Impact of a monitoring and evaluation training in 3 PEPFAR-supported countries

Anna Russell[a], **Smita Ghosh**[a,*], **Niharika Tiwari**[a], **Clarissa Valdez**[a], **Leigh Tally**[a], **Lindsay Templin**[a], **Danielle Pappas**[a], **Samantha Gross**[a], **Biniyam Eskinder**[b], **Sisay Alemayehu Abayneh**[c], **Elizabeth Kamga**[d], **Colince Keleko**[e], **Spence Lloyd**[a], **Nasim Farach**[f], **Sherri Pals**[a], **Eboni Galloway**[a], **Sadhna Patel**[a], **John Aberle-Grasse**[a]

[a]Division of Global HIV&TB, Centers for Disease Control and Prevention, Atlanta, GA, USA

[b]Division of Global HIV&TB, Centers for Disease Control and Prevention, Addis Ababa, Ethiopia

[c]PEPFAR Rwanda US Embassy Kigali, Rwanda

[d]Peace Corps Cameroon, Cameroon

[e]Division of Global HIV&TB, Centers for Disease Control and Prevention, Yaoundé, Cameroon

[f]Division of Global HIV&TB, Centers for Disease Control and Prevention, Central America Regional Office, Guatemala

Abstract

Background: The second phase of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) transitioned from scaling up HIV prevention and treatment to promoting sustainability and capacity building for programs monitoring performance and evaluating key program indicators. We assessed the success of a monitoring and evaluation (M&E) curriculum designed to build capacity in three PEPFAR-supported countries.

Methods: We customized M&E trainings based on country-specific epidemic control priorities in Ethiopia, Guatemala, and Cameroon. The M&E curriculum included five modules and three evaluation activities to assess impact: (i) in-person pre-post confidence assessment surveys (CAS), (ii) in-person pre-post knowledge tests (PPKT), and (iii) electronic 6–12 months post-training translating knowledge into practice (TKP) surveys. Pre- and post-training results were compared within and across countries and triangulation with the qualitative data evaluated overall success.

Results: Among 188 participants attending M&E trainings, 154 (82 %) responded to CAS and 165 (88 %) participants from Ethiopia and Cameroon completed PPKT. Overall CAS scores between pre- and post-test improved [Score mean difference:1.5–1.9]. PPKT indicated statistically

significant knowledge gained. One out of five TKP respondents provided direct application examples from the M&E training.

Conclusion: While feedback was predominantly positive overall, revisions were recommended for three of the five modules. Developing a customizable and adaptable M&E curriculum may sustain countries' ability to monitor their progress towards epidemic control.

Keywords

HIV; Monitoring; Evaluation; Capacity building; Cameroon; Ethiopia; Guatemala

1. Introduction

The second phase [2009–2013] of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) transitioned from scaling up HIV prevention and treatment to promoting country ownership and capacity building for sustaining program's monitoring performance and evaluating key program indicators for strategic decision-making (Office of the Global AIDS Coordinator, 2004). In close collaboration with its global and national partners, PEPFAR became well-positioned to transform the successes and challenges associated with early rapid scale-up of anti-retroviral treatment (ART) into future opportunities for sustainable, cost-effective, country-owned programs and systems (Basheka & Byamugisha, 2015; Collins et al., 2010; Porter et al., 2012; Palen et al., 2012; UNAIDS, 2004). As part of increased program strengthening and capacity building, many African, Asian, and Latin American countries began establishing national HIV/AIDS monitoring and evaluation (M&E) units, implementing new programs focused on strengthening health systems, and increasing health workforce capacity (Porter et al., 2012).

Despite a variety of guidelines and harmonizing efforts by numerous stakeholders to integrate M&E as a fundamental aspect of global HIV program planning, implementation, and improvement, efforts were hampered by lack of human resources, inadequate physical infrastructure, low organizational capacity, and insufficient funding (Collins et al., 2010; Porter et al., 2012; Program/Project Monitoring & Evaluation for Accountability and Learning (PMEAL) - Self-paced Certificate Course | ReliefWeb). While there has been an increase in the number of M&E training programs in the past several years, most programs are online, cost-prohibitive, or targeted at higher levels of the healthcare providers rather than site-level healthcare workers (Basheka & Byamugisha, 2015; Program/Project Monitoring & Evaluation for Accountability and Learning (PMEAL) - Self-paced Certificate Course | ReliefWeb; UNAIDS, 2008). Many of the PEPFAR-supported sites have limited or no internet access (Basheka & Byamugisha, 2015). Furthermore, the real-life experiential sharing with peers and trainers have demonstrated improved competencies (Kolb, 1984). Many countries do not offer national-level certification or training for M&E for site-level healthcare workers and most people learn on the job, through peer-to-peer training and guidance documents (Armstrong & Kendall, 2010; Kolb, 1984; Program/Project Monitoring; UNAIDS, 2008). Usually the M&E curriculums are standardized with little flexibility to cater to a country's specific M&E needs (Basheka & Byamugisha, 2015; Murray & Wibulpolprasert, 2004; Program/Project Monitoring; UNAIDS, 2008). To address these gaps, as part of CDC's larger continuous effort for M&E capacity building, CDC staff

in collaboration with ICF Macro, developed an M&E curriculum in a workshop format with five modules to serve as a capacity-building resource for PEPFAR/CDC-supported countries. The curriculum was intended to have enough flexibility to suit both site-level healthcare workers and program staff who may or may not have received training in M&E previously. We describe implementation of the M&E curriculum in three PEPFAR-supported countries, and whether knowledge gained during the training, translated into practice. We plan to use the recommendations from these findings to revise and improve future M&E capacity-building trainings.

2. Methods

M&E curriculum

The U.S. CDC's Division of Global HIV/TB's Monitoring, Evaluation, and Data Analysis Branch (MEDAB) developed a M&E curriculum during 2017–2018 in collaboration with ICF Macro, a strategic management, and communications contractor. The curriculum consisted of five modules with specific learning objectives: (1) Monitoring and Evaluation Basics, (2) Program Planning and Strategic Thinking (3) Program Monitoring, (4) Data Quality, and (5) Data Analysis and Use [Supplementary Table 1]. These modules were considered a core curriculum to build M&E foundational skills, with an added focus on PEPFAR-related M&E. They were intended to be flexible enough to be delivered to novices who had no prior M&E training, as well as provide advanced technical topics, such as complex methods of program evaluation, data analyses, and use for more experienced staff. All modules used PEPFAR-specific case examples and experiences.

Curriculum developers at ICF Macro, CDC subject matter experts, and CDC headquarters and country staff applied adult learning theories in the overall design and delivery of the curriculum. Experiential learning (Kolb's theory of concrete experience), reflective observation, abstract conceptualization, and active experimentation (Bell & Marais, 2015; Kolb, 1984) were incorporated into the curriculum by using exercises, quizzes, and interactive activities to promote class engagement. Experiential learning was also integrated by modifying the training's examples to relate to the local country context and their specific programmatic priorities.

3. Trainings

As baseline knowledge of M&E varied by audience in the different countries, headquarter CDC staff closely coordinated with the CDC country office staff, Ministry of Health (MOH) officials, and implementing partners to determine training scope, delivery language, translation if multiple languages were needed, and logistics. We offered customizable trainings to PEPFAR supported countries through in-person discussions and M&E distribution lists. Three PEPFAR-supported countries (Ethiopia, Guatemala, and Cameroon) volunteered and accepted this capacity building activity customized to their country context. The curriculum content was translated into Spanish and French to facilitate the delivery of the trainings in Guatemala and Cameroon, respectively.

Relevant modules were selected by each of the countries based on the country's HIV epidemic control priorities and the M&E needs of the participants (Table 1).

3.1. Ethiopia

The Ethiopia pilot was conducted in February 2019 with a primary audience that included implementing partners, MOH Regional Health Bureau (Federal Ministry of Health/HAPCO, 2003), and CDC staff. The training was conducted in English and was led by CDC headquarters and CDC Ethiopia staff. The training included four modules with a focus on data quality assessments, data analyses, and data use for decision making to align with efforts to implement a revised Electronic Medical Record System in Ethiopia (Yehualashet et al., 2021).

3.2. Guatemala

The audience for the May 2019 Guatemala pilot mostly consisted of Key Population Initiative Funding (KPIF) (U.S. Department of State, 2020) awardees including, but not limited to, civil society organizations that serve key populations (KPs), who may have had little to no experience in M&E, or high quality data collection and/or use. The KPIF initiative targets the HIV-related needs of KPs who are disproportionately affected by HIV (World Health Organization, 2014). All training materials, tools and forms were translated into Spanish by the country staff. The training was delivered in Spanish and led by CDC headquarter and CDC Central America staff. The M&E trainings included all five modules and practical examples relevant to KP activities and programming.

3.3. Cameroon

The M&E curriculum was delivered in September 2019 in Cameroon to data clerks, M&E officers, nurses, and implementing partners as the primary participants. There were two separate week-long training sessions to accommodate larger participant numbers from two different regions within Cameroon. All five modules of the trainings were conducted in both English (by CDC headquarters staff) and French (by CDC Cameroon staff) and tools, slides, and evaluation forms were translated by implementing partners and delivered in French.

4. Data collection for evaluation

We collected evaluation data through three activities. Before and after each training, we assessed the perception of confidence and knowledge gained. We also assessed if or how the knowledge gained from the M&E curriculum was translated into practice, through an online survey administered in February 2020. This survey was administered approximately one year after the Ethiopia training, nine months after the Guatemala training, and five months after the Cameroon training. All data collection tools were translated into the relevant language of the participants, including Spanish for participants from Guatemala and French for participants in Cameroon, and then back translated into English by CDC headquarters and country staff to ensure reliability and completeness of the answers and interpretation.

4.1. Confidence assessment survey

The paper-based pre-post confidence assessment survey (CAS) consisted of two sections. The first section was a five-point Likert scaled self-assessment evaluating confidence in understanding M&E concepts and practice based on the learning objectives for each module as well as the overall module. The second section consisted of several open-ended questions about participant experiences with the training, their opinions on what they liked and suggestions for improvement for each module (Appendix A). All three countries conducted this evaluation activity.

4.2. Pre-post knowledge test

The knowledge survey used paper-based pre-post knowledge test (PPKT) checks based on the curriculum slides and module's learning objectives to assess participants' knowledge gained from the M&E curriculum. The pre-test was administered on the first day of the training to assess baseline knowledge about M&E and the post-test was administered on the last day of the training to assess overall learning and knowledge gain. The pre-post knowledge surveys were administered in the preferred language of the participants. Due to logistical challenges, these pre-post knowledge assessments could not be administered in Guatemala.

4.3. Translating Knowledge into Practice Survey

Through an open-ended Translating Knowledge into Practice (TKP) online survey, we collected qualitative information on how participants from Ethiopia and Cameroon applied the knowledge and skills that they gained from the M&E trainings into their routine work. We were also interested in obtaining feedback on any additional support or technical assistance needs in the future. Challenges due to COVID-19 pandemic restricted us from sending out this online evaluation survey to Guatemala.

5. Analysis

5.1. Confidence assessment survey

5.1.1. Quantitative—We analyzed quantitative data by calculating measures of central tendency, e.g., frequency, medians) from the confidence and knowledge surveys. To determine whether there was significant change from the pre- to post-test on items from CAS, we first computed difference scores (post-test minus pre-test Likert scale rating), and then used a Wilcoxon rank-sum test to assess whether the difference scores were significantly different from 0 (Lin et al., 2021). The threshold for statistical significance was set at $p = 0.05$. Rank-sum tests were performed for each country individually, and then overall. We tested for a difference between countries using a Kruskal-Wallis nonparametric test with country as the classification variable. All analyses were done in SAS 9.4 (SAS Institute, 2011).

5.1.2. Qualitative—In addition, we conducted thematic analysis of the qualitative data from the open-ended questions in CAS and TKP. Inductive coding synthesized qualitative data into main themes to understand and summarize results. The Framework method (Gale et al., 2013) for analysis of qualitative data was applied to analyze results from the open-

ended questions in the confidence survey. Content analysis led to common themes that were grouped and quantified into positive feedback as well those suggesting changes or improvements (Pope et al., 2000). We constructed thematic bubbles by quantifying the qualitative themes that (i) were positive with green colored bubbles and (ii) suggested change in orange-colored bubbles.

5.2. Pre-post knowledge test

Knowledge tests comprising of 15 and 20 pre-training questions in Ethiopia and Cameroon, respectively, were repeated post-training and administered in Ethiopia and Cameroon. The median score differences between pre and post trainings were compared to understand knowledge gain in each of the two countries.

5.3. Translating Knowledge into Practice Surve

Participants' answers to the survey results were coded into three main themes carried out by drawing on *a priori* issues and questions derived from the aims and objectives of the study as well as issues raised by the respondents themselves and views or experiences that recur in the data (Patton, 1999; Pope et al., 2000). We conducted inductive coding that led to synthesizing various codes into three main themes: (i) demonstrated concrete application of knowledge gained during the training with examples of how they applied the training into practice, (ii) stated application of the curriculum but no provision of concrete examples, and lastly, (iii) no stated usage of the curriculum. A similar process led to further coding for a specific application of the knowledge category, which was coded further into three types of actions participants took post-training: (i) setting up data review meetings directly as a result of the training, (ii) creating logic models, and (iii) creating data quality improvement plans.

5.4. Triangulation

To gain a comprehensive understanding of convergence of information from various data collection sources and to strengthen the validity of the findings, we also triangulated between the quantitative and qualitative results from CAS and TKP (Carter et al., 2014; Hsieh & Shannon, 2005; Patton, 1999; Paul, 1996). Investigator triangulation involved second and third co-authors reviewing and discussing divergent interpretations until consensus was reached (Paul, 1996). Inter-coder reliability (Carter et al., 2014) was monitored to assure strength of the findings and a 90 % match between coders was found. We discussed findings among co-authors (peer-debriefing) before finalizing the manuscript (Hsieh & Shannon, 2005).

6. Ethical considerations

Since evaluation of these trainings were capacity building activities supported through CDC country offices, CDC determined this as a public health program evaluation activity, and not research, as defined in 45 CFR 46.102.

7. Results

7.1. Training and evaluation

We delivered all five modules including M&E Basics, PPST, Program Monitoring, Data Quality, and Data Analysis and Use in Guatemala and Cameroon, while the PPST module was not prioritized for delivery in Ethiopia. In total, 188 participants attended the M&E trainings across the three countries: 135 (72 %) from Cameroon, 30 (16 %) from Ethiopia, 23 (12 %) from Guatemala (Table 1). The majority of the participants (n = 154, 82 %) responded to the pre-post modules of the CAS. Almost all 165 (88 %) participants who received the PPKT in Cameroon and Ethiopia responded. Twenty-two percent (36 out of 165) of those who responded to the PPKT responded to the TKP surveys (Table 1).

7.2. Confidence survey

7.2.1. Quantitative analysis—Fig. 1 and Table 2 presents the quantitative comparison of items assessing confidence and learning for each of the modules. Participants gained confidence as demonstrated by overall improvements that ranged from 1.5 to 1.9 in overall mean differences between pre- and post-test scores. The most improvement (mean difference in score = 1.9) was seen in the Data Analysis and Use module's learning objective "Developing plan for data analysis and use", and the least improvement (mean difference in score = 1.5) was seen in learning objectives "Identifying core contributors to data quality" and "Developing and selecting appropriate monitoring questions, indicators, and data sources" (Table 2). When select learning objectives were assessed and compared across countries, for each of the five modules, there were statistically significant differences in the mean score differences between pre-post confidence scores for "Program monitoring" with lowest improvement in Ethiopia (mean difference in score = 0.4) and highest improvement in Cameroon for all learning objectives (Range: 1.5–1.9) (Table 2). When pre-post confidence scores were compared across select learning objectives between countries, all except for "Developing SMART objectives", "Identifying core contributors to data quality", "Using data for program planning and decision making" and "Developing a plan for data analysis and use" had statistically significant improvements in their mean score differences between countries (Table 2).

7.2.2. Qualitative analysis—The open-ended sections of the CAS asked participants what they liked the most and recommendations for improvement for each of the 5 modules. Inductive coding led to these seven major themes as depicted on the bubble graph (Fig. 2)- Code 1: Module specific topics, Code 2: Knowledge gained, Code 3: Application of knowledge gained in each of the specific modules, Code 4: Interactions/activities/examples utilized in each of the modules, Code 5: Whether adequate time was available for each module, Code 6: Comments about moderator's delivery, Code 7: No change suggested. The proportion of total comments (N = 759) varied across the seven themes. Positive comments (n = 487, 64%) outweighed the comments suggesting change [Supplementary Table 2]. Out of the 64 % of positive feedback for module specific content, the majority of comments for all 5 modules were related to knowledge gained. As one participant from Guatemala stated, "[*the training helped me*] determine what data should be presented and the best way to disseminate and use information." Half requested changes in the M&E Basics module

(147 out of 272 comments, 46 %) (Fig. 2). One-fifth of the comments indicated inadequate time for three modules (e.g., M&E Basics, Program Monitoring, Data Analysis and Use) [Fig. 2, Supplementary Table 2]. Most of these comments indicated that participants would have preferred more time for the interactive exercises and discussions. One participant from Cameroon stated that the lesson was "interactive and made me think immediately but would have liked more time to digest the material." M&E Basics had the most comments, for both positive feedback and changes requested (Fig. 2). Positive comments for activities being interactive (code = 4) for the PPST, and Data Analysis and Use modules were reassuring. Many participants commented that the activities solidified the information presented by the moderator: "I liked the exercises. They allowed us to assimilate the lessons." The 13 % of codes related to moderator's delivery were primarily positive across all modules [Supplementary Table 2]. Overall comments for each country's feedback for each module followed a similar pattern (data not shown).

7.3. Pre-post knowledge test

Participants completed pre and post knowledge tests in Ethiopia (n = 30) and both training sites in Cameroon (n = 135). The highest increase in knowledge indicated by increased median scores was seen among participants in Cameroon (Fig. 3).

7.4. Translating Knowledge into Practice Survey

The TKP survey was sent to all 165 participants who received trainings in Ethiopia and Cameroon. Among these, 36 (22 %) participants responded. A majority of (24 of 36, 67 %) participants from both these countries provided concrete examples of application of knowledge such as improving data quality (by triangulation, weekly reviews, logic checks, or other methods) or monitoring and analyses of data for specific trends or gaps within populations or decision making (Table 3). At least seven (19 %) participants reported that they were now sharing their data at weekly or monthly review meetings (Table 3) and 6 (17 %) reported daily meetings to address any data issues imminently. While ten out of 36 (28%) participants stated they were applying knowledge gained from the M&E curriculum training, they did not provide concrete examples. One participant from each of the two countries stated that they did not apply knowledge obtained from M&E training into practice. Among the 36 who were able to apply knowledge gained, 16 (44 %) requested additional trainings for topics related to advanced data analysis, visualization, and use, followed by topics on new indicators, index testing monitoring, viral load monitoring (8, 22 %) followed by PPST (7, 19 %) (Fig. 4).

7.5. Triangulation

Multiple forms of triangulation were utilized to strengthen the validity of findings (Hsieh & Shannon, 2005; Patton, 1999; Paul, 1996). Method triangulation (Hsieh & Shannon, 2005; Paul, 1996) was used as multiple methods of data collection through CAS and TKP surveys confirmed that some of the knowledge gained to ensure use of standardized tool/ SOPs; conducting monthly data review meetings or examples used specifically during data use and visualization as well as some of the data quality and program monitoring efforts were being practiced (Table 3). When results were shared with M&E training organizers within countries during debriefing, revisions included adding more practical suggestions and

exercises (code = 3) as well as allotting more time for some of the modules such as Data Quality and Data Analysis and Use (Code = 5) (Fig. 2).

8. Discussion

The M&E curriculum promoted building capacity through practical examples and exercises. Since the curriculum was customized to fit specific M&E needs, knowledge was translated into practice through awareness, acceptance, and adoption by implementing partners, and health facility staff in 3 PEPFAR-supported countries. There was improvement in confidence, satisfaction and knowledge gained by all participants.

It is important to note that this was the first M&E training for a majority of the participants in Cameroon, despite most of them being employed as M&E officers and data clerks in health facilities. While knowledge gained remained low in Cameroon (the average score of 58 % on the post-workshop knowledge test), one-third of the participants who responded reported using the information learned while being on the job. From the training in Cameroon, it became clear that despite some of the participants learning basic concepts of M&E for the first time, they were able to translate knowledge gained through this training into practice with the potential to improve M&E capacity at health facilities.

The empowerment of participants, with their perception of knowledge and -confidence gain as well as their reflection of where they applied knowledge into practice was a recurring theme. Usually, evaluations of M&E capacity building activities reveal recent knowledge gain at the end of trainings without assessing whether knowledge got translated into practice. This is usually seen as a gap in previously published work on M&E capacity building activities (Amde et al., 2014; Nalubega & Uwizeyimana, 2019; Zachariah et al., 2009). While the quantitative results showed improved confidence for participants who attended the M&E trainings and responded to CAS for select modules within countries, they also showed statistically significant improvement in confidence levels both within and between the three countries. Since the number of participants who responded to CAS for each of the learning objectives varied, mean differences between pre-post confidence surveys should not be over-interpreted. For example, a smaller number of participants attended and responded to fewer modules, especially for learning objectives relating to "data use for program planning and decision making" or "develop a plan for data analysis and use", that may have impacted statistical significance of the results.

Qualitative results coded into primary themes and then secondary themes based on content analysis demonstrated which components of the training may need to be revised. While feedback was predominantly positive, specific learning objectives for specific modules such as Data Quality and Program Monitoring may require revisions, including, but not limited to, more practical examples, and details on how to do run charts, or designing more interactive sessions on indicator development.

To customize the M&E training modules for country needs, many factors may have influenced assuring the level of translation and delivery of the training materials in the appropriate language. Considerations on time needed to customize, prepare, and implement

not only the training materials, but also translate all the materials including evaluation tools need to be factored in for delivery planning and resource management (Omar et al., 2009). Also, note that language translation may have impacted understanding and adoption of knowledge as well as feedback gathering through evaluation (Omar et al., 2009). Therefore, participants' satisfaction with module content, their confidence and knowledge gained, as well as their desire to apply these concepts to real-world settings varied.

To our knowledge, other M&E curriculum delivery models have not examined long-term impacts in the months and years following training implementation, – which leaves a gap in understanding if participants are using knowledge gained to benefit their practice. We attempted to address this gap by administering TKP surveys where we discovered participants were widely implementing the lessons learned from the M&E curriculum in their routine practice. While participants from the Cameroon and Ethiopia responded to share specifically how they were using the knowledge acquired during this M&E training 6–12 months later, it is clear from their descriptions of the concrete examples that many adequately understood the concepts taught in the workshop and were able to apply them to their work. By only measuring knowledge gain or satisfaction, we would have missed out on a valuable insight; scores on a test do not translate well to the ability to conduct work in the real world.

9. Limitations

We developed and implemented the curriculum customizing the materials to best fit participant needs. However, all 3 countries did not complete all of the 3 evaluation activities to analyze impact of the training i.e., CAS, PPKT, and TKP (e.g., Due to logistical issues, Guatemala could not implement PPKT or TKP). This limited the ability to assess in-depth differences in the outcomes between the 3 countries. Moreover, since the surveys assessed self-reported confidence, we cannot rule out a Hawthorn effect (when study subjects change their behavior in response to being observed). Furthermore, though modules were selected by the countries, customization for maximum benefits may have compromised comparability of data across countries for evaluation purposes. This led to fewer participants responding to evaluation of certain modules. Thus, survey responses for some learning objectives may have varied. Moreover, the customized module selection made it challenging to compare within and between survey results. TKP surveys had a low response rate and may not reflect all participants' perspectives. The TKP surveys were implemented during the first quarter of the COVID-19 pandemic, which may have reduced the response rate. In addition, while the majority of TKP survey respondents demonstrated meaningful changes to their M&E practices, this may not be generalizable to all participants as those who made changes may be more motivated to respond to a survey.

10. Conclusions and next steps

Previous reviews of M&E trainings indicate a focus on the technical and contextual aspects of M&E but very few do a thorough job of accommodating the institutional factors such as national M&E plans, policies and frameworks or stakeholders' organizational planning structures (Amde et al., 2014; Mapitsa & Khumalo, 2018). Our M&E training addresses

some of these institutional factors by incorporating a more flexible curriculum adaptable to country-specific contexts, and examples from different levels of the government such as local, regional and national level stakeholders. Even after a year, a sub-group of participants not only felt they had mastery of M&E concepts but were also able to apply knowledge into practice. Incorporating feedback from participants on additional training requests, especially for training on new indicators, and advanced data analysis and visualizations will be considered as the M&E curriculum is revised.

To align with PEPFAR's strategic priority of building capacity as the cornerstone of transitioning HIV treatment programs to country ownership sustainably, scale-up of training activities could include creating virtual capacity building activities to accommodate the rapidly changing training landscape due to COVID-19 (Chan et al., 2010; El-Sadr et al., 2012). A potential next step would be to share best practices and deliver a revised curriculum through virtual communities of practice (Struminger et al., 2017). Conducting trainings on virtual data quality assessments or data analysis, and re-formatting and recording videos of modules for wider dissemination and incorporation into an online learning platform [U.S. CDC DGHT's Monitoring and Data Analysis Branch (MEDAB)] may be explored as a natural next step (Bian et al., 2020). Continuing to conduct a post-training assessment after 6–12 months would ensure data capture and documentation on whether knowledge is getting translated into action. This will be critical to institutionalize and sustain a culture of M&E in program planning and decision making. This process may be iterative and build upon participant feedback to improve the training experience while still retaining the flexibility and adaptability of the curriculum. This will help develop local as well as global M&E capacity building environments to support achieving the UNAIDS 95–95-95 targets by 2030 (UNAIDS, 2015).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

Biographies

Anna Russell is a current medical student at the University of Rochester School of Medicine and Dentistry. She was previously an Evaluation Fellow with the Monitoring, Evaluation, and Data Analysis Branch of the Division of Global HIV and Tuberculosis at the US Centers for Disease Control and Prevention. Anna is interested in building capacity in clinical settings to both implement and monitor public health interventions.

Smita Ghosh is an epidemiologist in the Monitoring, Evaluation and Data Analysis Branch, at the Division of Global HIV and Tuberculosis, Center for Global Health, US Centers for Disease Control and Prevention. During her public health career spanning over 20 years at local, state, and federal agencies, Smita has focused on monitoring and evaluating public health programs, and assisting local partners to develop data-driven policies and best practices. Dr. Ghosh is passionate about monitoring, evaluation, public health surveillance, and epidemiology, primarily focusing on translating data into public health practice.

Niharika Tiwari is a Public Health Institute Global Health Monitoring and Evaluation Fellow working in the Monitoring, Evaluation and Data Analysis Branch, at the Division of Global HIV and Tuberculosis, Global Health Center of the US Centers for Disease Control and Prevention. Niharika is passionate about working at the intersection of infectious diseases, environmental health, capacity building, and health equity. Through her work with data analytics/visualization, epidemiology, and M&E, Niharika has provided a wide range of support to a variety of partners, sectors, and organizations in using data for strategic decision making and public health action.

Clarissa Valdez is an epidemiologist with the Monitoring, Evaluation and Data Analysis Branch of Division of Global HIV and Tuberculosis, Centers for Disease Control and Prevention. She has worked in global HIV strategic information at CDC for over 13 years and has led multiple innovative strategic information initiatives at national, provincial, and regional levels to improve HIV program data management, use of data to reach high-risk groups, inform public health policies, and strengthen local public health capacity in multiple international settings as Haiti, Dominican Republic, Caribbean, Central America, South Africa, Nigeria, Zambia, Kenya, and Botswana.

Leigh Tally serves as an Associate Director for Data with the US Centers for Disease Control and Prevention, Namibia, previously in Zambia as a Branch Chief for epidemiology and strategic information. She has been a global health professional with over a decade of domestic and international experience in program implementation, monitoring and evaluation, research, and partnership-building.

Lindsay Templin is an epidemiologist in the Mozambique Country Office under the Division of Global HIV and Tuberculosis, Global Health Center of the US Centers for Disease Control and Prevention. Lindsay began her public health career as a Peace Corps Volunteer in Vanuatu and then transitioned to working with the CDC as an ASPPH Fellow for the Monitoring, Evaluation and Data Analysis Branch. She currently serves as the Monitoring and Evaluation Team Lead in Mozambique supporting the national HIV program in using data to inform strategic planning and quality improvement.

Danielle Pappas is a health scientist for the Epidemiology Laboratory Capacity and Informatics Branch (ELCIB) in the Division for Disease Readiness and Innovation (DDRI) within the National Center for Emerging and Zoonotic Infectious Diseases (NCEZID) at the US Centers for Disease Control and Prevention. She was previously a Public Health Institute fellow for the Monitoring, Evaluation and Data Analysis Branch within the Division of Global HIV and Tuberculosis, Center for Global Health.

Samantha Gross works as an epidemiologist at the Office of the Associate Director for Science, at the Center for Global Health, Centers for Disease Control and Prevention.

Biniyam Eskinder is a public health specialist who focuses in statistical analysis and modeling in Ethiopia.

Sisay Alemayehu Abayneh is an epidemiologist who serves as a Strategic Information Liaison in the PEPFAR Program in Rwanda. Sisay has worked for over thirteen years in the PEPFAR program with the US CDC in Ethiopia in various roles, including as associate director for Monitoring, Evaluation, and Data Integration.

Elizabeth Kamga is a monitoring, reporting and evaluation coordinator with the Peace Corps Cameroon.

Leonard Colince Keleko is epidemiologist with the Cameroon Centers for Disease Control Prevention.

Spencer Lloyd is a Medical Officer at the Centers for Disease Control and Prevention (CDC). He completed an Epidemic Intelligence Service fellowship at the CDC from 2012–2014 and then joined the HIV Care and Treatment Branch where he currently specializes in HIV viral load, HIV drug resistance, and ART optimization. He also currently serves as the point of contact and a subject matter expert for all HIV care and treatment related activities in Cameroon, Jamaica, and Trinidad and Tobago.

Nasim Farach is a Public Health Specialist at the Centers for Disease Control and Prevention (CDC) office for Central America, where he serves as Regional HIV Prevention and Testing Advisor and Honduras Country Lead under the President's Emergency Plan for AIDS Relief (PEPFAR) program. A Fulbright alumnus with a penchant for interdisciplinary approaches, Mr. Farach has trained in social marketing, public health, epidemiology, and international studies at the Central American Technological University (Honduras), University of Essex (England), University of Michigan, and Ohio University.

Sherri Pals is a statistician with the Statistics, Estimation and Modeling (SEM) Team Health Informatics, Data Management and Statistics Branch, Division of Global HIV & Tuberculosis, Center for Global Health, Centers for Disease Control and Prevention.

Eboni Galloway is an Epidemiologist and Chief of the Behavioral Science and Epidemiology Branch in the Division of STD Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention within the US Centers for Disease Control and Prevention. Since joining CDC in 2010, Dr. Galloway has served in various global and domestic leadership roles within the agency including six years leading initiatives to improve the use of evaluation to inform global HIV programs.

Sadhna Patel is the current Branch Chief of the Monitoring, Evaluation and Data Analysis Branch, at the Division of Global HIV and Tuberculosis, Global Health Center of the US Centers for Disease Control and Prevention. Sadhna Patel has worked as an epidemiologist

in global HIV strategic information at CDC for over 20 years, first housed within the domestic HIV/AIDS program in CDC-Atlanta and then joining the inaugural CDC Global AIDS Program (GAP) surveillance team when it was formed in 2002. During her career, she has provided technical assistance to over 25 countries, and worked in Namibia for 5 years where she was the CDC strategic information lead.

John Aberle-Grasse is an epidemiologist, most recently Branch Chief for the Monitoring, Evaluation and Data Analysis Branch, at the Division of Global HIV and Tuberculosis, Global Health Center of the US Centers for Disease Control and Prevention. During his public health career spanning over 30 years at federal agencies as well as national organizations, John has focused on HIV epidemiology, monitoring and evaluating public health programs, public health surveillance, to support international as well as host country partners in developing evidence based data-driven policies, plans and practices. Mr. Aberle-Grasse is passionate about the international HIV response, epidemiology, monitoring and evaluation, and public health surveillance focused on translating data into public health action.
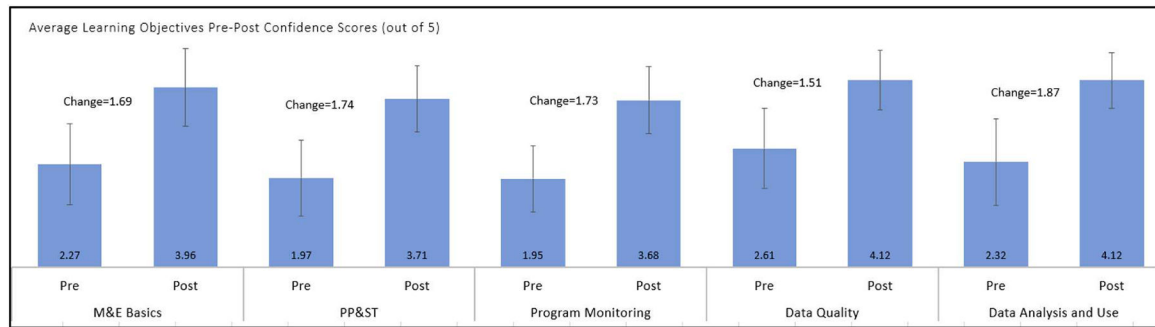
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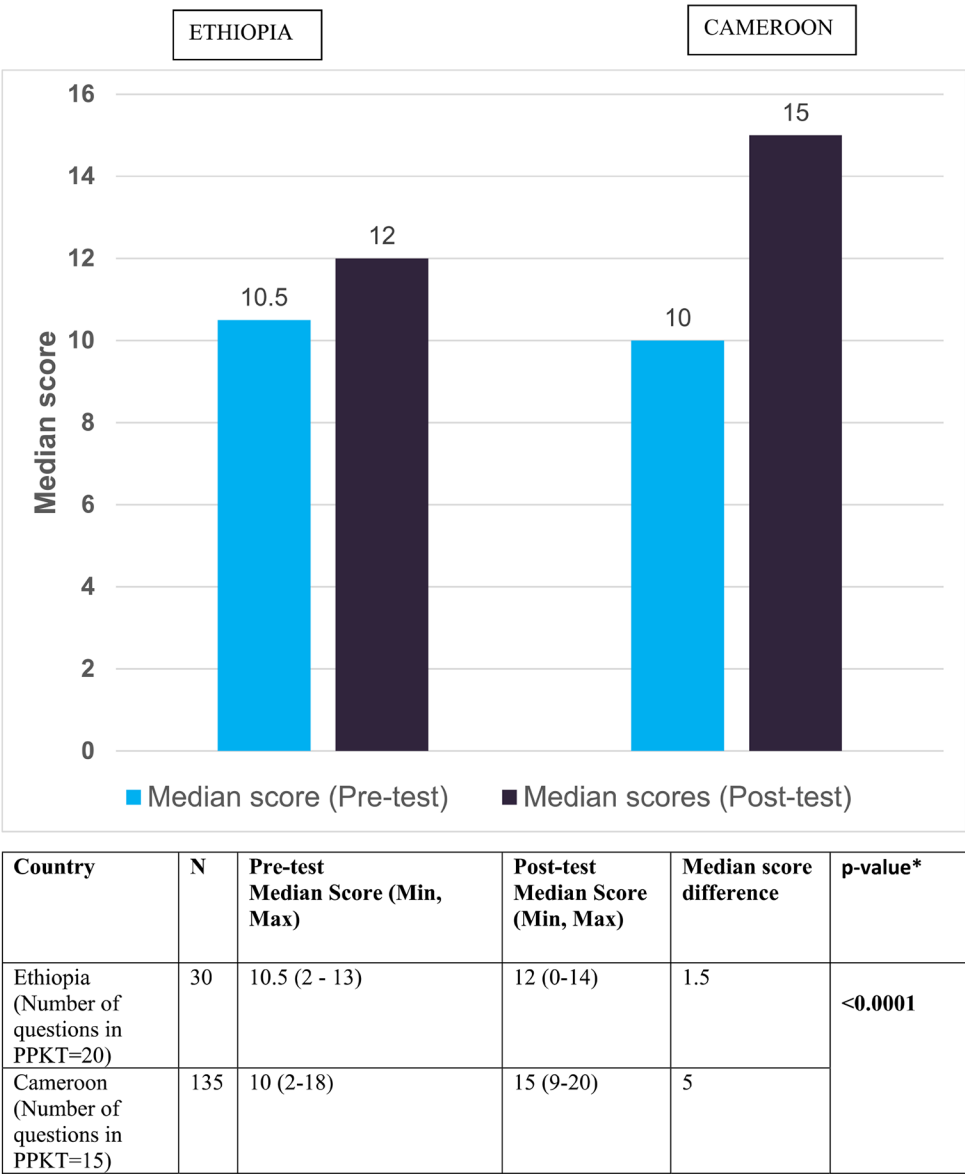
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Fig. 1.
Average pre-post Confidence Assessment scores for five modules of the M&E training.
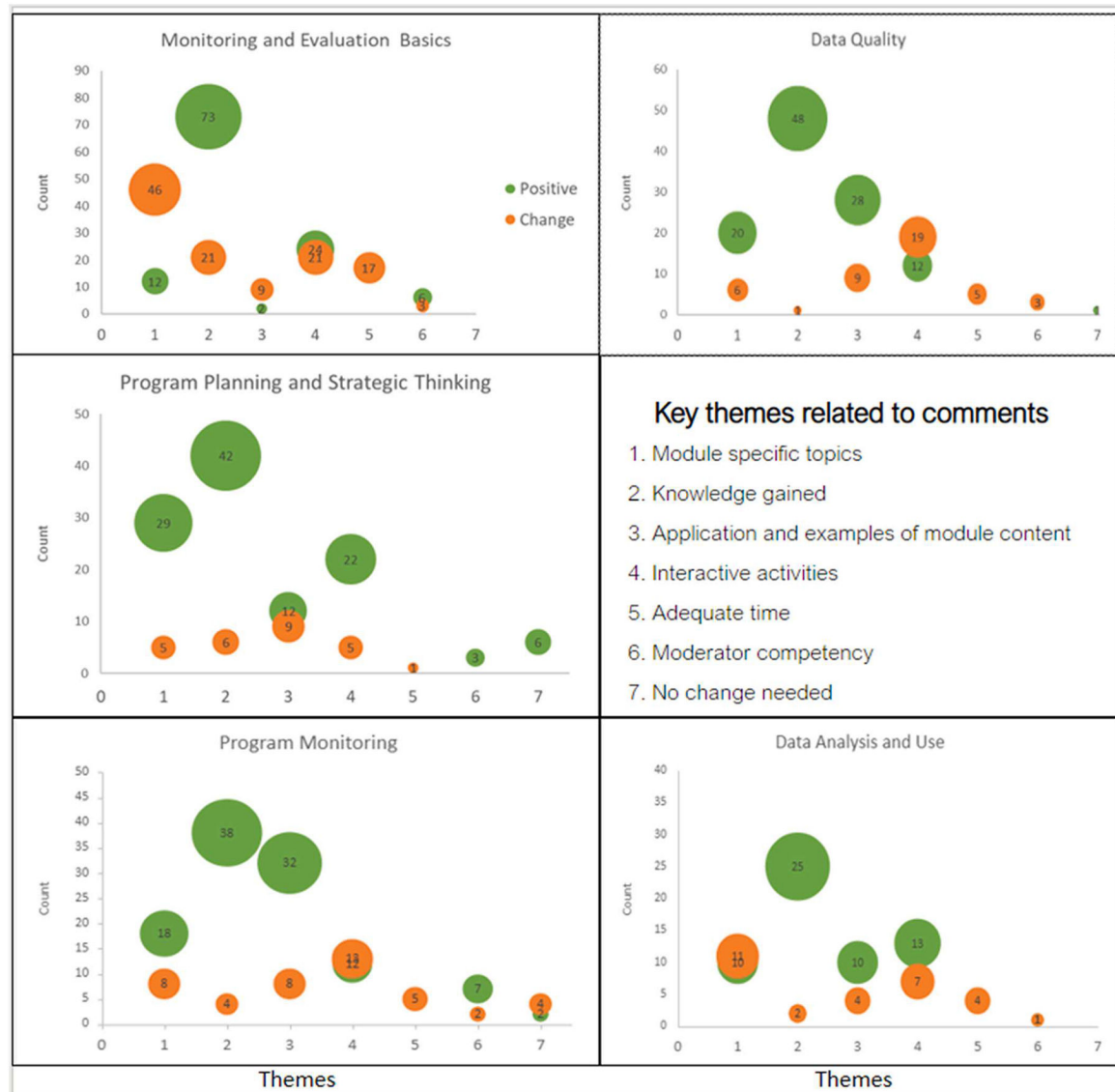
Fig. 2.
Bubble graph with 7 key themes related to comments from Confidence Assessment Surveys.

Country	N	Pre-test Median Score (Min, Max)	Post-test Median Score (Min, Max)	Median score difference	p-value*
Ethiopia (Number of questions in PPKT=20)	30	10.5 (2 - 13)	12 (0-14)	1.5	**<0.0001**
Cameroon (Number of questions in PPKT=15)	135	10 (2-18)	15 (9-20)	5	

*Kruskal-Wallis Test used on pre-post difference scores to test for a difference between countries.

Fig. 3.

Median pre-post knowledge test score differences indicating knowledge gained was statistically significant, (n = 165).
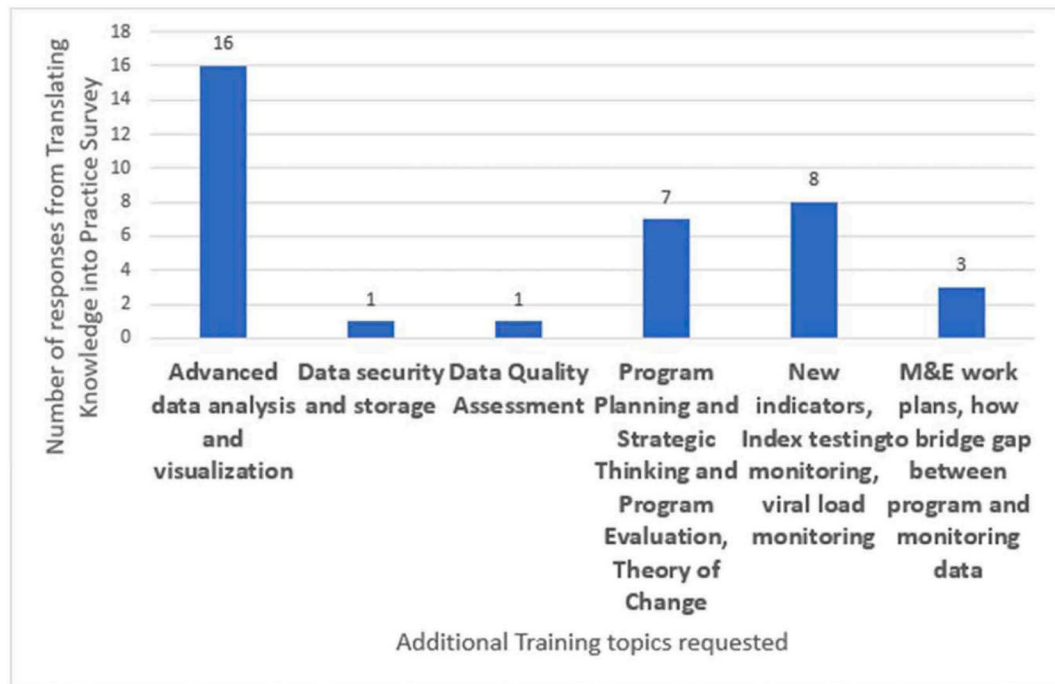
Fig. 4.
Requests for additional M&E training topics.

Table 1

Participation in the M&E training and response rates.

	Number (%) of participants who attended M&E training[a]	Number (%) of participants who responded to confidence assessment (CAS)[b]	Number (%) who responded to pre-post test (PPKT)	Number (%) who responded to Translating Knowledge into Practice Survey (TKP)[d]
Cameroon	135 (72 %)	113 (84 %)	135 (100 %)[b]	21 (16 %)
Ethiopia	30 (16 %)	18 (60 %)	30 (100 %)[b]	15 (50 %)
Guatemala	23 (12 %)	23 (100 %)	—	—
Total Number of participants	188 (100 %)	154 (82 %)	165 (88 %)[c]	36 (22 %)

[a] Denominator is a column percent of the total number of participants who attended the M&E training workshops (n = 188).

[b] Denominator is a row percent for the number of participants who attended the M&E training workshops in each country (i.e., Cameroon = 135, Ethiopia = 30, Guatemala = 23).

[c] Denominator is a row percent for the number of participants who attended the M&E curriculum workshops in countries where pre-post tests were conducted (165 out of 188).

[d] Denominator is a row percent number for participants who responded to the PPKT, where these online surveys were sent (total = 165).

Table 2

Within and between country comparisons in pre-post Confidence Assessment Survey Scores.

Modules	Learning objective for sessions	Number of responses	Mean difference score (post-pre)	p-value[a]	Test for differences between countries[b]
1.) Monitoring and Evaluation Basics	**Differentiate between monitoring and evaluation**				
	Overall	**145**	**1.8**	**< 0.0001**	
	Ethiopia	18	0.9	0.0005	0.0007 *
	Guatemala	14	1.4	0.0002	
	Cameroon	113	1.9	< 0.0001	
	Summarize the importance of monitoring and evaluation				
	Overall	**144**	**1.5**	**< .0001**	
	Ethiopia	18	0.8	0.0001	0.0022 *
	Guatemala	14	1.4	0.0002	
	Cameroon	112	1.7	< 0.0001	
	Define monitoring				
	Overall	**145**	**1.6**	**< 0.0001**	
	Ethiopia	18	0.4	0.0469	< 0.0001 *
	Guatemala	14	1.3	0.0005	
	Cameroon	113	1.8	< 0.0001	
	Define evaluation				
	Overall	**145**	**1.6**	**< 0.0001**	
	Ethiopia	18	0.7	0.0005	< 0.0001 *
	Guatemala	14	1.4	0.0005	
	Cameroon	113	1.7	< 0.0001	
2.) Program Planning and Strategic Thinking	**Describe phases of Program Planning and Strategic Thinking**				
	Overall	**139**	**1.7**	**< 0.0001**	
	Guatemala	18	0.9	0.002	0.0007 *
	Cameroon	121	1.8	< 0.0001	
	Develop SMART Objectives				
	Overall	**142**	**1.8**	**< 0.0001**	
	Guatemala	18	1.7	0.0001	0.5336

Modules	Learning objective for sessions	Number of responses	Mean difference score (post-pre)	p-value[a]	Test for differences between countries[b]
	Cameroon	121	1.9	<0.0001	
3.) Program Monitoring	**Develop and select appropriate monitoring questions, indicators, and data sources for effective program monitoring**				
	Overall	**143**	**1.5**	**<0.0001**	
	Ethiopia	13	1	0.0039	
	Guatemala	14	1.3	0.0002	0.0228*
	Cameroon	116	1.6	<0.0001	
4.) Data Quality	**Identify core contributors to data quality**				
	Overall	**143**	**1.5**	**<0.0001**	
	Ethiopia	10	1.2	0.0156	
	Guatemala	19	1.6	<0.0001	0.1332
	Cameroon	114	1.5	<0.0001	
	Develop data quality improvement strategies				
	Overall	**143**	**1.6**	**<0.0001**	
	Ethiopia	10	0.9	0.0156	
	Guatemala	19	1.6	<0.0001	0.0251*
	Cameroon	114	1.6	<0.0001	
	Define data quality				
	Overall	**126**	**1.4**	**<0.0001**	
	Ethiopia	10	0.9	0.0156	0.0293*
	Cameroon	116	1.5	<0.0001	
5.) Data Analysis and Use	**Use data for program planning and decision making**				
	Overall	**109**	**1.7**	**<0.0001**	
	Ethiopia	7	1.1	0.0625	0.1443
	Cameroon	102	1.7	<0.0001	
	Develop a plan for data analysis and use				
	Overall	**109**	**1.9**	**<0.0001**	
	Ethiopia	7	1.6	0.0313	0.4056
	Cameroon	102	1.9	<0.0001	

[a] Wilcoxon signed rank test.

[b]Kruskal-Wallis Test with country as classification variable.

[*] p < 0.05.

Table 3

Paraphrased qualitative responses from participants who responded to translating knowledge of M&E training into practice survey.

Module	Examples from participants (*an asterisk indicates that multiple participants provided the similar examples*)	Number of responses n = 36, (%)
M&E Basics	• Provided M&E trainings or mentorship for other staff members, including on how to complete data collection tools [*] • Ensured standardized tools and operating procedures were available at all locations [*] • Created reference guide on workflow to ensure high data quality, analysis, and use	24 (67 %)
Program Planning and Strategic Thinking	• Conducted patient and data flow mapping exercises [*] • Created logic model for site performance	5 (14 %)
Program Monitoring	• Improved site's performance monitoring [*] – *Specific examples including improving data collection at Antenatal care clinics, pharmacy, and Unit for Prevention and Education for Community Health (UPEC)*	6 (17 %)
Data Quality	• Conducted monthly data review and validation meetings [*] – *In one case, leading to a quality improvement project on retention* • Conducted monthly data quality assessment • Created monthly validation checks on key data sources [*] • Improved data reporting timelines	6 (17 %)
Data Analysis and Use	• Created visualizations with key indicators [*] • Communicated results in simple and effective terms [*] • Analyzed data by age groups	11 (31 %)

[*] Multiple participants provided similar examples.