitude gap, although knowledge acquisition could also be required.

Of the 69 who reported learning about COVID-19 vaccine via at least one new method, satisfaction with the new approaches was positive, with 57 percent reporting that, if offered, "they would happily use this method again." Learners felt generally confident after training: at least 70 percent at each administrative level reported feeling fully prepared to do their work. Fifty-seven respondents reported receiving timely and accurate updates, while 16, including one at the health facility level, reported "often being on my own" to find the latest updates. Almost three-quarters *(*74 percent) indicated that they were also responsible for teaching others. Of those, 65 indicated that the training they delivered included "something new." Almost 90 percent of the trainers were satisfied with the new methods, and almost half of those reported that all new training approaches have been incorporated into standard operating procedures. Trainers ranked training design and planning as the highest success factor, followed by trainer capacity/skills, motivated participants, sufficient technical/financial resources, and local supervisor encouragement. Approximately half of the supervisors reported that almost all workers needed training for vaccine introduction were trained, and 34 percent said staff were fully prepared for their COVID-19 vaccine responsibilities after training.

Over half of the respondents reported an innovation in non-training capacity building. Most noted non-training capacity building innovations related to supportive supervision, virtual support, mentoring, and job aids. Fifty-nine respondents reported pre/post tests and observation at work sites as a monitoring and evaluation method.

Discussion

There were several limitations to the landscape analysis, most notably the survey design and dissemination, which introduced selection bias, as it only reached those with internet access. The small sample size and relatively small number of countries represented means that the data are not globally representative. There were also very few responses at the local level, which means vaccinators' voices, who are crucial to COVID-19 vaccine introduction, are not prominent in this analysis. Additional limitations are elaborated on in the full report.

The innovative training delivery methods described by the respondents (e.g., pre-recorded trainings, exchanges with peers, and blended learning), provide a glimpse of the potential for integration into future vaccine introduction and routine immunization. Depending on the context, virtual delivery methods could be effective and more economical than traditional in-person training, especially when supplemented with discussion groups or supportive supervision. Non-training interventions were noted in the global survey and key informant interviews, and innovations such as the national hotline in India and new methods of supervising teams in Burkina Faso have been incorporated into standard practice. The role of the supervisor, as well as performance monitoring, incentives, and accountability, continue to have an important role in achieving capacity building goals. In-person learning, both in a structured training setting and through one-on-one coaching and mentoring, continues to be an effective method of capacity building, provided it follows best practices of training design and personnel management. Challenges to distance-based training, particularly in low-resource settings, include inconsistent internet access, which limits participation and jeopardize equity, and resistance among participants, decision makers, and funders. Additional challenges are listed in the full report.

Contextual factors to consider when making decisions about using online and other innovative methods for capacity building include the learning and work environment; design and planning of training and non-training interventions; local supervision and encouragement; and available resources.

Recommendations

This analysis surfaced recommendations that apply to any capacity building initiative, as well as some that are specific to training or non-training interventions.

For any capacity building:

a) Use a multifaceted approach, combining delivery methods as appropriate and supporting training with on-the-job application.

b) Consider strong management and accountability practices when designing an intervention, and adapt as needed.

c) For those with reliable connectivity and comfort with online methods, distance-based solutions enable workers to direct their own learning.

d) Conduct a needs assessment that includes availability and acceptance of technology before designing an intervention, develop accordingly, monitor results, and continuously improve.

e) Monitoring and evaluation methods can contribute to capacity building by developing processes and tools that go beyond learner satisfaction and capture their ability and confidence.

f) Resource limitations do not necessarily limit innovation or quality improvement.

For training interventions:

a) Match the learning need to the delivery method.

b) Transitioning to online learning is more than delivering in-person materials via the web. Decisions must be made as to the appropriate technology, content, and exercises for the audience.

c) There is still likely to be value in in-person training for problem solving, peer learning, and sharing best practices.

For non-training interventions:

a) Consider a blend of distance-based and in-person supportive supervision.

INTRODUCTION

The introduction of the COVID-19 vaccine has presented several unique challenges due to the nature of the disease and the vaccine itself. The widespread effects of a novel disease, the development of multiple vaccines with varying management and administration protocols, and the addition of populations not traditionally reached with immunization meant that 'business as usual' was impossible and unacceptable. Immunization staff at all levels of health systems around the world had to introduce new vaccines, many of which were developed using new technology. The new vaccines often required new protocols and processes and involved populations not typically immunized. Some countries introduced multiple COVID-19 vaccine products, each with their own protocols.

This complex initiative occurred within the existing culture and processes of capacity building in public health. Specifically, despite the widespread and dynamic availability of technologies, in-person cascade training is the standard training delivery method employed in global immunization, and the one that is most frequently funded.[1]

Social distancing protocols have affected vaccination administration and supervisory processes, as well as the method of training. In addition, frequent developments regarding the COVID-19 virus itself, government policies, and the protocols for an array of vaccines necessitated timely and accurate dissemination of updates to multiple levels of health staff throughout the country. The workers in several job categories, particularly vaccinators, community health workers, logisticians, and local supervisors, encountered changes to the tools and procedures to which they were accustomed.

The United States Agency for International Development (USAID)-funded MOMENTUM (Moving Integrated, Quality Maternal, Newborn, and Child Health and Family Planning and Reproductive Health Services to Scale) Routine Immunization Transformation and Equity project (the project) has been USAID's major vehicle for providing technical assistance to countries for COVID-19 vaccine roll-out. As part of this support, the project conducted a landscape analysis to analyze emerging practices for health worker training and capacity building associated with the pandemic, particularly for COVID-19 vaccine introduction. The aim of this analysis was to assess managerial aspects of alternative, or innovative approaches to training and their applicability to routine immunization over the longer term. It had three major phases:

PHASE 1. Brief online survey was distributed to project country programs where staff had supported COVID-19 introduction and implementation. The online survey asked specific questions about training and non-training methods that were used to prepare staff to introduce COVID-19 vaccines. This survey, conducted in May 2022, was delivered in English and French. It elicited 10 responses from six countries: The Democratic Republic of Congo (DRC), India, Kenya, Niger, South Sudan, and Vietnam. Respondents reported use of new training methods such as virtual live sessions, videos, and the ECHO platform[2] to train service providers. They also reported non-training innovations for capacity-building, such as group chat via social media, national helpline (India) for health workers to get prompt technical assistance, and reform of supervision practices (DRC, India, Kenya, Niger). Survey responses indicated that non-training interventions were more successful than training innovations. Support by the immediate supervisor and

[1] Bluestone J et al. Situational analysis of learning and performance management. 2022 Jhpiego.

[2] Project ECHO

participant enthusiasm were most frequently cited as the reason for training and non-training successes. The survey responses informed the development of country-specific interview guides for Phase 2.

PHASE 2. Key informant interviews with seven in-country project staff, representing the countries who responded to the online survey, who were familiar with COVID-19 capacity building, conducted June–August 2022. Responses from all six countries reported delivering training through a blend of in-person and virtual methods. For most countries, COVID-19 was the first opportunity to explore online learning as a national initiative. Vietnam was the exception, where online learning had already been widely adopted for many job cadres. Innovations in the non-training interventions that were described were implemented primarily at district or local level. In some instances, an innovation was piloted in a small number of districts, and some were adopted as a standard practice when vaccine introduction was scaled up. Examples from the key informant interviews are provided as appropriate throughout this report. The complete summary of Phases 1 and 2 is in Annex 1.

PHASE 3. An online survey of the global immunization community was conducted in October 2022 to capture trends in innovative capacity building strategies. The design of this survey was built on findings from Phases 1 and 2.

Most of this report describes the global online survey, including major findings and implications for routine immunization. However, notable findings from the earlier two phases inform the interpretation of data from the global survey and recommendations for the future.

METHODS

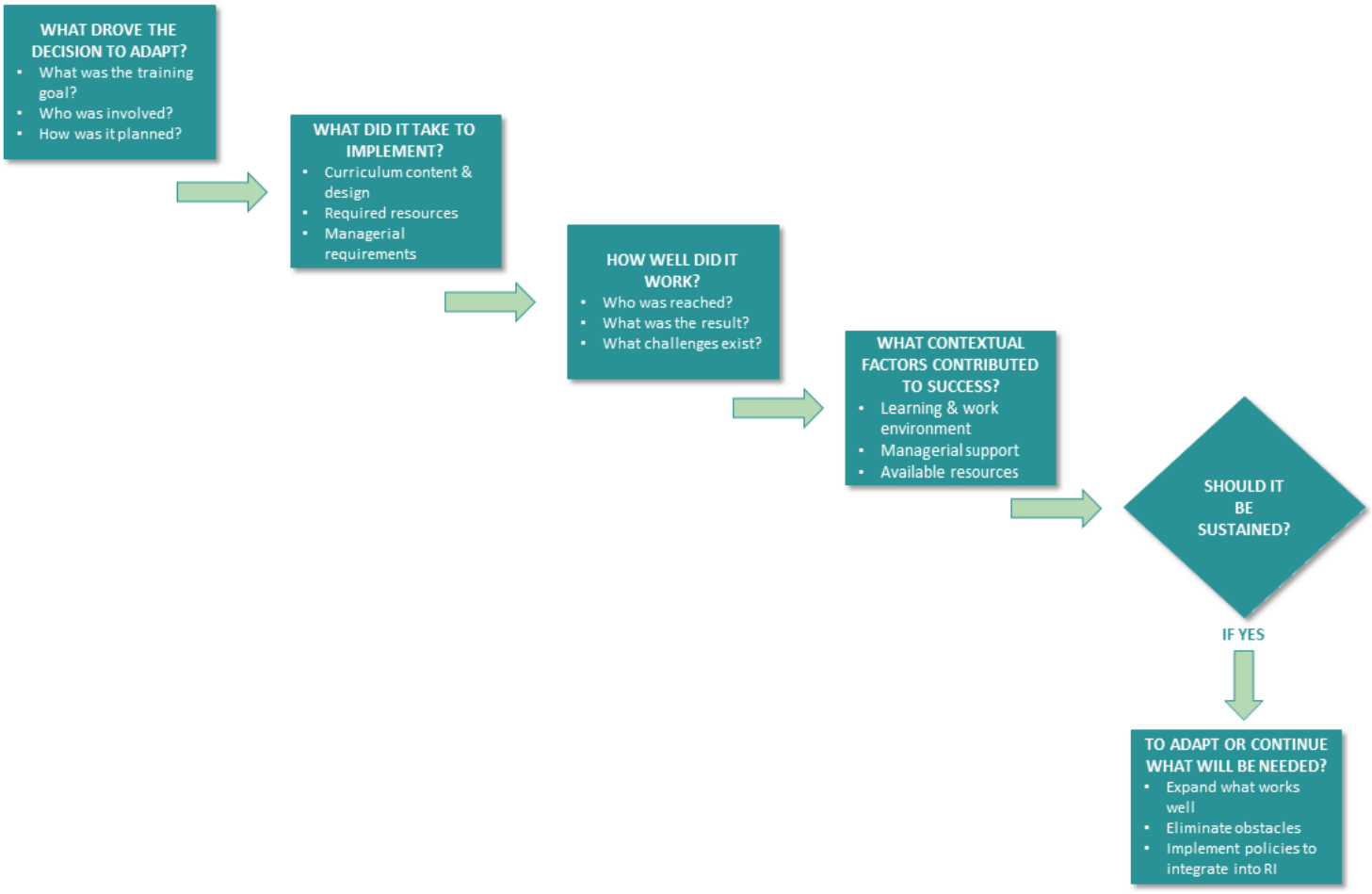
Research Questions

Two research questions defined the scope of the landscape analysis:

1. How has health worker capacity building for COVID-19 immunization been delivered in selected countries since the beginning of the pandemic, and what factors have influenced its implementation?
2. What factors affect the potential applicability of these new or modified methods for routine immunization over the long term?

"Health worker" was defined as any individual employed at any level within a ministry of health who held immunization program responsibilities, as well as individuals in partner agencies (ex-Nongovernmental institutions, academia) who participated in the introduction of the COVID-19 vaccine. A framework (Figure 1) to illustrate the analysis was used to guide the development of questions.

Figure 1. Framework for landscape analysis of COVID-19 vaccine interventions



Survey Design

A survey for global distribution was designed to get input from immunization staff at all administrative levels of ministries of health, nongovernmental organizations, and academia. *S*urvey questions were presented using Google Forms and based on the findings from the previous internal project survey and key informant interviews. Additional sources for survey questions were discussions with colleagues at the WHO Geneva Immunization, Vaccines and Biologicals office and a review of the findings from a 2022 WHO online learning survey for COVID-19 country immunization staff.[3] The survey was designed with skip patterns to enable further probing of respondents who indicated innovations in capacity building or had training or supervision responsibilities. Both quantitative and qualitative questions were included. The survey was developed in English and translated into French. Surveys in both languages were pre-tested by project staff and revised for clarity and ease of use. The global online survey is shown in Annex 2.

The intended survey respondents—country and subnational -level immunization practitioners—complements previous data collected by the WHO that focused on global, national, and subnational respondents.[3] To facilitate

[3] WHO's Monthly Operational Update on COVID-19, November 2022.

dissemination at the country level, the survey was distributed via email to all project country leads and JSI's internal Immunization Center listserv. It was also posted in French and English to the online immunization community through Boost, TechNet-21, and the Zero Dose Community of Practice. These platforms were selected because they have a broad membership base inclusive of national and sub-district practitioners. To encourage response, the team held a raffle for a free one-hour consultation in workforce development. The cover email message to the survey set a two-week window for response, during which several reminders were sent.

Survey Analysis

Data were analyzed using Google Forms tools and MS Excel. Quantitative analysis was conducted using Excel pivot tables. Qualitative analysis was done using keyword coding by two members of the project team.

RESULTS

Survey Respondent Characteristics

A total of 100 responses were received from individuals across 35 countries. Seventy-one responded to the English language survey and 29 to the French version. A total of 31 females and 69 males responded. Responses came from Africa, Asia, and the Pacific Islands, as summarized in Table 1. In terms of the highest educational level attained, the greatest number (58) reported having a master's degree. In terms of types of organizations represented, most were from ministries of health (39) and partner agency/nongovernmental organizations (37). The highest number of responses came (31) from people reporting 11–20 years of experience working in immunization; the median was 6–10 years. Table 2 shows that the highest percentage (31) of respondents worked at the provincial level. All had some type of immunization program responsibility (80 supervisors, 24 program managers, 6 community health workers, 5 logisticians, and 2 primary care nurses/vaccinators).

Table 1. Country responses, by frequency

Country	Responses	Country	Responses
Nigeria	13	Benin	1
DRC	12	Burundi	1
Ethiopia	10	Congo	1
Kenya	8	Egypt	1
Ghana	6	Gambia	1
Burkina	5	Indonesia	1
India	5	Laos	1
Zambia	4	Lebanon	1
Niger	3	Madagascar	1
Pakistan	3	Malawi	1
Bangladesh	2	Mali	1
Cameroon	2	Nepal	1
Central African Republic	2	Senegal	1
Chad	2	South Sudan	1
Mozambique	2	Sudan	1
Togo	2	Tanzania	1
Uganda	2	Tunisia	
Total			**100**

Table 2. Respondents, by gender and administrative level

Administrative Level	Female	Male	Total
Health facility/local level	2	8	10
District	5	12	17
Province/State	8	23	31
National	11	17	28
Regional (multi-country)	3	8	11
Global	2	1	3
Total	31	69	100

Vaccination Training Interventions: "Training You Received"

Respondents were asked to select the delivery methods they used to learn about COVID-19 vaccine, choosing among options for in-person and virtual learning, as well as informal practices such as internet searches. Webinars were the most common learning method, with 77 percent of respondents reporting taking part in virtual webinars with participant interactions. Respondents also took part in informal learning via internet searches (72 percent) and discussions with colleagues (70 percent). Table 3 summarizes the training delivery methods. There was no measurable difference between French- and English-speaking respondents.

Table 3. Methods used to learn about COVID-19 vaccine

Delivery methods for training and capacity building (N=100)	Number/%
Virtual-live webinars with participant interactions	77
Internet search	72
Discussions with colleagues	70
In-person lectures	64
Virtual live webinars, lecture	61
Virtual-recorded webinars	48
Self-paced-videos, tutorials, or PowerPoints	42
In-person demonstration	33
In-person role play/case study	32
In-person Q&A	29
Other	11

Table 4. Methods decribed as new to respondents

"New way to learn" (N=69)	Number	%
Virtual	40	58
Webinar	23	33
Content	13	19
Processes	10	15
Self-paced	8	12
Community engagement	4	6
Interactive	3	4
E-tool	2	3
Job aids	2	3
Peer-learning	2	3
Social media	2	3
Training schedule	2	3
Certification	1	1
Integration	1	1
Mobile	1	1
Primary audience	1	1
Social distancing	1	1
Videos	1	1

Sixty-nine respondents reported that at least one method was a new way for them to learn. Qualitative analysis of their description of the innovation in learning resulted in 117 key word responses. As shown in Table 4, 40 of the 69 (58 percent) respondents reported that learning virtually was new, and 23 specified webinars as a new method for learning. Additional innovations related to self-paced learning (7 percent). Some respondents indicated the content (11 percent) such as engaging the community in a new way, or the processes (9 percent) (either how they learned or immunization processes) were new.

Perceived Training Needs

Respondents answered questions about the types of training they would need to support COVID-19 vaccination introduction. The choices they were asked to select from parallel the broad performance categories of gaps in knowledge, skills, and attitudes. As shown in Table 5, almost all (82 percent) expected to be able to use their current skills, and needed information (knowledge) such as guidelines and protocols. The second-most frequent training need (60 percent) involved knowledge and possibly skill to enable the worker to converse with colleagues and the community in a constructive way. A sizable minority (43 percent) reported concerns about COVID-19 disease and/or the vaccine. This is an example of an attitude gap, although knowledge acquisition could also be required.

Table 5. Expected training needs to prepare for COVID-19 vaccine introduction

Expected training needs, according to survey prompts (n=100)	#/%
I expected to be able to use my current skills, but I needed information, such as guidelines and protocols.	82
I knew of colleagues and/or community members who had concerns about COVID-19 disease and/or the vaccine itself, and I wanted to be able to converse with them in a constructive way.	60
I expected to need new skills, such as for vaccine administration or logistics.	49
I wanted to learn more about COVID-19 disease and/or the vaccine itself because I had concerns that made me reluctant to support the COVID-19 response.	43
Other	7

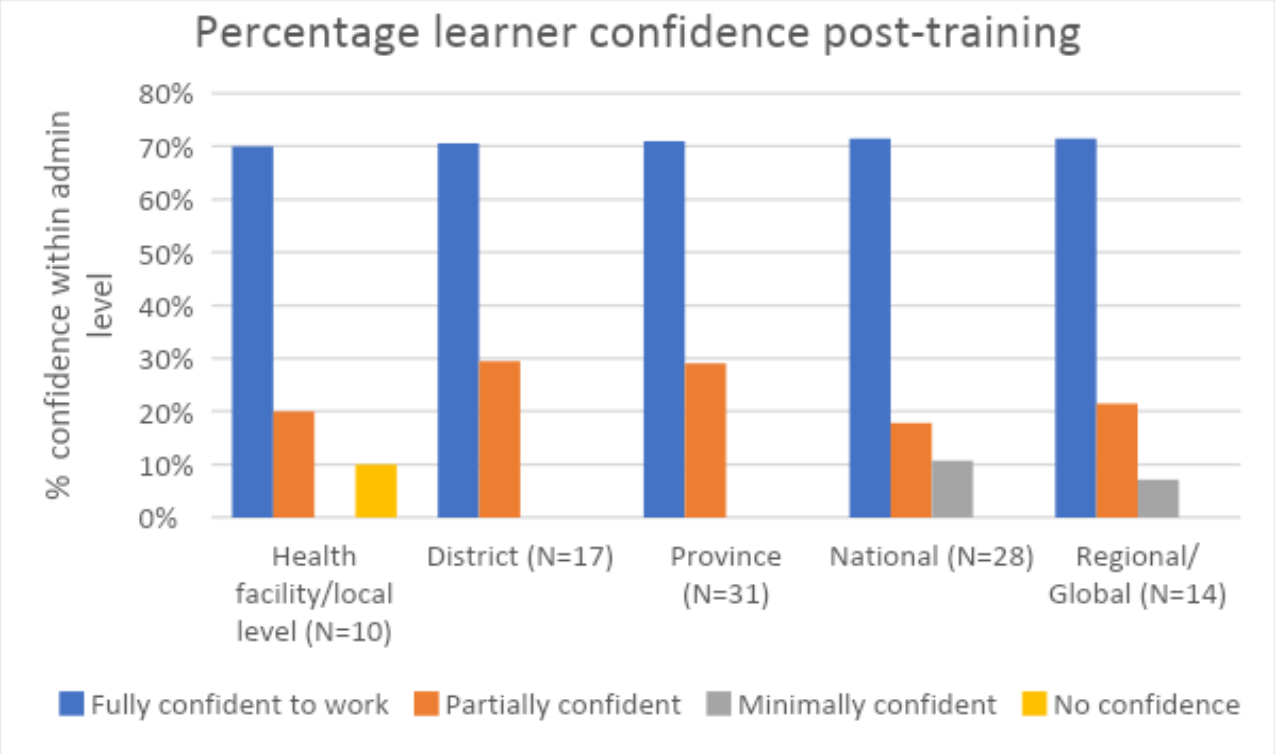
Satisfaction and Confidence After Training

Satisfaction with the new approaches was positive, with 57 percent of the 69 respondents who learned about COVID-19 immunization using at least one new method reporting that, if offered, "they would happily use this method again." Over one-third (38 percent) reported that some new methods worked well, and "I may consider continuing to use this approach." Four responded "If I have no other options, I would use this method again." Three of the four who responded this way described the innovations as "long duration virtual trainings," "virtual trainings and workshop," and "virtual training." The fourth described the innovation as "Conducting training using online platforms was a great lesson that during the pandemic [one is] able to conduct training and meetings. Specially [sic] for COVID-19 disease means of transmission, virtual training was a best approach [sic] and we were successful in reaching almost most of the training participants within a short time[sic] before starting the rollout."

Following training, at least 70 percent at each administrative level reported feeling fully prepared to do their work. Note Figure 2 below combines global (3) and regional (11) responses. Just one respondent, a supervisor at the health facility level, reported frequently feeling unprepared to do their work. (This respondent reported learning via multiple in-person and virtual methods and that they would "happily use the new methods again.") In addition, 57 percent of respondents reported receiving timely and accurate updates, while 16 percent, including one respondent at the

health facility level, reported "often being on their own" to find the latest updates. Analyzing the self-reported confidence with the perceived training needs indicates that most respondents felt capable of doing their jobs and needed only information and guidelines, either to inform their work or to advise others. Respondents also appear satisfied with their ability to obtain help when needed.

Figure 2. Self-reported confidence in COVID-19 vaccine work after training, by administrative level



Vaccination Training Interventions: "Training You Delivered"

Almost three-quarters *(*74 percent) of respondents indicated that they were also responsible for teaching others. Of those, 48 indicated that the training they delivered included "something new." Of these, the most frequent response (27 percent) was that content was new. Related to training modality (means of delivery, generally differentiated between in-person and distance-based) or design, virtual training was most noted (22 percent). Innovations related to training design (19 percent) and job aids (10 percent) were also noted. Several descriptions of the innovative training involved blended learning, such as "blended training with video job aids," and "blended type," and "provide trainers with the option of choosing how to use the materials." One or two respondents specified localizing the material based on the audience, but there was no mention of adapting materials to accommodate the virtual format. In the key informant interviews conducted prior to the global survey, staff from all countries reported using classroom training materials, either developed in-country or adapted from WHO, to deliver presentations as a webinar. There was no evidence of content being redesigned to make deliberate use of the webinar format (e.g., by using online polls, breakout sessions), or other interactive methods.

Almost 90 percent of the trainers were satisfied with the new methods: 17 (35 percent) judged the new approach as exceeding expectations, and 26 (54 percent) thought the new approach worked well in some settings but not others.

Only one respondent, at national level in Kenya, reported to be unlikely to use the new approach in the future, but s/he did not describe what was new. Of the 43 reporting positive results with the new approach, almost half (44 percent) reported all new training approaches have been incorporated into standard operating procedures, with another 44 percent reporting some new training approaches have been continued, with plans to continue with others. Four of the 43 (9 percent) reported a strategy in place to sustain the new methods, but it is yet to be implemented. One respondent reported encountering obstacles when s/he tried to expand.

Contextual Factors Related to Perceived Training Effectiveness

In the Phase 1 online survey with project staff, respondents who said that new training methods were successful were asked to select from a list of possible reasons for success. Their responses were elaborated during the Phase 2 key informant interviews. Facilitators of success fell into the themes of learning and work environment; managerial support, and available resources.

LEARNING AND WORK ENVIRONMENT

- Availability of global and international guidelines and training materials
- Clear expectations of work responsibilities (ex S Sudan orientation meetings, Kenya OTJ coaching)
- Availability of physical (Niger temperature monitoring device) and electronic (Vietnam microplanning template) tools
- Dependable availability of technology
- Trainers who were subject matter experts
- Motivated workforce

MANAGERIAL SUPPORT

- Importance of the initiative communicated and regularly re-affirmed by leaders throughout the health system
- Reinforcement of desired work practices by supervisors (e.g., South Sudan daily review meetings to discuss digitally reported data)
- Established infrastructure for virtual supervision and networking (usually WhatsApp chat group)

AVAILABLE RESOURCES (SEE ANNEX 1 FOR DETAILS)

- Platforms to host webinars and store electronic resources (guidelines, job aids and training materials)
- Funding for supervisor transport and mobile vaccination teams
- Availability of tablets and smart phones at health facility level
- Collaborations with non-traditional partners (e.g., non-communicable disease program in India) that provided equipment (tablets that had been provided by Malaria or Polio programs) or key information (line lists of target population in India)

These responses, while informative, were difficult to interpret, if one were to prioritize which factors could be most helpful for future interventions. Therefore, for the Phase 3 global online survey, respondents who identified as trainers were asked to rank five possible contextual factors. Those five were chosen because they came up most frequently in the previous phases. Only trainers who reported that the new methods exceeded expectations or 'worked well in some settings but not others' saw this question (n=43) Using weighted analysis, the trainers ranked the reasons for successful training as:

1. Design and planning of training.

2. Capacity/skills of trainers.
3. Motivated participants.
4. Sufficient technical (internet access, equipment for training)/financial resources.
5. Local supervisor encouragement.

Training of Trainers

Because training of trainers (TOT) is a popular training delivery strategy, questions were included to determine if decision makers took a new approach to TOTs during the pandemic. Just under 80 percent (59/74) of trainers reported being involved in a TOT as a learner or a trainer. Of those, over half (32) reported that new methods were used for the TOT. The most common innovation related to virtual learning, with respondents reporting teaching at least some content virtually, or training certain levels virtually, then cascading to in-person sessions. Modification of in-person sessions to comply with social distancing protocols was noted. Almost half (49 percent) of respondents considered the new methods very effective, reaching almost all the intended staff with high-quality trainers and materials. However, 42 percent considered the new methods partially effective, reaching almost all intended staff, but with a quality that was less than desired.

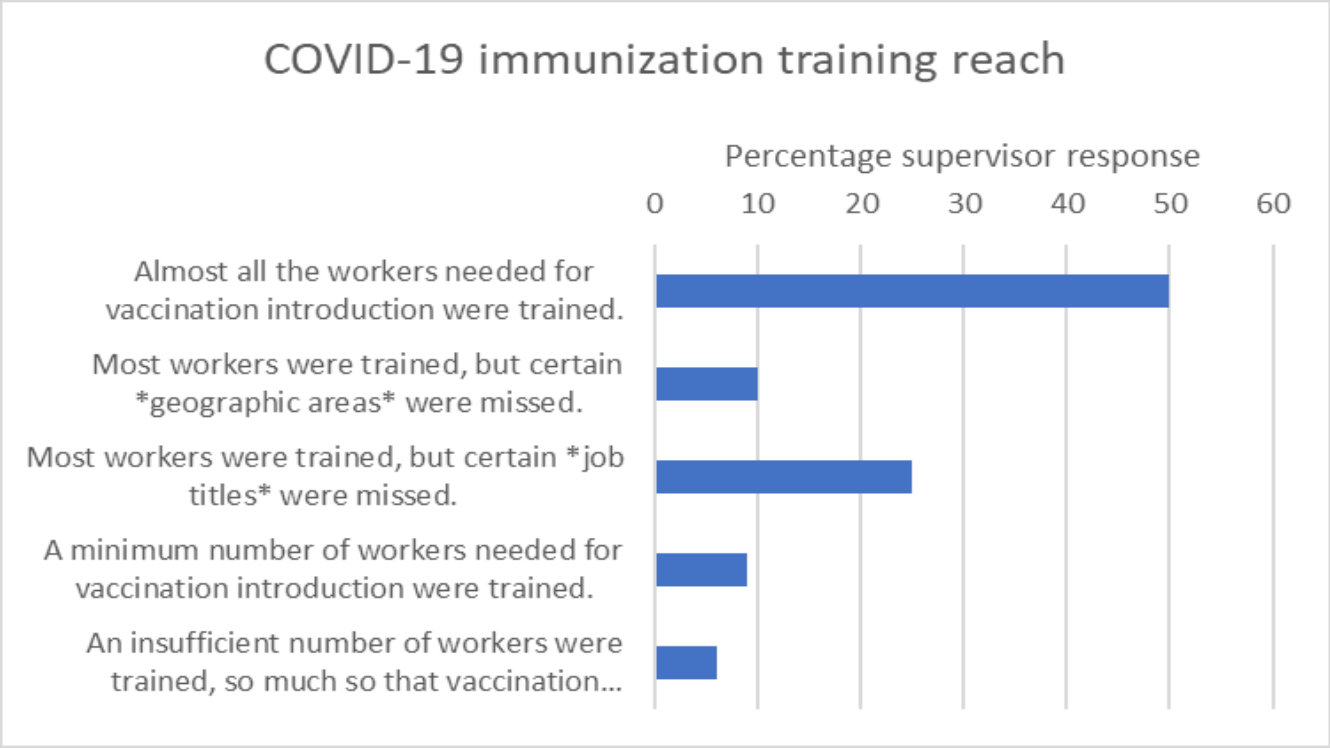
Supervision for Vaccine Introduction

We were interested in supervisors' perceptions of the readiness of the workforce to introduce the COVID-19 vaccine. Some 80 respondents reported supervisory responsibilities. As shown in Table 6, women constituted less than one-third of the total number of supervisors responding to this survey. The highest number of supervisors were males at the provincial level.

Table 6. Supervisors, by administrative level and gender

Administrative level	Female	Male	Total
Health facility/local level	2	4	6
District	4	11	15
Province/State	6	19	25
National	9	15	24
Regional (multi-country)	3	6	9
Global	1		1
Total	25	55	80

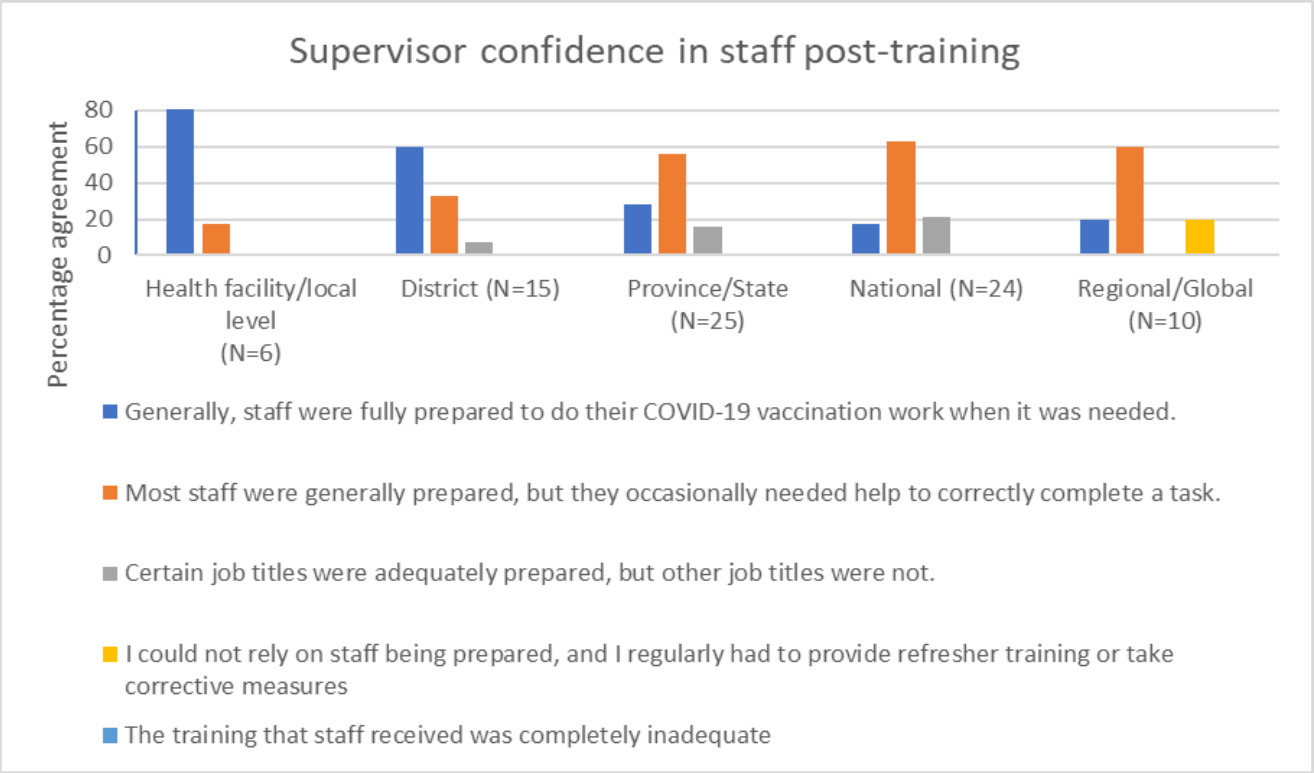
Figure 3. Supervisors' perception of COVID-19 training reach



As shown in Figure 3, half the supervisors reported that almost all workers needed for vaccination introduction were trained. This perception by supervisors aligns with the perceptions of the cascade trainers mentioned previously. However, 25 percent of all supervisors reported that while most workers were trained, certain cadres were missed.

Supervisors were also asked about the effectiveness of the COVID-19 training. The question was worded to parallel the earlier question to COVID-19 learners, so that supervisor and learner perceptions could be compared. (See Figure 2.) Figure 4 shows that supervisors at the health facility and district levels reported the highest confidence in staff ability to perform duties after COVID-19 vaccination training. Supervisor confidence appears to decline at the provincial level and above. Differences between the supervisors' and learners' perceptions could not be analyzed, due to the small sample size of each population and the fact that the survey did not explicitly capture the perception of workers and their specific supervisors.

Figure 4. Supervisor confidence in staff post-COVID-19 training, by administrative level



Non-training Interventions

"Non-training interventions'' were defined for the survey respondents as "policies and practices that support worker on-the-job performance, such as supervisory practices, work tools, job aids, or mentoring." Over half of respondents (59) reported some type of new method, and 53 provided a description that could be analyzed. Nineteen (36 percent) descriptions related to health worker capacity building. Most noted were innovations related to supportive supervision (47 percent); virtual (37 percent); mentoring (32 percent); and job aids (16 percent). The key informant interviews conducted in Phase 2 revealed innovative practices that were well received and continued post-vaccine introduction. For example, in India, state-level webinars were supplemented by daily review meetings to discuss the progress of the COVID-19 campaign. When learning gaps were noted, supplemental webinars or in-person coaching were conducted. In addition, managers took a new approach to in-person training that focused on peer learning instead of formal presentations. Similarly, in Kenya, training was conducted via one-hour weekly sessions that participants attended with their supervisors. Training was supplemented by virtual and in-person supportive supervision, a two-way experience, as supervisors received real-time updates about field activities. These examples demonstrate the relationship between 'training' and 'non-training' interventions for capacity building, providing continuity among several practices and recognizing the connection between a training experience and post-training application.

Of the 19 statements in the survey that related to new methods of non-training capacity building, four respondents reported that the new approach exceeded expectations; 13 reported that it worked in some settings but not others; and two reported reverting to more traditional approaches after implementation challenges. Of the 17 statements with positive results, five reported that all new approaches have been incorporated into standard operating

procedures; 11 reported that some new non-training approaches have continued and there are plans for others; and one reported there is a sustainability strategy that has yet to be implemented. Table 7 presents the five non-training capacity building strategies that were both satisfactory and fully sustained, with country of reporting.

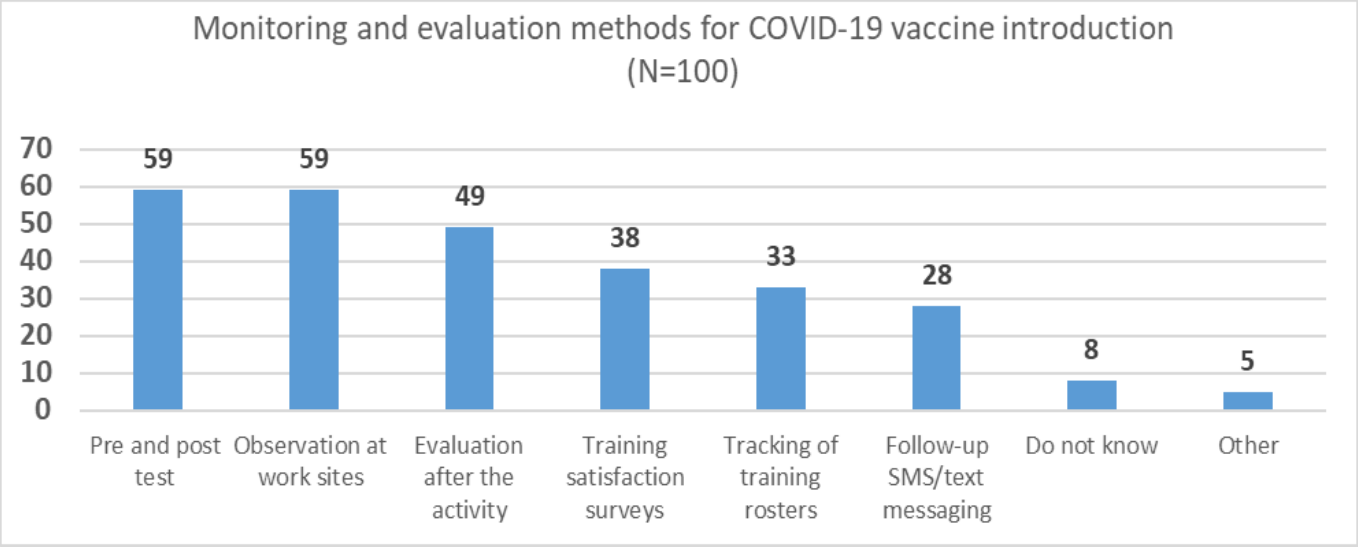
Table 7. Sustained non-training capacity building innovations

Innovation	Keyword analysis	Country
"Used WhatsApp groups to share knowledge"	Mobile, peer-learning, virtual	Zambia
"On-the-job training with ongoing support post-training"	In-person, mentoring	Bangladesh
"New protocols and guidelines…"	Job aids	Kenya
"Providing job aids to health personnel as well as guidelines for vaccination against COVID-19 have been of greatest importance"	Job aids	Burkina Faso
"There were new methods of supervising teams and providers regarding mandatory adverse effects following immunization (AEFI) notification"	Supportive supervision, processes	Burkina Faso

Monitoring and Evaluation

Checking all the monitoring and evaluation (M&E) methods that were used for the COVID-19 vaccine introduction, respondents reported several activities, connected with either the training or the non-training interventions. Most frequently reported were pre/post-tests to capture knowledge/skill/attitude changes and observation at work to assess performance. Figure 5 summarizes the M&E activities.

Figure 5. M&E methods for training and non-training interventions



LIMITATIONS

There were limitations to our landscape analysis, all of which should be carefully considered when interpreting the results. A notable limitation is that the survey design and dissemination introduced selection bias, as it only reached those with internet access. This population could also be more acclimated to using technology, thus introducing a bias toward technology-based learning solutions. Internet availability generally diminishes at the local level, which could account for the low number of health facility respondents. Local vaccinators were crucial to COVID-19 vaccine introduction, but as only 10 percent respondents, their voices are not prominent in this analysis. In addition, descriptions of new methods were brief and lacked details on planning, design, delivery, and implementation. Any determination of if and how to adopt in other contexts will require in-depth understanding of these important factors.

The small sample size and relatively small number of countries represented means that the data are not globally representative. Additionally, all data are self-reported: we were unable to compare capacity building initiatives to health outcomes, or compare learner satisfaction and confidence between traditional and new methods due to the survey design. We were unable to collect data on the duration of trainings, as many or most staff participated in multiple trainings, including sessions that could have integrated COVID-19 vaccination content with other topics, over the course of the pandemic response. Requesting respondents to recall and analyze detailed information, such as the duration of their COVID-19 vaccine-specific trainings could have increased the difficulty of and time needed for responding. This, in turn, could have reduced the response rate, and increased the risk of recall bias.

DISCUSSION

Among the challenges of introducing a new vaccine during a global pandemic, respondents reported that training and non-training interventions to build capacity were conducted and prepared staff for their role. In-person lectures, a training delivery method that has been widely described in public health literature, was used by over two-thirds of the respondents. Cascade training continued to be delivered, but over half (32/59) of respondents who were involved in cascade training reported related new methods, most frequently involving virtually learning. Over three-quarters (77 percent) of respondents reported that virtual live webinars with participant interaction was one way they prepared for their responsibilities, and over one-third of these reported that virtual learning was a new way for them to learn. Almost 20 percent of learners mentioned webinars as a new way to learn. There were several examples of a blend of delivery modalities using different strategies. For example, a national program officer in Tanzania reported blending virtual with face-to-face training, including practical sessions. We had already learned through interviews with project staff in Phase 2 of blending delivery methods: India, Niger, and South Sudan used online training as part of a TOT. In India and Niger, staff delivered distance-based learning via live webinars for national and regional levels but shifted to using in-person visits to continue the cascade to lower levels.

In addition to learning by distance for the first time, innovative training delivery methods were mentioned. While recognizing the limitations noted above, they provide a glimpse of the potential for integration into future vaccine introduction and routine immunization, as exemplified by these responses:

- “The pre-recorded trainings and web searches and exchanges with those in other continents was new and special.”
- “I think the production of ideograms [a graphic depiction of a procedure or concept] on the different aspects of vaccination against COVID-19 has been very innovative in my learning methodology.”
- “Training through tutorials and PowerPoint video.”

Before interpreting the satisfaction and sustainability of training innovations, it is important to review the training needs. As Table 5 shows, almost all (82 percent) respondents expected to acquire new knowledge about COVID-19 vaccination, such as guidelines and protocols or information to make their communications with others constructive. Best practices of adult learning match the training need with the delivery method. Indeed, a review of the WHO curriculum related to COVID-19 vaccine introduction reveals most content to be information based, with a small number of skill instruction generally for health facility level personnel, such as systematic listening and interacting with non-traditional beneficiaries.[4]

Depending on the context, virtual delivery methods could be effective and more economical than traditional in-person training, especially when supplemented with discussion groups or supportive supervision. The Kenyan example mentioned previously, in which participants and supervisors attend the same sessions, could reinforce this approach. (Although the dynamics of the relationship must be taken into consideration. There is a risk that staff may disengage when supervisors are present.) Sample delivery methods for knowledge transfer include summary sheets, infographics, and live or recorded lectures. Our survey indicates that most learners felt relatively confident to do their work after they were trained, with 70 percent or higher from almost every level reporting that they felt fully prepared. The exception is the global level, where only one of the three respondents (33 percent) felt fully confident in his/her ability to conduct tasks related to COVID-19 vaccination. However, at all levels, the denominator in this survey is so small (for example, 10 responses from staff at health facility level) that conclusions cannot be drawn, and reporting feeling confident may or may not be an indicator of actual ability to do the work.

The second-most frequent response related to learner confidence was that 21 percent felt somewhat prepared and were able to get help when they needed it. At the same time, at every administrative level, just over half (57 percent) of respondents reported receiving timely and accurate updates. These findings reflect a realistic scenario of a dynamic workplace: competent staff who were dealing with a fluctuating and physically hazardous environment felt they were prepared to do their work, needed to get help from time to time, and were able to obtain it. The profile of respondents supports this conclusion: median experience in immunization was 6–10 years, with 82 percent reporting they primarily needed to learn new information, and only 49 percent reporting needing new skills. This picture is also supported by supervisors' perceptions of staff readiness: just over half (51 percent) of the 80 supervisors reported that most staff were generally prepared, but they occasionally needed help to correctly complete a task. About one-third (34 percent) reported that staff were fully prepared to do their COVID-19 vaccination work. We attempted to compare learner and supervisor confidence but limitations in sample size (30 of 35 countries had five or fewer respondents), meant that we could not assume the supervisors responding to the survey supervised the respondents at the corresponding lower level. Thus, we found it impossible to do a comparative analysis between the supervisors and learners. It is important to note that, given the dynamic nature of the pandemic environment and the frequency of new information, capable staff would need occasional assistance. Thus, it appears that the training methods, both traditional and innovative, were effective at preparing the workforce, at least as it pertains to responses to the online global survey. One finding of potential concern to decision makers is the report by 25 percent of supervisors that certain job titles were unprepared. It is important to identify all job titles that are affected by vaccine introduction and ensure that their capacity building needs are met.

These respondents also appeared satisfied with the new learning experiences. Almost all (95 percent) reported they would happily use or at least consider using the new method again. Most trainers report that the new approaches have been partially or fully sustained.

While these brief descriptions do not provide sufficient information related to learning context, or training design or quality, they surface important practices. Self-paced learning materials such as videos can provide just-in-time and

[4] OpenWHO Training.

just-enough learning. Self-paced learning also provides flexibility for decision makers in a dynamic environment. For example, if a vaccine introduction is delayed or expanded to an unexpected geographic area, training delivery schedules can be nimble, at least in terms of having content available. At the same time, for distance-based learning to be accepted into practice, existing paradigms such as monetary incentives to attend in-person training must be reconciled. Job aids such as the ideogram mentioned above provide on-the-job support that can be shared with colleagues. Exchanges 'with those in other continents,' as mentioned by a local supervisor in Mali, fosters development of a peer network that can be a powerful means of informal learning and empowering local workers. Still, for these approaches to succeed, all materials for training and on-the-job support must be designed with this scenario in mind; sufficient resources must be allocated to allow for timely reach; and staff supervision and mentoring must be supported. It is also important to remember that in-person learning, both structured (e.g., training) and on-the-job (coaching, mentoring) continues to be an effective method of capacity building, provided it follows best practices of training design and personnel management.

This brings us to a notable observation. When one examines the innovations in learning, it is important to remember that they were new to that specific learner responding to this survey. Since virtual learning, including webinars, has been used for workplace development for over 25 years, there is a body of knowledge to guide decisions such as training modality (in-person, virtual), structure (formal vs informal learning), and methods (lecture, role play, case studies, peer learning).[5] As technological and social advances make it possible to bring virtual learning to more people in harder-to-reach areas, the body of knowledge continues to grow.

Of particular interest for capacity building are interventions related to on-the-job support. Innovations in supervision, such as developing and using a WhatsApp platform, have already demonstrated their potential for adoption into routine immunization.[6] As noted earlier, over one-third (37 percent) of non-training capacity building innovations related to virtual on-the-job support. A typical response in this area is that of a Nigerian respondent who reported that "A WhatsApp coaching platform was formed to allow weekly learning exchanges and off-site support to subnational teams," an innovation that exceeded expectations and has been partially sustained. In India, a national helpline was introduced to enable any health worker to contact an expert for questions related to COVID-19 or the vaccine. This innovation has been adopted into standard operating procedures. M&E methods contribute to the supervision process: observation at work sites, one of the most frequent M&E methods, is an opportunity for just-in-time constructive feedback and coaching. Text messaging, noted by 28 percent of respondents, can be initiated by the worker as well as the supervisor, as well as within a staff/mentor relationship.

The most highly reported training innovation in all three phases of the landscape analysis was the introduction of online learning to staff who had not previously used it, specifically the use of webinars. The most highly reported non-training innovation for capacity building was the introduction of some degree of virtual supervision (Table 8).

[5] Neelson M, Kirschner P. Evidence-informed learning design. Kogan Page Ltd. 2020.

[6] Hossain I, Mugoya I et al. Blended learning using peer mentoring and WhatsApp for building capacity of health workers for strengthening immunization services in Kenya, GHSP 2021.

Table 8. COVID-19 vaccine capacity building innovations

Training	• Blended delivery methods • Electronic updates • Interactive webinars • Adapting content for local context • Peer learning, virtual and in-person • Self-paced online learning, including videos and tutorials
Non-training innovations for capacity building	• Job aids • Regular (e.g., weekly) virtual staff meetings • Social media and text messaging groups • Virtual supportive supervision & mentoring
M&E	• App-based monitoring • Follow-up text messaging • Internet-based pre/post training surveys

Implications for Future

Responses from all phases of this landscape analysis indicate that respondents were generally satisfied with the training and non-training innovations and that the new methods have been sustained or are in the planning stages to do so. This brings us to our research question: what factors affect the potential applicability of new methods to routine immunization?

Before we discuss, it is important to recognize a significant difference between COVID-19 vaccine introduction and routine immunization. Given the nature of the pandemic, which brought the introduction of 15 new formulations of a COVID-19 vaccine on a global scale, the global health community in effect conducted the training and the workplace needs assessments for immunization staff.[7] For routine immunization, any capacity building intervention, whether training or not, should be preceded by an assessment to identify the cause of performance challenges. As documented by experts in performance improvement, knowledge or skill gaps are only one of at least six influencers of a worker's performance.[8] [9] No training, whether online or in-person, should be developed before understanding the performance gap and the work context.

[7] WHO COVID-19 vaccines.

[8] Gilbert, T. Human Competence: Engineering worthy performance. 3rd ed 2007. Pfeiffer.

[9] Rummler, G. Improving Performance: How to manage the white space in the organization chart. 2nd ed. 1995 Jossey-Bass.

Further, we acknowledge that our own data are not generalizable, and it would be reckless to assume that all new methods are worthy of integration (see Limitations section above). However, there is ample research on workplace management and capacity building including in low- and middle-income countries, which we draw from and which can be a useful lens through which to interpret our findings.[10] Potential advantages to distance-based training include:

- Saves time and can be updated in real time.
- Reduces participants' time away from the workplace because they are not traveling to in-person trainings.
- Enables learning on-the-job, at the moment the work is being done.
- Allows health workers to follow COVID-19 safety protocols.
- Decentralized learning, where expertise is exchanged within a or among neighboring facilities, and provides practical and realistic knowledge sharing and diffuses best practices.

However, important challenges to distance-based training have also been observed, particularly in low-resource settings. These include:

- Resistance among participants, decision makers, and funders, all with their own reasons.
- Possible high up-front costs, though with usage, cost-per-learner will decline.
- Where internet access is less stable, online training could limit the number of participants, jeopardizing equity.
- Difficult to gauge participant interest, engagement, and competency.
- Not all learners are familiar with how to navigate or use online platforms.
- In-person training materials don't always work when using online platforms, and staff often lack expertise in converting in-person curricula to online versions.
- Online trainings can be lengthy if they are not designed to fit virtual delivery methods.
- Training that requires hands-on learning or instructors to demonstrate skills or techniques is challenging to do online.
- The design and management of effective online training require skills that may not be widely available.
- Distance learning does not generally provide sufficient opportunity for socialization among learners, a key component when training for attitude or motivation. Socialization is also important when training staff who work in group-based environments (e.g., nurses), to ensure that the learning environment simulates the workplace as closely as possible.

Though many of these challenges also apply to non-training methods for capacity building, an additional challenge in the non-training context could be insufficient introduction of new methods to priority audiences: job aids, videos, virtual platforms are likely to require a formal launch, with regular encouragement by supervisors until their use becomes habit.

Contextual factors to consider when making decisions about using online or other innovative methods for capacity building include:

1. The learning and work environment, such as access to technology, peer support, and material and non-material incentives for workers.

[10] Clark, R. E-Learning and the Science of Instruction: Proven guidelines for consumers and designers of multimedia learning. 3rd ed. 2011 Pfeiffer.

2. Design and planning of training, such as materials that are appropriate for the delivery method, with lessons and exercises that simulate the work environment.
3. Local supervision and encouragement, such as reinforcement of desired work practices by supervisors, established infrastructure for virtual supervision, and regular feedback.
4. Available resources, such as training and non-training materials designed according to the performance need, funding for supervisor and peer-support visits, and platforms to host webinars and store electronic resources.

RECOMMENDATIONS

The COVID-19 pandemic and the global introduction of the COVID-19 vaccine were opportunities for the immunization workforce to seek new ways to build capacity. Our survey indicates that these respondents, including program leaders, trainers, and learners, were open to learning virtually. Programs can benefit from this momentum and examine and build on lessons learned over the past two years. At the same time, it is important to recognize that no one delivery modality will meet all training needs, nor is every performance problem solved by training.

When considering a mix of training and non-training capacity building methods, immunization programs could leverage lessons learned using new methods for COVID-19 immunization and learn from the literature on adult learning and performance improvement and the practices of other health programs. Specifically:

For all Capacity Building Interventions

a) Use a multifaceted approach to capacity building. Training should not be designed in isolation; it should be one component of an intervention that combines job aids, regular feedback, and material and non-material incentives to each worker. Review and adapt supervision and accountability practices to support the application of learning and performance improvement.

b) For those with reliable connectivity and comfort with online methods, distance-based solutions enable workers to direct their own learning. Short videos or live 'chat with an expert' are both 'training' and 'on-the-job' performance support.

c) Conduct a needs assessment that includes availability and acceptance of technology before designing any intervention. Develop accordingly, monitor results, and continuously improve. For example, respondents from Niger used training by peers with in-person exchanges with the regional officers. This strategy circumvented the technological challenges and was very well received. As technology infrastructure develops in Niger, it could leverage the peer network it has already developed to expand and sustain knowledge sharing.

d) M&E methods can contribute to capacity building by developing processes and tools that go beyond learner satisfaction. Specific performance improvement goals (e.g., decrease dropout rates by 15 percent) should be tied to capacity building efforts so that staff and supervisors work toward common goals.

e) Resource limitations do not necessarily limit innovation and quality improvement. Designing interactive practical training that follows best practice of adult learning does not cost any more than disconnected training ("more practical session for injection introduction," Bangladesh). Implement supportive supervision policies that reinforce learning.

Training Interventions

a) Match the learning need to the delivery method. For example, if higher administrative levels have only a knowledge gap and have reliable access to technology, our survey findings suggest that virtual learning can be effective. At the local level, where learning might include skill development (e.g., administering a vaccine in a new

way) and access to digital technology is spotty, in-person hands-on learning is likely more practical and effective, and provides valuable opportunities for socialization.

b) Transitioning to online learning is more than delivering in-person materials via the web. Make decisions as to whether the training should be self-paced (video, interactive tutorials) or live (webinars, discussion groups); task- or project-based. Competency-based learning, which typically combines knowledge, skill, and attitude development demonstrated by completion of more complex tasks, is an example of how a mix of delivery modalities and training methods could be quite effective.

c) There is still likely to be important in-person training value for problem solving, peer learning, and sharing best practices.

Non-training Interventions

a) When feasible, consider a blend of distance-based and in-person supportive supervision. Foster a culture of constructive distance-based supervision, using technology and policy changes (e.g., WhatsApp coaching platform was formed to allow weekly learning exchanges and off-site support to subnational teams in Nigeria). Be sure to train supervisors on new tools and processes and monitor their progress as 'blended' supervisors.

ANNEX 1. FINDINGS FROM PROJECT STAFF SURVEY AND INTERVIEWS

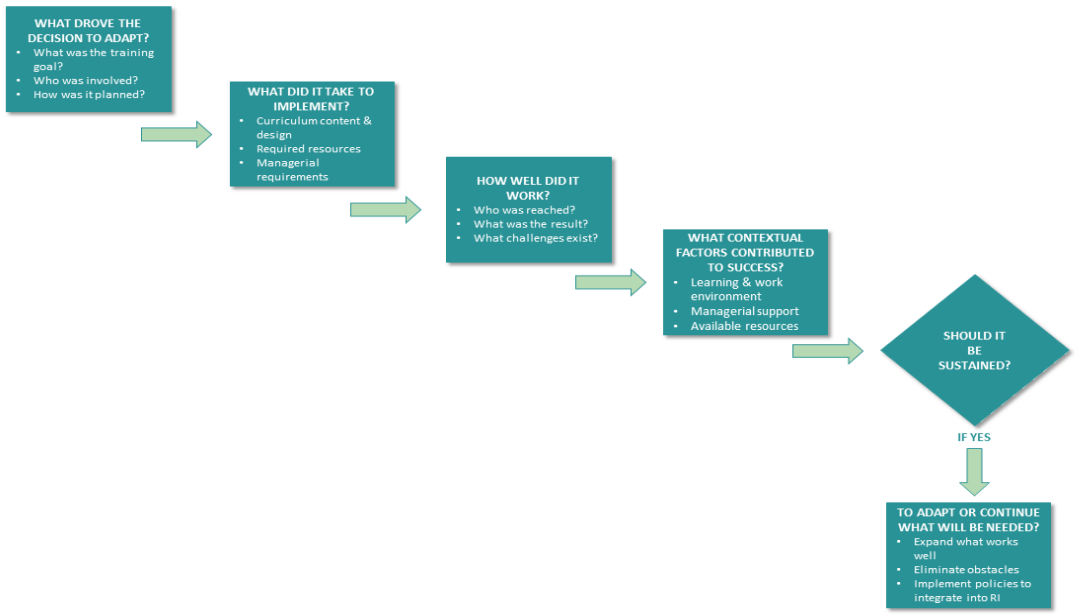
Analysis of COVID-19 Vaccine Interventions: Findings of Online Survey and Interviews

BACKGROUND

Introduction of the COVID-19 vaccine presented several unique challenges due to the nature of the disease and the vaccine itself. Social distancing protocols affected vaccination administration and supervisory processes, as well as the method of staff training. The widespread effect of a novel disease, the development of multiple vaccines with varying management and administration protocols, and the addition of new populations meant that 'business as usual' was unacceptable. In addition, frequent developments about the disease and government policies necessitated timely and accurate dissemination of updates to multiple levels of health staff throughout a country. The workers in several job categories, particularly vaccinators, community health workers, logisticians, and local supervisors, encountered changes to the tools and procedures they were accustomed to. This report describes the findings of an online survey and interviews with project staff who worked with partners to introduce innovations in workforce capacity building. Capacity building activities that were of interest included training and non-training interventions, such as supervisory practices, tools, and process improvements. Lessons learned can inform the expansion and sustainability of innovations.

Data were collected from JSI staff in DRC, India, Kenya, Niger, South Sudan, and Vietnam. The project's in-country staff shared their observations based on their collaborations with MOH, EPI, and partners such as UNICEF.

This report follows the framework that was developed by the project team involved in this activity. The diagram below visualizes the thought process that connects retrospective and prospective analysis. The report describes both training and non-training interventions.



What Drove the Decision to Adapt?

1. What was the training goal?
2. Who was involved?
3. How was it planned?

Broadly, the training goal was to impart knowledge and skills that were necessary to introduce COVID-19 vaccine per each country's vaccine introduction strategy. Specific goals varied depending on the MOH staff's job title and level in the system. For example, staff from nine of the 10 responding countries reported unique training designed for vaccinators. Seven of the nine respondents reported unique training developed for district-level managers, logisticians, and supervisors. Six of the nine respondents reported unique training developed for community health workers.

Project staff took an active role in the planning, working with MOH EPI, UNICEF, and community leaders. Partners collaborated on non-training interventions as well, sometimes integrating the two initiatives in a systems-based strategy to build capacity.

Non-training interventions were generally planned by the same staff, and sometimes integrated with the training initiatives.

What Did it Take to Implement?

1. Curriculum content and design.
2. Required resources.
3. Managerial requirements.

Training Interventions

All countries reported delivering training through a blend of in-person and virtual methods. For most, COVID-19 was the first opportunity to explore online learning as a national initiative. Vietnam was the exception, where online learning had already been widely adopted for many job titles. Several countries reported an in-person TOT at national level, with virtual live webinars at the community level (DRC, India, Kenya, South Sudan, Vietnam).

Niger reported a different design, delivering training distance-based via live webinars for national (delivered by in-country and international subject matter experts) and regional levels (by national staff). Lower levels in the cascade were trained via in-person visits by the immediate supervisor. India used the same approach, delivering TOT via live webinars to national and state levels.

For live webinars, staff from all countries reported using the library of in-person materials to deliver presentations as a webinar. There was no evidence of content redesign to maximize the webinar format.

Kenya reported that updates (which were frequent) and refresher trainings were conducted via weekly 1-hour webinars, while DRC reported updates via email and text messages. Vietnam reported updating guidelines by cascading official letters that began at the national level, but did not report the delivery method.

Several countries reported training interventions that were introduced as **innovations**:

TABLE 9. COUNTRY REPORT ON TRAINING INNOVATIONS

DRC	1. Live webinars, using materials from in-person training. 2. Updates via email or text message.
India	3. ECHO platform. 4. TOT delivered via live webinars at national and state levels. 5. State-level webinars were monitored via daily review meetings. When learning gaps were noted, supplemental webinars or in-person coaching was conducted. 6. In-person training is now focused on peer learning instead of formal presentations.
Kenya	1. Live webinars, delivered in weekly 1-hour sessions, using materials from in-person training. Frontline health workers participated with their supervisors. A schedule was provided so workers could plan accordingly.
Niger	1. Live webinars to train national and regional levels. 2. Training by regional-level peers provided credible and trustworthy testimonial of innovative methods and built a peer network.
South Sudan	1. Live webinars for supervisors and trainers.
Vietnam	1. Designed blended learning at health worker level, combining half-day webinars and in-person sessions. Supportive supervision reinforced formal training. 2. Conducted orientation and provided job aids to introduce online learning method to community health staff.

Required resources mentioned included internet capability, smart phones/tablets, data/minutes, webinar platform (Zoom, MS Teams, Skype Business).

Managerial requirements included identifying workers to be trained, supporting learners by allowing time for training, following up with learners to answer questions or provide local context, and reporting operational problems to the next level. In Niger, the MOH and the national EPI director communicated the importance of COVID-19 vaccine introduction and provided encouragement before every campaign, urging people to attend training. Support at the highest level, as mentioned in Niger, is a best practice and can be a key motivator.

Non-training Interventions

Several countries reported non-training interventions that were introduced as **innovations**:

TABLE 10. COUNTRY REPORT ON NON-TRAINING INNOVATIONS

DRC	1. Mobile vaccination teams conducted social mobilization and vaccination sessions. 2. Regular monitoring by supervisors who conducted daily debriefings with the teams. 3. Provincial and district level supervisors use WhatsApp groups to share information. 4. Introduction of tablets for data recording.
India	1. A national helpline was established to enable health workers to contact an expert for COVID-19-related questions. This worked well and will be used for future vaccine introductions. 2. While group chats were already in place, specifically with WhatsApp, social media communication increased notably for COVID-19. It's speculated that this is because the vaccine beneficiaries were diverse (not limited to children). Twitter and Facebook messages increased to keep the population aware of current vaccine guidelines, especially important because of the great vaccine enthusiasm and the prioritization of certain populations. 3. Developed a COVID-19-specific daily reporting tool (Google sheets) to track and analyze campaign progress. Debriefed via daily meetings at every level. 4. Collaborated w/non-traditional partners (e.g., non-communicable disease, education departments) to identify and reach the unreached. Created and strengthened partnerships at every level. 5. Job aids and FAQ documents were regularly created and dispersed as the COVID situation evolved and guidelines changed. These were made available on the MOH website.
Kenya	1. Regular supervision of health workers to reinforce training content, correct misperceptions, and answer questions. Learning was two-way, as supervisors obtained real-time feedback of field activities. Supervision was virtual in the early stages of the response, with in-person recommencing when possible.
Niger	1. Reduced supervision from national level due to COVID-19 increased emphasis on supervision by the next level above. 2. Released a new tool for monitoring temperature. This improves the process as well as the method of vaccine storage and transport.
South Sudan	1. Digital reporting using ODK to provide daily reporting and track people who were being vaccinated, thereby informing vaccination campaigns. 2. Reinforced via daily review meetings & local supportive supervision.
Vietnam	1. Group chat via social media at various system levels for real-time troubleshooting and updates. 2. Excel microplanning tool automated microplanning process at community level, reinforced by supportive supervision and policy change to promote usage.

Required resources for non-training interventions ranged from providing tablets (or leveraging those that had been furnished via other programs) to ensuring supervisors had transport so they could visit vaccination teams (DRC).

Additional resources included vaccinator pay and physical (Niger) or electronic (South Sudan, Vietnam) tools that facilitated immunization program tasks.

Managerial requirements for non-training intervention included regular supportive supervision, whether in-person or virtual; equipment allocation; reinforcement of adoption of new tools, such as the microplanning tool in Vietnam; and encouraging/motivating the workforce.

How Well Did It Work?

1. Who was reached?
2. What was the result?
3. What challenges existed?

Training Interventions

Most countries reported that almost all workers who needed training were reached. South Sudan was the exception, reporting that a minimum number was reached. DRC and Kenya reported changing strategies when it became apparent that the planned training methods were not reaching their audiences. For example, in DRC, after repeated challenges with online learning innovations, the program reverted to face-to-face training. Challenges in South Sudan included poor internet access, inadequate number of trainers who could work in culturally sensitive areas, security threats, inappropriate (too technical and abstract) training materials, and no ability to evaluate learning. Health worker training was centralized in Juba or through individual coaching at the health facility level.

Distance-based methods were generally more successful at the national and provincial levels, due to more reliable internet access. However, several respondents reported the greater challenge as participation and engagement. Peer training in Niger was very successful: the regional officer conveyed personal experiences and confirmed its value. Niger's role as an early adopter was highly respected and staff think it could motivate others to step forward in future initiatives.

India staff reported high satisfaction with the distance-based TOT, by both participants and training administrators. They noted that online learning saves time, as updates can be delivered immediately, and participants are not burdened with travel. Cost savings and reduced administrative time are additional benefits. India has continued live webinars for training, offered in short, multi-day sessions.

As far as training results go, no country was able to confidently state that training improved workers' knowledge or skill. Evaluation methods, when conducted, focused on participant satisfaction. (One respondent reported that satisfaction survey data are unreliable as participants are reluctant to criticize trainers.) An exception was Vietnam, where staff specifically reported that post-test for knowledge improvement were conducted (and for one cohort of 159 participants, all passed).

Most accurate were supervisors' observation of task performance, where real-time coaching could occur. As mentioned during the South Sudan interview, it was at this level where workers were taught and practiced lessons. In addition, as mentioned in the Vietnam interview, training itself is not enough to change behavior. It must be reinforced with policies, tools, and on-the-job support.

Challenges related to the design, delivery, and evaluation of the training innovations include:

- Content was frequently technical and not based on practical application.
- Materials developed for in-person training were not redesigned for the webinar format.
- Content was dynamic and required frequent updates.
- Inconsistent access to technology (internet, smartphones/tablets, data, batteries).
- Reluctance to use technology for learning. Strong preference for in-person training among leaders and many participants.
- Participants were not engaged during the distance-based sessions.
- Lack of basic technology skills among participants.

- Difficult for facilitators to monitor participant engagement during webinars.
- Lack of tools or processes to evaluate participant satisfaction, learning, or behavior change for distance-based modality (though it is unclear if these were in place for traditional training modalities).
- Lack of learning management system to track who needs to be trained and which trainings have been completed.

Non-training Interventions

Innovations in non-training interventions that were described were primarily at district and local levels. Often, an innovation was piloted in a small number of districts, and some were adopted as a standard practice when vaccine introduction was scaled up.

Results mentioned (but not independently confirmed):

- More accurate microplanning (Vietnam).
- More of the population reached (DRC).
- More accurate and timely data recording and reporting (DRC, South Sudan).
- Timely update of COVID-19 vaccine guidelines and policies (DRC, Vietnam, DRC, Kenya).
- More effective and efficient temperature monitoring (Niger).
- Higher vaccination coverage in India due to innovative collaborations, more accurate and timely reporting.
- Improved access to timely and accurate information for vaccination staff (India).

Challenges related to the non-training innovations:

- Insufficient funding for vaccinator salaries and supervisor transport.
- Inconsistent access to technology (internet, smartphones/tablets, data, batteries).
- Reluctance to change work processes (Vietnam).

WHAT CONTEXTUAL FACTORS CONTRIBUTED TO ITS SUCCESS?

This section discusses training and non-training innovations together, as many of the contextual factors are identical. Contextual factors that were either explicitly mentioned or implied:

LEARNING AND WORK ENVIRONMENT:

- Availability of global and international guidelines and training materials.
- Clear expectations of work responsibilities (South Sudan, Kenya)
- Availability of physical (Niger) and electronic (Vietnam) tools.
- Dependable availability of technology.
- Trainers who were subject matter experts
- Motivated workforce

MANAGERIAL SUPPORT:

- Importance of the initiative communicated and regularly re-affirmed by leaders throughout the health system.
- Reinforcement of desired work practices by supervisors (South Sudan).
- Established infrastructure for virtual supervision and networking.

AVAILABLE RESOURCES:

- Platforms to host webinars and store electronic resources (e.g., guidelines, job aids and training materials).
- Funding for supervisor transport and mobile vaccination teams.
- Availability of tablets and smart phones at health facility level.
- Collaborations with non-traditional partners that provided equipment (tablets that had been provided by malaria or polio programs) or key information (line lists of target population in India).

TO ADAPT OR CONTINUE, WHAT WILL BE NEEDED?

1. Expand what works well.
2. Eliminate obstacles.
3. Implement policies to integrate into routine immunization.

The responses of the key informants indicate great interest in continuing or expanding distance-based learning in some fashion. There is also appreciation for strong on-the-job support of workers, particularly vaccinators.

To expand what works well:

- Use a multifaceted approach to capacity building. Training should not be designed in isolation – it should be one component of an intervention that combines job aids, regular feedback, and material and non-material incentives to each worker.
- Engage an expert in instructional design to develop online learning materials that engage participants in practical, useful activities that they perceive to be of value.
- Coordinate training initiatives at the highest level so that it is clear how they support national program goals.
- When trying to improve performance, do not assume training is the solution. Instead, modify the work process or develop physical or electronic tools that simplify tasks.
- Implement a performance management system that reinforces job expectations and recognizes mastery of competencies.
- Expand the use of peer networks within and across administrative levels.
- Introduce rigor to the evaluation process: review methods for evaluating training satisfaction and introduce substantive methods for assessing knowledge, skill, attitude, and behavior change.

Obstacles to be eliminated:

- Reconsider TOT as the standard for frontline workers. Use cost savings to increase access to technology and provide material incentives for meeting performance goals.
- Continue/expand virtual supervision by providing appropriate tools and funding.
- When introducing a new vaccine, advocate for funding for training needs assessment and post introduction evaluation when planning the initiative. Include budgets for site visits.

Implement policies to integrate into routine immunization:

- Develop practices to help supervisors provide meaningful virtual supervision. This could be a library of encouraging text messages or links to pertinent information that supervisors could easily send to local staff.

- Do not expect training alone to result in behavior change. Policies, tools, and on-the-job support, as well as worker motivation, are important to worker performance.
- Replace on-site meetings or trainings with regular webinars that have specific objectives. As mentioned in the Niger interview “make meetings easier.”
- One size doesn't fit all: virtual learning may be appropriate for some but not all audiences. However, all modalities should harmonize.
- Use in-person meetings or trainings as an opportunity for peers to collaborate on problem solving, goal setting, and program planning. Eliminate lecture formats.
- Whether developing new training or converting existing course to distance-based, consult an instructional designer to ensure the training meets its objective.
- When scaling up, consider the diversity, language requirements, and technological capability of the audience.
- Provide a library of short lessons and a purposeful design of distance-based continuing education using accessible technology (e.g., plan a schedule of text messages that push learning on a regular basis).
- Provide orientation and job aids when introducing new learning methods.
- When planning training, look for dynamic content. Use delivery methods that are economical and efficient and develop a plan to update trained workers with new content.
- Design ALL training to be engaging and participatory to reduce learning dropout and increase retention.
- Distance-based support for hard-to-reach workers could include webinars facilitated by a local trainer, and the creation of a more structured text messaging schedule that could include workers sharing videos and mentors offering remote coaching.

ANNEX 2. ONLINE SURVEY COVID-19 VACCINE INTRODUCTION: SUSTAINING INNOVATIONS

Below is a reader friendly version of the English Google Forms survey.

Red font means required question.

Some questions trigger a SKIP PATTERN. If 'YES', additional questions are indicated in columns to the right of the question.

Selections for MULTIPLE CHOICE questions are indicated in *italics.*

TARGET AUDIENCE: GENERAL IMMUNIZATION COMMUNITY

We appreciate your willingness to assist us. As you complete the survey, please reflect upon training and other activities to support the COVID-19 vaccine introduction which were completed in the past 18 months in your country.

We will ask you about training and non-training interventions.

Training refers to formal or informal activities that aim to build knowledge/skill or change attitudes.

Non-training refers to policies and practices that support worker on-the-job performance, such as supervisory practices, work tools, job aids, or mentoring.

If you were responsible for designing or delivering training, or for supervising, we have a few questions about that too.

Your responses are completely confidential and will only be used in summary form. We are requesting your email address only for the purpose of the raffle.

This survey will take you about 20 minutes to complete.

PERSONAL INFORMATION

1. Country of work	**Drop down list:** *Countries of the world*
2. Highest level education achieved	**Drop down list:** *Diploma, Bachelor degree, Master's degree, PhD/Doctorate, Other + fill in*
3. Gender	**Drop down list:** *Female, Male, Prefer not to answer*
4. Organization type	**Drop down list:** *MOH/government, partner agency/NGO, consultant, student/academic, Other + fill in*

5. Administrative level of work	**Drop down list:** *Global, Regional (multi-country), National, Province/State, District, Health facility/local level)*
6. Job title/primary responsibility	**Drop down list:** *Primary care nurse/vaccinator, logistician, community health worker, supervisor, program manager, Other+ fill-in*
7. Number of years in immunization	**Drop down list:** *Less than 2, 2-5 years, 6-10 years, 11-20 years, More than 20 years*

COVID-19 VACCINATION TRAINING INTERVENTIONS

Training refers to formal or informal activities that aim to build knowledge/skill or change attitudes.

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
8. What methods did you use to learn about COVID-19 vaccination?	**Checkbox** Check all that apply. *In-person lectures* *In-person demonstrations* *In-person role play/case study* *In-person Q&A* *Virtual-live webinars with participant interactions* *Virtual live webinars, lecture* *Virtual-recorded webinars* *Self-paced-videos, tutorials or PowerPoints* *Discussions with colleagues* *Internet searches* *Other_____*		
9. Were any of the training methods a	**Multiple Choice (triggers branching)**	9a. Briefly describe what was new for you.	**Textbox**

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
new way for you to learn?	*Yes* *No*	9b. How well did the new method work for you?	**Multiple choice** Choose the most accurate answer. *If offered, I would happily use this method again.* *Some new methods worked well, and I may consider continuing to use this approach.* *If I had no other options, I would use this method again.* *The new methods did not work well, and I would not try to use them again.*
Training quality/satisfaction			
10. When thinking back on the type of training that you needed to prepare you for COVID-19 vaccine introduction, what type of training did you need?	**Checkbox (check all that apply)** *I expected to be able to use my current skills, but I needed information, such as guidelines and protocols* *I expected to need new skills, such as for vaccine administration or logistics* *I wanted to learn more about COVID-19 disease and/or the vaccine itself because I had concerns that made me reluctant to support the COVID-19 response.* *I knew of colleagues and/or community members who had concerns about COVID-19 disease and/or the*		

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
	vaccine itself, and I wanted to be able to converse with them in a constructive way. *Other: _____*		
11. After you were trained, how confident did you feel to carry out your COVID-19 vaccine responsibilities?	**Dropdown list** *I felt fully prepared to do my work.* *I felt somewhat prepared, and I was able to get help when I needed it.* *I felt somewhat prepared, but there were times when I could not get help when I needed it.* *I frequently felt unprepared to do my work.*		
12. How well do you think you were informed as guidelines or circumstances changed?	**Multiple choice** Choose the most accurate answer. *We received timely and accurate updates* *We received accurate updates, but sometimes they were slow to arrive* *We often were on our own to find the latest updates* *I was very dissatisfied with the timeliness and accuracy of updates.*		
Training design and delivery for others This section pertains to your responsibilities for designing or delivering a formal training for health care staff or the community for COVID-19 vaccine introduction.			
13. Were you responsible for designing or delivering COVID-19	**Multiple choice (triggers branching)**	**13a** Were COVID 19 vaccination training curricula developed that	**Checkbox** Check all that apply.

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
vaccine training to others?	*Yes* *No*	were **unique** to specific workers?	*Vaccinators* *Community health workers* *Supervisors* *Logisticians* *District level managers* *All workers took the same training* *Do not know* *Other_____*
		13b Were any of the training methods considered innovative or used for the first time?	*Yes* *No* *Do not know*
		13c Please briefly describe what was new about the training that you helped design or deliver.	**Textbox**
		13d How well did the new approach work? Choose the most accurate answer. **Triggers branching for certain responses.**	**Dropdown** Choose the most accurate answer. *The new approach exceeded expectations* *The new approach worked well in some settings but not others.* *We experienced issues with implementation, and we reverted to more traditional approaches.* *We are unlikely to use the new approach further.*

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
			The new was entirely unsatisfactory, and we will not try to use it again.
		13e What do you think contributed to the success of the new approach? Rank the following reasons from greatest to least. Only offer this question if they clicked the 1st 2 choices of 13d	**Ranking** *Design and planning of training* *Local supervisor encouragement/support* *Sufficient technical and/or financial resources* *Motivated participants* *Capacity or skills of the trainers*
		13f Have any new training approaches been adopted into standard practice?	**Multiple choice** *All new training approaches have been fully incorporated into our standard operating procedures.* *Some new training approaches have continued, and we have plans for others.* *There is a strategy in place to sustain new training approaches, but we have not yet implemented.* *We encountered obstacles when we tried to expand.* *We determined the new approach was not sustainable or desired.* *Do not know*
Cascade training			

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
14. Did your training responsibilities include a cascade element: were you trained via a TOT, or were you responsible for organizing a cascade?	**Dropdown (triggers branching)** *Yes* *No*	Cascade training innovations and effectiveness 14a Were there any new methods introduced in the cascade training? Describe briefly.	**Textbox**
		14b How effective was the cascade training that you were involved with? Choose the most accurate answer.	**Dropdown** *Very effective: we reached almost all the staff we intended, with high quality trainers and materials.* *Partially effective: we reached almost all the staff we intended, but the quality was less than desired.* *Partially effective: we had good quality trainers and materials but did not reach all the intended audience.* *Minimally effective: we reached far fewer than we intended, and the quality was not what we had expected.* *Not effective: we missed most of the intended staff and found we had to conduct multiple refresher trainings.* *Do not know*
Supervision for COVID-19 vaccine introduction			
	Dropdown (triggers the branch pattern)	15a How widely was staff training delivered?	**Multiple choice** Choose the most accurate answer.

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
15. Did you supervise staff during COVID-19 vaccine introduction?	*Yes* *No*		*Almost all the workers needed for vaccination introduction were trained.* *Most workers were trained, but certain **job titles** were missed.* *Most workers were trained, but certain **geographic areas** were missed.* *A minimum number of workers needed for vaccination introduction were trained.* *An insufficient number of workers were trained, so much so that vaccination campaigns were impacted.* *Do not know*
		15b In general, how prepared was the staff to carry out their COVID-19 vaccine responsibilities?	**Dropdown list** *Generally, staff were fully prepared to do their COVID-19 vaccination work when it was needed.* *Most staff were generally prepared, but they occasionally needed help to correctly complete a task.* *Certain job titles were adequately prepared, but other job titles were not.* *I could not rely on staff being prepared, and I regularly had to provide refresher training or take corrective measures.*

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
			The training that staff received was completely inadequate.
Non-training interventions Specific to the supervision or capacity building of workers during COVID-19 introduction, we would like to know about interventions that were not training. Non-training interventions to strengthen health worker capacity can include practices that support worker on-the-job performance, such as supervisory practices or mentoring. It could also include physical tools, such as job aids or temperature monitors; or electronic tools, such as a spreadsheet template.			
16. Compared with standard non-training approaches typically used in immunization service delivery**, w**ere any new or different measures used to support staff performance for COVID-19 vaccination?	**Multiple Choice (triggers branching)** *Yes* *No* *Do not know*	16a Briefly describe what was new or different with the non-training aspect of vaccine introduction.	**Textbox**
		16b How well did the new approach to non-training support work? **Triggers branching for certain responses.**	**Multiple choice** Choose the most accurate answer. *The new approach exceeded expectations* *The new approach worked well in some settings but not others.* *We experienced issues with implementation, and we reverted to more traditional approaches.* *The new methods did not work well, and we will not try to use them again.*
		Reasons for success 16c What do you think contributed to the success of the new approach? Rank the following reasons from greatest to least.	**Ranking** *Design and planning of support activity* *Local supervisor encouragement* *Sufficient technical and/or financial resources*

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
		Only offer this question if they clicked the 1st 2 choices of 16b	*Motivated staff* *Donor support*
		16d Have any of the new approaches to non-training support been adopted into standard practice?	**Multiple choice** *All new non-training approaches have been fully incorporated into our standard operating procedures.* *Some new non-training approaches have continued, and we have plans for others.* *There is a strategy in place to sustain the new non-training approaches, but we have not yet implemented.* *We encountered obstacles that prevented us from expanding or continuing, but we hope to resolve.* *We determined the new approach was not sustainable or desired.* *Do not know*
Other vaccine introduction innovations In addition to non-training interventions, we would like to know if your organization used new methods or tools when introducing the COVID-19 vaccine. You might have changed a process, designed a new process, introduced a new tool, or used existing tools in a different way. You do not need to repeat any previous responses.			
17. For the COVID-19 vaccine, did you substantively change the way you handled any of the vaccine introduction tasks? Check all that apply.	**Checkbox** *Microplanning* *Social mobilization* *Data recording* *Data reporting*		

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
	Vaccine safety processes *Vaccine storage and transport processes* *Planning vaccination sessions (fixed or mobile)* *Vaccination campaign management* *Other*		
18. Can you elaborate on what was different?	**Textbox**		
Evaluation and moving forward			
19. Did the training or non-training interventions include any monitoring or evaluation activities?	**Checkbox** (check all that apply) *Training satisfaction surveys* *Pre and post test to capture knowledge/skill/attitude change* *Tracking of training rosters* *Evaluation after the activity* *Observation at work sites to assess performance* *Follow-up SMS/text messaging* *Do not know* *Other _____*		
20. Are you aware of any additional innovations in your country or jurisdiction related to the COVID-19 vaccine introduction that you think should be	**Textbox**		

QUESTION	RESPONSE FORMAT/CHOICES	IF BRANCHING	
		ADDITIONAL QUESTIONS	RESPONSE FORMAT/CHOICES
continued or expanded?			
21. Do you have any suggestions on how training or non-training methods can be improved for vaccine introduction or for routine immunization?	**Textbox**		

ANNEX 3. SUMMARY OF NON-TRAINING INNOVATIONS

53 of 59 descriptions of new methods of non-training capacity building provided a description that could be analyzed. Of those, 19 referenced some aspect of health worker capacity building. The tables below display the statements, coding keywords, and country of reporting.

Table 11. Capacity building statements (N=19)

Non-training innovation description	Country	Keyword coding
App based supervision and monitoring	Bangladesh	mobile, virtual, supportive supervision, mentoring
On the job training during session ongoing with trained one	Bangladesh	in-person, mentoring
Providing job aids to health personnel as well as guidelines for vaccination against COVID-19 have been of greatest importance	Burkina Faso	job aids
There were new methods of supervising teams and providers regarding mandatory AEFI notification	Burkina Faso	supportive supervision, processes
DQA was used for supportive supervision	Ethiopia	processes, supportive supervision
Supporting on the microplan development and M&E	Ethiopia	supportive supervision, processes
Supportive supervision was used as onsite knowledge and skill transfer initiative	Ethiopia	in-person, mentoring, supportive supervision
Online trainings	India	virtual
WhatsApp videos and self-paced learning modules	India	mobile, self-paced, virtual
Partnership with private sectors, new protocols and guidelines, new approaches such as vaccine champions to address vaccine hesitancy.	Kenya	processes, job aids
Support supervision and mentoring	Kenya	supportive supervision, mentoring
The read[i]ness of the health care workers to start COVID vaccination after training	Kenya	mentoring
The training was complemented by supportive supervision and monitoring to health facilities and vaccination sites. Job aids were also provided to guide health workers.	Laos	supportive supervision, mentoring, job aids
The electronic platforms for follow up	Lebanon	virtual, supportive supervision

The database was put online despite having its limits (lack of internet connection or quality of internet connection in some places), the presence of national supervisors at the regional level and the technical support of partners	Niger	E-tool, processes, supportive supervision, mentoring
A WhatsApp coaching platform was formed to allow weekly learning exchanges and off-site support to subnational teams	Nigeria	mobile, virtual, mentoring
Involving some stakeholders as part of the training.	Nigeria	community engagement
WhatsApp, social media	Senegal	mobile, social media, virtual
Used WhatsApp groups to share knowledge	Zambia	mobile, peer-learning, virtual

Table 12. Statements that were not capacity building (N=19)

Non-training Innovation description	Country	Keyword coding
The cold chain used for the logistics of the introduction of the COVID vaccine	Burkina Faso	processes
The expanded door-to-door campaign approach	Burkina Faso	processes
Communication	Central African Republic	processes
Provision of vaccines according to batches and types	Central African Republic	content
Here almost everything is new. It took a lot of effort for the trained staff to be equipped to better communicate with the clients who are often hesitant.	Chad	content, processes
Immunizing doses at introduction and the need for booster for sufficient immunity	Chad	content
Adaptability, simplicity, practicality, flexible	DRC	processes
Every type of vaccine had its mode of storage and administration, this required regular updating and especially most of the types of vaccines are used in emergency mod and underwent regular changes in their operating mode	DRC	content, processes
Explanation of the history that led to the development of the vaccine in such a short time, related to the clinical trial steps	DRC	content
Mobile team and non-traditional partners through co-creation	DRC	processes
The speed of bad information on COVID-19 in the community (infodemic) which led to the targeting of influencers first in awareness raising (parliamentarians, senators, men in uniform, religious leaders, associations, civil society, businesses, health professionals and the media), analysis of community feedback to deconstruct rumors and improve the acceptance of vaccination by our communities.	DRC	content, processes
Vaccine management and infodemic management	DRC	content, processes
We used a mobile strategy for reaching outlying populations for vaccination	DRC	mobile, processes
The new was combating vaccine misinformation	Egypt	content

They did not differentiate the vaccine types, did not know AEFI to be reported, and did not understand or use M&E tools properly	Ethiopia	content
Reduced personal contact	Gambia	social distancing
Meetings with stakeholders and community leaders to brief them on COVID-19	Ghana	community engagement
Using the vaccine hesitancy as against the disease risk ...thus using risk communication strategy	Ghana	processes
Defined allocated areas for waiting, vaccine and observation and vaccination at non-conventional sites like marriage halls and community halls in addition to hospitals and health center	India	processes, social distancing, community engagement
For COVID-19 vaccine, we use p-care to track the vaccination that was done by participants	Indonesia	E-tool, processes
Identification of vaccination champions and maximizing key influencers voices	Kenya	processes
Limitation in mass gatherings, high-level use of masks, few responses from the community for services.	Kenya	social distancing, community engagement
Use of community opinion leaders in the campaigns	Kenya	community engagement
We were given COVID-19 allowances.	Kenya	processes
Availability of vaccines, use of PPE, data entry	Madagascar	content
The scale and involvement	Mali	content
Storage and preparation of (vaccines)	Niger	
Using 2 doses	Niger	content, processes
Electronic management was used for capturing and storage of immunization data	Nigeria	E-tool, processes
Not physically demonstrating how to vaccinate	Nigeria	content
Whole Family Approach and Adopt a facility. Integrated services	Nigeria	community engagement, integration
Mostly were the new vaccines compared to the normal routine vaccines that we have always known	South Sudan	content

Vaccine storage, dosage that depended on the specific vaccine	Togo	content
Gadgets for temperature	Uganda	E-tool, processes