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Determinants of Program Sustainability and Application
to the Liberia Field Epidemiology and Training Program

By

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Master of Public Health

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By

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Bachelor of Arts
The Ohio State University
2015

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An abstract of
A thesis submitted to the Faculty of the Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of Master of Public Health in the Hubert
Department of Global Health

Abstract

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to the Liberia Field Epidemiology and Training Program

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Background

The past decades have seen increased attempts to implement public health programs in underserved, underdeveloped countries by funding agencies. Many fizzle out after spending their initial funds. The term “sustainability” can refer to the concept of maintaining the environment, continuation of a program, or economic viability of an income-generating program in a developing country. With so many resources targeted to health-related interventions, stakeholders are increasingly focused on longevity, sustainability, and local ownership. Health systems throughout the underserved world suffer from insufficient financial and human resources, limited institutional capacity, weak health information systems, and a need for management capacity building. Using various frameworks, we assessed factors that influence sustainability and applied them to the newly organized Liberia’s Field Epidemiology Training Program.

Methods

A literature review was performed using a broad approach to explore program sustainability. Eight in-depth interviews and one focus group were conducted with key figures in the Liberia FETP. Interview participants represented host organization, the implementing partner, the funding agency and Liberia FETP participants. Interviews were transcribed and deductive codes compiled into a codebook. Coding of the transcripts were done in three stages. Initial reviews of each transcript led to additional codes. Subsequent reviews of the transcripts were performed to assign codes. The lexical search feature of MAXQDA was utilized to automatically search the documents and assign to codes. The resulting codes were organized and grouped by similarity.

Results

Three main areas were found to influence sustainability: the financial environment; the characteristic of the program; and the political environment.

Discussion

The Liberia FETP is strong in many aspects of internal program capacity. All interviewed and focus group participants highlighted the program’s strength being in its leadership and management. The quality of the program with respect to producing skilled graduates is also very high. The program does faces funding insecurity.

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I. Introduction

The past decades have seen increased attempts to implement public health programs in underserved, underdeveloped countries by funding agencies. Many fizzle out after spending the initial funding. With so many resources targeted to health-related interventions, stakeholders are increasingly focused on longevity, sustainability, and local ownership. Funding agencies now require grantees to include a sustainability plan in the grant application. “Despite long-term interest in issues of program sustainability, sustainability research has not coalesced into widely used set of research questions, operational definitions and procedures or a research paradigm.”²¹

There are variations of program sustainability. A review of empirical studies of program sustainability identified five debated questions: “What is sustainability? Why does it occur? How does one measure it? When does it start? Where are programs sustained?”²¹ These serve as a foundation for a comprehensive sustainability model.

The term “sustainability” can refer to the concept of maintaining the environment, continuation of a program, or economic viability of an income-generating program in a developing country.²⁸ We examined various notions of sustainability and strategies. “Sustainability could mean continuation of the project, sustaining the outputs, or maintaining the desired outcomes.”²¹ There is not a model that provides a roadmap for program sustainability and evaluating it. Empirical data that influence sustainability are still in an early stage.

Health systems throughout the underserved world suffer from insufficient financial and human resources, limited institutional capacity, weak health information systems, and the need for management capacity building.⁴ The U.S. Center for Disease Control and Prevention (CDC) has been supporting field epidemiology capacity through the development of Field Epidemiology

Training Programs (FETP). “From its inception, the goal of the FETP funding was to help partner countries create strong, self-sustaining training programs.”²⁰

Using various frameworks, this study seeks to assess factors that influence sustainability and use Liberia’s FETP as a case study. An already-weakened Liberia health system was stretched to its limit by the 2014 Ebola virus disease (EVD) epidemic in West Africa. Liberia – one of the countries affected by EVD – had insufficient qualified health workers, limited infrastructure, and poor public health surveillance (PHS). The rapid spread of EVD highlighted the need for better PHS, preparedness, and management of health systems in Liberia.¹⁶ Liberia’s recent 14-year civil war left the health system and infrastructure shattered.¹⁰ Rebuilding requires collaboration, external resources, and a sustainable framework. “The existing evidence underscores the importance of country ownership of management capacity building efforts, which often challenge the *status quo* and thus need country leadership to sustain despite inevitable friction”.⁴⁰

Liberia’s Ministry of Health (MOH) has begun investing to build a sustainable health system. The EVD epidemic led the MOH to develop an investment plan for building a resilient health system by 2021. “The investment plan seeks to strengthen epidemic preparedness, surveillance and response”.⁴¹ The MOH partnered with Emory University, the Africa Field Epidemiology Training Network (AFENET), and the U.S. Centers of Disease Control and Prevention (CDC) to develop a Frontline-FETP. The Frontline-FETP focused on improving PHS and preparedness capacity of public health workers at district, county, and national levels. It has proven to be a great step in improving PHS and public health response efforts.⁴¹ However, the initial 5-year funding agreement with the U.S. CDC ends soon; it is important to review factors that influence sustainability of the Liberia FETP.

Problem Statement

In light of increased interest in sustainability research, it is important to understand factors associated with it to develop a comprehensive model. “Existing frameworks for the assessment of public health evidence do not deliver key pieces of information to inform best practices for community and large-scale, global health programs, with the lack of information about implementation and sustainability being an important identified gap.”³³ Progress on sustainability research has been made; several frameworks examine different factors. However, little is known about their strengths. Furthermore, many program implementers focus only on finances. So, it is important to develop a comprehensive model that includes determinants of sustainability, while categorizing their level of impact.

Objective

We reviewed determinants of sustainability and applied them to the newly formed Liberia Frontline-FETP.

Aims

- Conduct literature review to identify and assess determinants contributing to sustainability of a training program
- Evaluate the Liberia FETP by assessing strengths, weaknesses, opportunities, threats, and determinants of sustainability
- Review sustainability goals and indicators to assess the Liberia FETP

Statement of Significance

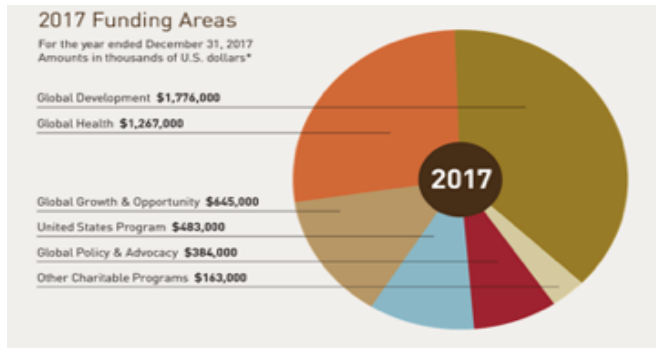
A clear, measurable, proactive plan for sustainability will serve planning and implementation, save resources, and improve outputs and outcomes. Findings from this work will help funders and implementers understand the determinants that affect program sustainability and provide a method and tool for evaluation. Shared with international partners (e.g., stakeholders in the Liberia FETP), this work will conceive and develop a tool to assess program sustainability.

Key Terms

Sustainability, Empowerment, Capacity Building, Sustainable Development, Institutionalization

II. Literature Review

Many developing countries receive millions (sometimes billions) of dollars annually from foreign aid. However, basic services and poverty continue below global expectations. In 2017, USAID budgeted USD \$50 billion across wide-ranging programs in 209 countries.¹ “The FY 2019 President’s Budget for the State Department and USAID is USD \$39.3 billion, including \$16.8 billion partially managed through the Economic Support and Development Fund, global health programs, transition initiatives, international disaster assistance, and USAID operational accounts”.¹ In addition to U.S. government aid, many other governments including China, the United Kingdom, and non-profit organizations such as the Bill and Melinda Gates Foundation spend billions on foreign aid.



Gates Foundation 2017 funding area

There have been reports of the factors that contribute to the ineffectiveness of foreign aid.¹² Moosa Elyah discussed two contradictory views: the public interest perspective (PIP) and the public choice perspective (PCP).¹² Based on his research, the PIP makes the assumption that “it is legitimate to grant foreign aid, as most poor, developing countries lack local financial resources to fund beneficial investment opportunities or lack access to international capital markets.”¹ According to Sach, the key to put an end to extreme poverty is to enable the needy to determine and achieve their development by themselves.¹² This is parallel to the concept of capacity building as a component of sustainability. Sach argues that if foreign aid is big enough to last for an appropriate time, public capital will rise in a way that guarantees the transition of poor families into a stage above self-sufficiency.¹²

On the other hand, PCP argues that “aid flows have contributed greatly to the failure of the development efforts employed in developing countries. The direct reason for such a failure of the expansion of governmental bureaucracies that may lead to the propagation of personal benefits out of aid programs, corruption and the enrichment of the elite in poor countries.”²⁸ This perspective makes the point that there is an indirect correlation between the amount of money spent on foreign aid and the growth of the recipient countries. “Researchers in this field have discovered that in most cases foreign solutions provided by foreign aid led to the undermining of the ability of the

recipient countries.”² Several factors undermining ineffectiveness of foreign aid, including: corruption, weak policies, fragile institutions, goals of the donors, and lack of domestic knowledge by foreign subject matter experts.¹² With so many resources going to global development, it is critical more than ever to improve sustainability.

Definition

“Sustainability is the continued use of a program components and activities for the continued achievement of desirable program and population outcomes.”²³ Terminology such as institutionalization, continuation, and durable are used to describe sustainability. “sustainability is a broad term that incorporates essential notions in continuation without limiting its manifestations to any particular forms. In contrast with institutionalization, incorporation, routinization, sustainability does not limit the survival within an organization structure or imply a static program”³³ The strength of a program can be influenced by its ability to evolve and incorporate new findings. Moore and colleagues constructed a comprehensive definition of sustainability through syntheses of 209 original articles. The revised definition is comprised of five constructs: (1) after a defined period of time; (2) a program, clinical intervention and/or implementation strategies continue to be delivered; (3) individual behavior change is maintained; (4) the program and individual behavior change may evolve or adapt; and (5) continuing to produce benefits for individuals/systems.¹⁴ These definitions were categorized into three different perspectives:

- Maintain health benefits achieved through the initial program
- Continue program activities within an organization structure
- Build capacity of the recipient community

Sustainability research has an ethical component. “Is it ethical for researchers to build up an intervention and then abandon it abruptly when the research funding ends.”²⁸ Alternatively, is it ethical to proceed only with the implication of continuing an effective program? Failure to sustain a program can negatively affect the target population. For example, if a program supporting individuals with tuberculosis (TB) abruptly ends due to funding, people who were dependent on the program could develop multidrug-resistant TB or further spread the disease leading to negative consequences.

However, it is important to take note that not all programs are meant to sustain. Program implementers and funders should continuously monitor and evaluate their programs, assessing their effectiveness in the target population. As Scheirer stated, sustainability research is not intended to promote sustained interventions that are not effective in producing beneficial outcomes for consumers. Glaser pointed out that, when a validated, more efficacious, more suitable, or cost-effective means of meeting the given problem, the former program should be updated to reflect the current change in status or supplanted to give way for other innovations.

The intended purpose is to sustain a program or activities with proven beneficial outcome for the target population. “the likelihood of sustainability is heightened when there is an alignment, capability or convergence of problem recognition in the external organizational environment or community, the program in question and internal organizational objectives and capacities.”²⁸

These multiple layers outline the complexities of sustainability research. Each component should be included to sustain an intervention. Some sustainability researchers viewed programmatic outcome as either sustained or not sustained. This dichotomous evaluation can be short sighted because of the multi-layer system of health programs. To combat this deficit in the understanding of sustainability, Scheier put together six types of potential dependent variables. These dependent

variables enable stakeholders to observe the change in specific outcome that contribute to the sustainability of the program.

(1) Whether benefits or outcome for consumers are continued, when the intervention provides services to individuals

(2) Continuing the program activities or components of the original intervention

(3) Maintaining community-level partnership or coalitions developed during the funded program

(4) Maintaining new organizational practices, procedures and policies that were started during program implementation

(5) Sustained attention is paid to the issue or problem

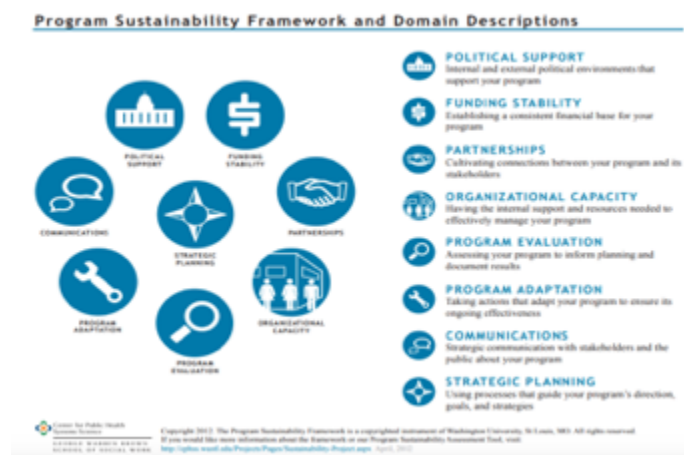
(6) Program diffusion and replication in other sites

Contrary to the belief that finances are the main determinant of sustainability, “Researchers have found that although funding sources may be necessary for sustainability, funding is not the only factor contributing to continuation of an intervention.”²⁸ Sustainability researchers have identified two main funding streams: (1) Institutionalization and continued external funding including grants and volunteers.²³ Institutionalization refers to the integration of the program within the organization. This perspective of sustainability can be both beneficial and limiting. For example, institutionalizing the Liberia FETP ensures the commitment to the program and promote the continuation of the program after the initial funding. However, this may limit the reach of the program and restrict its continuation to one institution.

Determinants of Sustainability

Over the past few years, much attention has been given to the topic of sustainability. This has resulted in many frameworks and constructs. For example, Schell *et al.* developed a new framework through comprehensive review of empirical studies and concept mapping. The framework encompasses nine domains: political support, funding stability, partnership, organization capacity, program evaluation, program adaptation, communication, public health impact, and strategic planning.

Although there are many different frameworks available; common themes include social, political, and financial.



Center for Public Health Science, George Warren Brown School of Social Work

Capacity Building

Israel and colleagues described community capacity building as activities to improve the ability and infrastructure of an organization or community to provide services and programs.⁴¹ Second to financial resources, many countries lack qualified human resources. Community building is an important part of sustainability because it can both a determinant and an outcome. Increasing the capacity of target populations ensures that the program will run without foreign employees.

Building both skills and infrastructure will empower individuals to continue the program. “community capacity is based on the development of sustainable skills, resources, and structures.”⁴¹

On the other hand, long-term program can build the skills of people in the community thus becoming an outcome of sustainability.

Routinization

Yin defines routinization as organization activities for which sustainable resources are mobilized. Routinization falls under three categories: production, including routine objectives in organization plan; maintenance, stability of employees and management; stability of financing and material items.²² “(1) the financing of routinized activities is an integral part of an organization’s regular budget; (2) the personnel in charge of routines hold permanent positions; and (3) materials required for completing routines appear on an organization’s inventory.”²² Embedding the financial components of an intervention into the organization regular budget is an essential step to ensure routinization. According to Pluye and other existing literature, routines includes four main characteristics: memory; adaptation; values; and rules (ref).

Funding Stability

Financing an intervention is an important factor influencing sustainability. Without adequate funding, other factors of sustainability will be difficult to develop. Many stakeholders consider sustainability only in terms of the availability of financial resources. “Funding stability is defined as establishing a consistent financial base for a particular program”.³² Research identified two main funding streams: “institutionalization of the intervention, which involves the incorporation of new activities into the agency’s ongoing budget and operation procedures; and (2) continued external

financial support via grants, volunteer services or donor support.”²⁸ Institutionalization is usually a desirable element to ensure continuation of a program. However, it can sometimes limit the movement of an intervention. Some researchers have proposed the fee-for-service model as a method of sustaining intervention. A critical component of this model involves “institution of another level of fiscal management, especially for program with public funding.”⁴³ A variety of funding sources makes programs more resilient and adaptable to different factors. “Funding high and lows put stress on programs and make it difficult to provide consistent quality services. Programs that rely on a single funding source, rather than multiple sources are more vulnerable when funding cuts occur.”³² Thus, when planning for sustainability, it is imperative to assess the risk of various funding sources and develop a contingency plan in case the funding is disrupted.

Partnerships

Developing relationships between your program and stakeholders is key to garnering support and buy-in. According to the program sustainability assessment tool, partners can play a role in connecting programs to greater resources or expertise, providing a range of services. “Building awareness and capacity for sustainability requires a strategic approach and partnerships across sectors.”³⁶ Partnerships can be an important asset for maximizing resources and providing quality service to target populations. For example, forming partnerships with other organization doing similar work can be beneficial to sharing resources and prevent wasting resources on an activity that have been found to be ineffective in target areas. Partnerships with the target population is critical in sustaining any intervention.

Political Support

Irrespective of the level of a program, the financial standing or potential benefits, political climate can sometimes be a deciding factor in success. Prior to initiating any program or intervention, assessing the political climate and establishing relationship with policymakers is a key determinant of program sustainability. With strong political support, programs can garner government funding and increase chances of institutionalization. Poor political support results in many obstacles from funding to implementation to community buy-in.

Organizational Capacity

Organizational capacity is the internal characteristics of an organization and encompasses many factors. The internal structure of an organization including staff and leadership. “Cultivating and strengthening a program’s internal support can also increase the likelihood of long-term success.”³² “Strong leadership sets the tone of an organization and influences other staff to perform at optimum capacity. “Bossert’s study identified the strength of an organization that is implementing the program as a variable positively related to program sustainability; institutional strength referred institutions which were well integrated, had goal structures that were consistent with the project goals, and had strong leadership and relatively high skills levels.”²⁸ Other studies also found that more stable and mature organizations tend to better promote program institutionalization by providing a strong organization base for the new organization.

Program Adaptation

A key component of any program success is its ability to evolve. Times are constantly changing, and new research is constantly being done. To ensure continuation of a program, adaptability to the environment is important. Shediac-Rizkallah stated that adjustment of formal program rules to

local conditions contributes to continuity as the program and the environment adapt to each other. “Flexible institutional arrangements and management strategies that promote continual adaptability and learning are identified as traits with the greatest potential to guide systems.”²⁸ Scheier argues the adaptations of the customizable components may contribute to the host organization’s or community’s identification with the program.²⁸

Communication

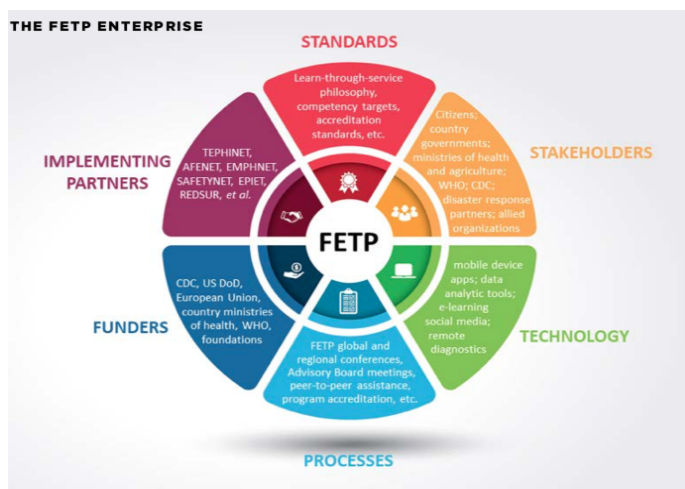
Communication (both internally and externally) impacts the success of any program. “Communicating externally about your program’s effectiveness helps the program gain greater visibility and builds support from stakeholders.”³² Many sustainability models do not include communication. However, it is important to openly communicate with beneficiaries about a program. This establish trust and can improve participation. “Communication with stakeholders can prove and invaluable source of information and ideas for improving and rethinking aims and projects.”¹⁷ Disseminating information about the intervention and also openly receiving information will help improve the program and promote long-term continuation.

Field Epidemiology Training Program

The Field Epidemiology Training Program (FETP), developed in 1980 by the U.S. Centers for Disease Control and Prevention (CDC) builds global capacity in applied epidemiology.²⁰ To date, the CDC supports FETP globally, as funders. FETPs are implemented based on the approach of learning by doing. The program is composed of both didactic and practical components. The combination of theoretical and field experience improves the public health workforce.

Over the years, sustainability has become a priority for partners of the FETP. “To craft a guiding long-term vision of the FETP, the Task Force for Global Health convened a meeting with leaders and partners to develop and effective global field epidemiology capacity.”²⁰

The FETP enterprise was developed by the Task Force of Global Health to frame the global partnership.



The FETP Enterprise developed by leaders and Partners of Task Force for Global Health global field epidemiology meeting.

Institutionalization is defined as the key pathway for sustainability of FETPs. The global field epidemiology roadmap report discussed dimensions of institutionalization identified by CDC:

- Organizational integration in a ministry of health of national public health body
- Program oversight
- Existence of a functional strategic plan
- National technical support and staffing
- National management/administration support
- National financial support

III. Methods

Literature Review

The initial review of the literature was carried out using a broad approach to explore the concept of program sustainability. We examined articles that discussed sustainability of health programs, sustainability frameworks, and definitions and measures of sustainability. The literature review was composed of peer-reviewed and grey literature. The databases used in this search were:

- Emory University dissertation repository
- Pubmed
- Web of Science
- Google Scholar
- EBSCO
- Science Direct
- Elsevier

The initial search terms included phrases such as ‘sustainability framework’, ‘sustainability definition’, ‘sustainability factors’. Searches were expanded base on result from initial search. Other literatures were found through references from relevant literature. Authors from these manuscripts were searched using Pubmed; relevant articles were identified. Factors influencing sustainability cited in relevant articles were also use as search term into Pubmed to identify other literature. The list of initial search terms and expansion captured the right content (Table 1).

Table 1. Program Sustainability Literature Review Search Terms, 2019

Primary Search Terms	Expansion Search Terms
Sustainability in Public Health	Foreign Aid and Sustainability
Sustainability of Public Health Programs	Assessment and Sustainability
Sustainability Definition	Institutionalization and Sustainability
Sustainability Framework	Factors Affecting Sustainability
	Determinants of Sustainability
	Capacity Building and Sustainability
	Adaptability and Sustainability
	Outcome vs Process Sustainability

Data Collection

In this study, the Liberia Field Epidemiology Training Program (FETP) was used as a case study to validate factors attributed to sustainability. From June to September, eight in-depth interviews and one focus group were conducted with key figures in the FETP. Interview participants represented host organizations, implementing partner organizations, the funding agency, and FETP participants (i.e., the Liberia National Public Health Institute [NPHIL], African Field Epidemiology Network, and the U.S. Centers of Disease Control and Prevention). Six of the in-

depth interviews and the focus group were conducted in person at the Liberia NPHI. Two non in-person interviews were conducted; one phone and one video conference. These interviews gathered data that assessed the strengths, weakness, opportunity, threats, and factors influencing sustainability of the Liberia FETP. Interviews were facilitated in English using a structured interview guide with open-ended questions. Interviews were recorded and transcribed. The interview guide was approved by Emory and the Liberia's FETP resident advisor.

Data Analyses

Interviews were transcribed verbatim using a voice transcribing tool and Maxqda. The recording time ranged from 12 minutes to 25 minutes. The transcripts were deidentified, removing reference to specific individuals. The host organization, implementing partner, and funding agency references were not removed. Based on the interview guide and literature review, deductive codes were compiled to create a codebook. Coding of the transcript was done in three stages. The initial review of each transcript led to development of additional codes. Subsequent reviews of the transcript were performed to assign codes. *In vivo* codes were assigned throughout the process. Lexical search features of Maxqda were utilized to automatically search the documents and assign codes. Resulting codes were organized and grouped by similarity. An overview of the codes used are found in Table 2.

The MAXMaps tool of Maxqda was used to visualize the data, form categories, and connect codes. Using the organized codes an, in-depth description of the term sustainability was developed. The description explored the term and how it is interlinked to other codes in the data. Further analyses of the data led to the development of a flowchart, depicting the factors influencing the sustainability of the Liberia FETP. Exploration of the data and code informed analysis assessing the strengths, weaknesses, opportunities, and threats of the program.

Table 2. Description of Codes Used in Data Analyses, Liberia FETP, 2019

Code	Type	Description	Example from Data
Definition of Sustainability	deductive	participants definition of sustainability; apply to common terms and phrases use to describe sustainability (e.g., continue, duration over period time)	Sustainability is the capacity to continue a project or to ensure longevity.
Purpose	deductive	phrases or sentences describing the purpose of FETP	The main purpose of FETP is to address the human resource gap as stated in the national strategic plan. The strategic area number three speaks to strengthen surveillance. So, FETP is embedded in strengthen the human resource capacity.
Goals	deductive	use for discussion on both short- and long-term goals	short term, training of surveillance officers, from national to counties, districts and health facility surveillance focal persons. Long-term ability to measure the impact to see how surveillance has changed and see how outbreaks were being investigated on time and reports were being analyzed, reports are being giving on time
Quality of FETP	deductive	use for description of the programs; categorical ratings of the program	Quality wise, it's a little different. I think they are among the best in Africa.

Improvement	deductive	discussion on how the program can improve, what needs to improve	Improvement, what I will say is that ensuring that the tools we use to train them are kind of merge with what their work will require of them when they finish. We have face instances where we train them to use certain tool for their weekly surveillance reporting, data analysis and so on. But they have gone back, they have been ask to use another reporting tool. So they kinda put away what we have thought to use.
Capacity building	deductive	any related discussion on building capacity, increasing knowledge and skills	NPHIL is working with the FETP program to be able to train its staff within the counties to be able to combat any outbreak within Liberia
Adaptability	deductive	discussion on the program ability to change. include anything mention of flexible, addition	The program is an evolving program that caters to the need of the country
Mentorship	inductive	any mention or discussion pertaining to mentoring	I would not hesitate to say that the field mentorship. Because after the classroom sessions, we spend time with the trainees to ensure that they have embarked on what we have thought and practicalize it in delivering outputs that they use what we have taught them to use.
Fieldwork	inductive	discussion on fieldwork, any mention of practical activity	I would say, FETP is a hands-on program, a competency-based program, not only theory. But you actually go in the field and practicalize what you have been taught in the classroom.
transition	inductive	any mention of transition the program	

curriculum	inductive	any mention of curriculum	So at the intermediate level, there may be few changes done as we go along with the curriculum.
local ownership	inductive	discussion on local ownership	To be sure that this program is totally transition to local institution and NPHIL and provide direct support to these institution.
improvement	inductive	any mention of improvement, discussion on areas that needs improvement, ways to improve	local content
challenges	inductive	use for discussion on challenges	We still have the low level of computer education. Because Liberia have been faced with war, the education has been truncated over those years so, for the training, so those that are being train you still have to add some form of basic education along with the computer education.
leadership	inductive	use for any mention of leadership	And if the program lacks the national leadership, it also affects sustainability
Funding	deductive	use for any mention on funding, financial capacity, donors	If it is not own by the government and donor driven, you may not have the donor at all times or you may have some programs and the partners may not be able to continue providing support.
Political	inductive	any mention of government, political will	From political buy-in, they have it. For some countries they are happy for CDC to do the work but not really interested in taking it over. But Liberia have, they are interested in taken over the program.

University	Inductive	use for mention of university and its role in sustainability of FETP	NPHIL has already started making efforts in using the FETP model for the public health curriculum at University of Liberia.
Sustainability Plan			no sustainability plan

Ethical Considerations

IRB approval was waived this study because it did not meet the definition of “research” with human subjects. Before conducting the interviews and focus groups, consent was obtained from all participants. Because interviews were conducted with staff members, we included measures to protect consequences to employment. All names and position were not recorded. Information collected were compiled de-identified and results are reported in a generalized summary form. Participants were made aware of their right to end the interview at any time and were free to skip questions.

Results

An in-depth description of the term sustainability and determinants, informed by qualitative data from the Liberia FETP, are illustrated in Table 3. The description provided contextual meaning of each area influencing sustainability and examples from the data. Through direct observation, desk review and qualitative data, an analysis assessing the strengths, weaknesses, opportunities, and threats (SWOT) was conducted (Table 4).

Figure 1. Determinants of Sustainability Concept Map, Liberia FETP, 2019

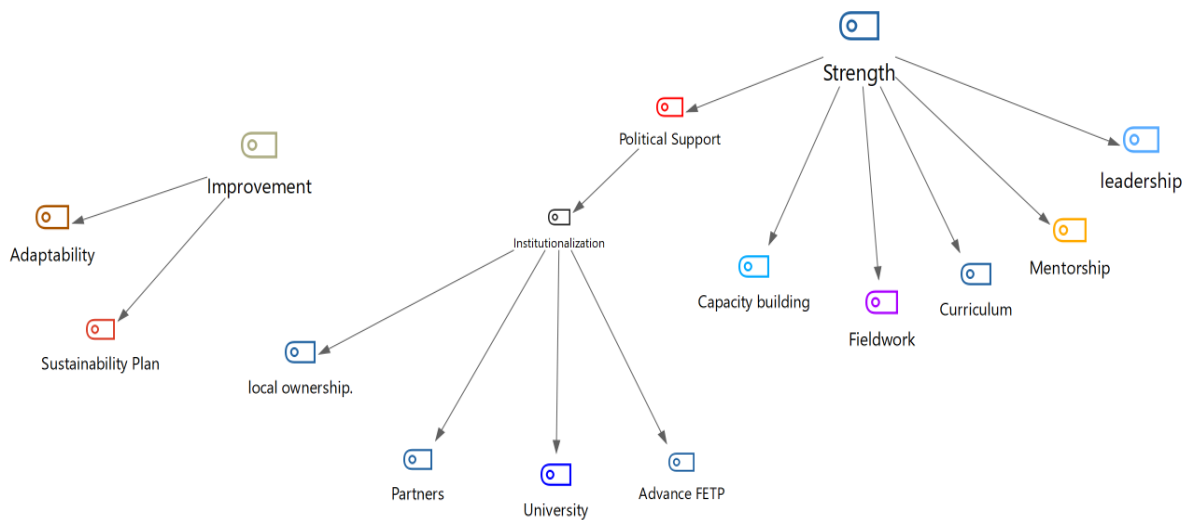


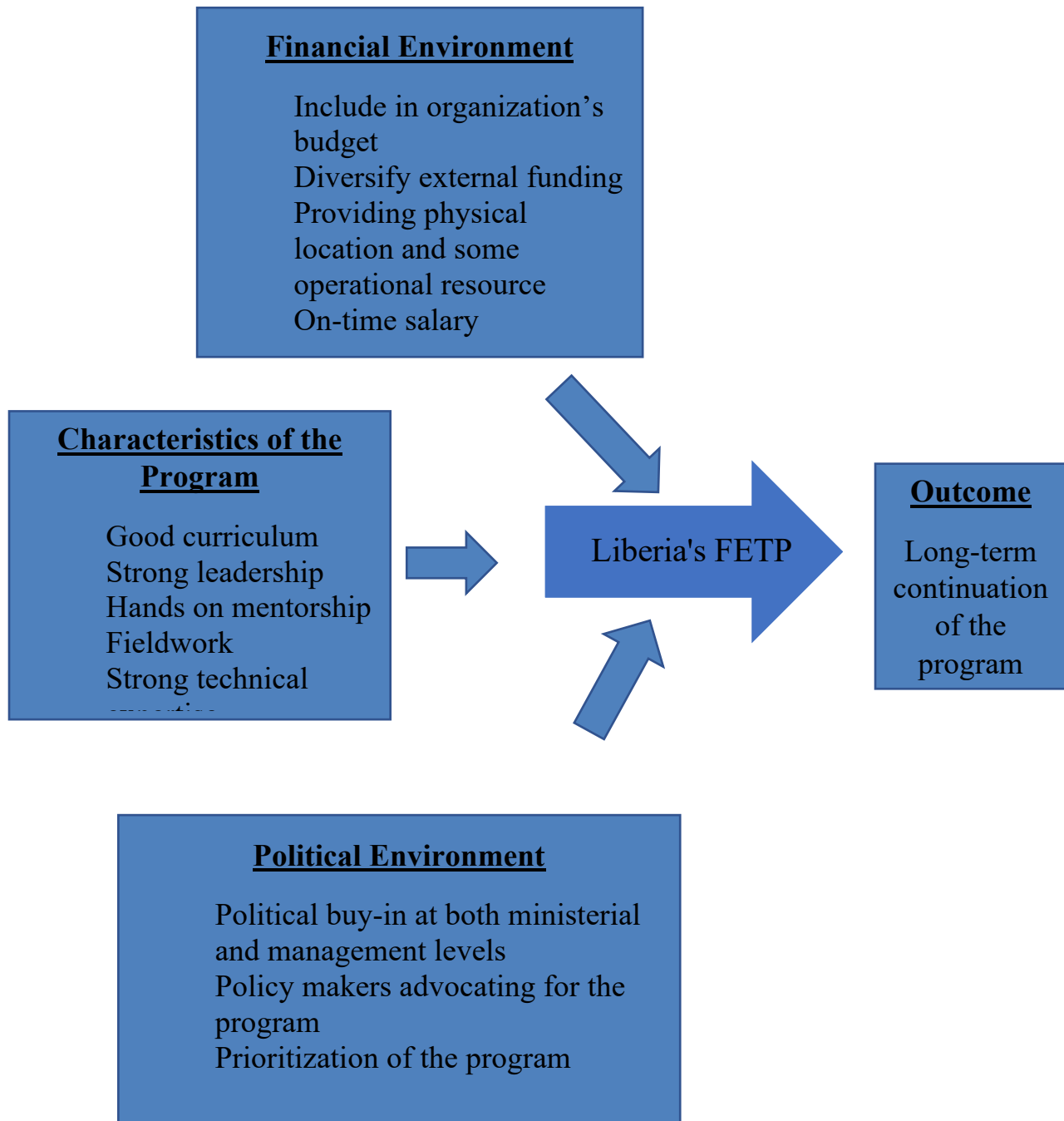
Table 3. Description of Sustainability Outcomes, Liberia FETP, 2019

Aspects	Context and Meaning	Examples	How Often Mentioned	Associated Codes
Financial support	Financial resources allocated to the running of Liberia FETP	“I don’t think they have identified sources of funds to run the program if the donor were to pull out.”	Frequently mentioned by all participant. Main consensus that future funding had not been secured.	Funding, partners, donors
Institutionalization	Incorporating Liberia FETP into the host country; own and operated by	“... NPHIL is making progress in institutionalizing the program at the University of Liberia”	Very often. Many participants discussed the program being incorporated into the university.	Local ownership, University, Advance FETP, Partners
Political support	Governmental interest and policy makers support advocates on behalf of the program	“As for political buy-in, they have it... they are interested in taking over the program.”	Often. Several participants mentioned the interest of the host institute and government at large to keep the program.	Government, Ministry of Health
Technical expertise	Internal characteristics of the program to effectively transfer knowledge	“FETP provides hands on training for our staff, increasing on the job performance and the mentorship also provides a form of guidance for trainees.”	Frequently. Several aspects of the program that lead to increasing capacity were discussed by all participants.	Leadership, mentorship, fieldwork, curriculum, capacity building

Table 4. Strengths, Weaknesses, Opportunities, and Threats, Liberia FETP, 2019

Strengths	Weaknesses
<ul style="list-style-type: none">• Structure: theoretical and fieldwork• Mentorship• Local staff inclusion• Strong leadership• Well organized trainings• Incorporation of relevant examples during training sessions to reinforce concepts	<ul style="list-style-type: none">• No initial sustainability plan
Opportunities	Threats
<ul style="list-style-type: none">• Partnership• Political buy-in• Established FETP network	<ul style="list-style-type: none">• Road conditions• Unstable surveillance officer compensation• Future funding uncertainties• Staff attrition• Poor communication network especially in rural area

Figure 1: Determinants Influencing Sustainability of the Liberia Field Epidemiology Training Program, 2019



Determinants

The following are in-depth reviews of each factors influencing the Liberia FETP sustainability.

Political Support

A critical aspect of the Liberia FETP is the country's understanding of its importance. The program is currently housed at the Liberia NPHI. The Director of the Epidemiology Department at NPHI also serves as the director of the Liberia FETP. This combination of leadership helps in advocating for the FETP. Throughout the interviews, FETP participants and host organization interviewees stressed the need to prevent another epidemic similar to that of the Ebola virus disease (EVD). The tragic experience with the EVD outbreak serves as a motivation for political buy-in. All stakeholders of the program understand its value and supports the long-term continuation as a means of strengthening the public health workforce to prevent and respond to threats. One of the areas that leaders of the FETP hope each program has are champions that can advocate for the program; in the goal of institutionalization. Liberia has champions at all levels who understand the need of the program.

Funding Stability

Funding instability is the main cause for early termination of many programs. Currently, the Liberia FETP is funded by the U.S. CDC in a five-year agreement. With the funding period coming to an end, securing funding for the program is a priority. All interviewees stressed the importance and urgency of stabilizing funding. Ideally, to include the FETP in the annual budget is the goal. However, according to various stakeholders, current resources are not sufficient to absorb the program within the NPHI budget. To financially secure the program, the Liberia NPHI is working to obtain other grants. Diversified funding will help secure the program.

Partnerships

Partnerships both external and internal are essential to success. The Liberia FETP was developed through the collaboration of various international and national partners. Currently, the program is owned and housed by the National Public Health Institute of Liberia, implemented by African Field Epidemiology Network, and funded by the U.S. CDC. Expertise and support from various organizations has helped the program grow and produce a stronger public health surveillance workforce. The host organization understands the importance of these partnerships and has continued to develop new ones. NPHIL is currently working with the University of Liberia to develop an advance FETP.

Organization Capacity

The internal characteristics of an organization is critical in its longevity. These elements greatly influence the outputs to achieve program objectives. Through interviews and observation, one of the greatest strengths of the Liberia's FETP is the capacity of the organization. The program has very strong leadership and a motivated team. From both the administrative to workshop delivery, the FETP team maintains a level of excellence. The program has trained eight frontline cohorts and two intermediate cohorts. Results from focus group with participants of the program stress the value of the fieldwork and mentorship. Many participants applaud the program on its approach to capacity building.

Program Adaptation

For a program to sustain overtime, it is important for it to be flexible and able to adapt in the wake of new evidence and an ever-changing environment. The Liberia FETP has shown strength in its ability to adapt. Several interview participants discussed how the program has strengthened its curriculum over the years to best fit the environment. Program facilitators included country-

specific examples in workshops to reinforce epidemiologic concepts. Tailoring trainings to fit the context in which surveillance officers work is essential in retention of concepts and application to daily activities. Interviewed participants discussed the ongoing work to align its output material with that of the surveillance officers. This synergy will harmonize workshop material and improve the participants data collection and verification skills.

Communication

Communication and transparency among all levels of stakeholders and within the program can impact sustainability. Effective communication between the host organization, implementing partners and funders is important in continued success. Additionally, transparency between the program and participants will increase motivation to apply knowledge and skills gained from workshops in the field. Field epidemiology depends on the cooperation of all stakeholders; especially the local community. Thus, sharing outcomes of the program with the community can build a trusting relationship.

Institutionalization

In program sustainability literature, institutionalization is used interchangeably with sustainability. Institutionalization refers to the integration of the program within the local organization.²¹ “Institutionalization of FETPs in country’s ministry of health or NPHIs has been an underlying determinant of sustainability for funding partners. This include technical, administrative oversight, and financial support from in-country”.²⁰ Due to resource limitations, Liberia is not yet in the position to assume complete financial responsibility for the program. One way the Liberia NPHI is considering institutionalizing the program is in partnership with the University of Liberia. The Liberia NPHI is currently in the process of developing an advance level of the field epidemiology and training program. Students will be able to enroll by paying tuition. However, results of in-

depth interview showed not all stakeholders agreed with this approach. The underlying question for this approach to sustainability is the availability of participants. Some concerns raised were that Liberia is a small country with an even smaller public health workforce. After the initial workforce are trained in the first few years, the number of participants needed to maintain the program would be limited. Additionally, incorporating all level of the program within the university might also limit the number of people who are trained. Individuals that have not gone through the traditional route of schooling and qualify and are accepted in the university would be excluded from training. These conversations are an important step in finding the best way to integrate the program within the local organization.

IV. Discussion

This analysis utilized literature review, in combination with in-depth interviews and focus groups, to synthesize factors influencing sustainability. Through the literature review, several frameworks were assessed. They covered three key areas: the financial environment, Internal program capacity, and the broader external environment. Exploration of different frameworks showed that program sustainability developed by Schell and colleagues comprehensively covered factors influencing sustainability. Using the Liberia FETP as a case study, these factors were assessed and the program was evaluated based on sustainability goals developed by leaders and partners of the FETP. The results showed that the Liberia FETP is strong in many aspects of internal program capacity. All participants of the interviews and focus groups highlighted the program's strength in leadership and management. The quality of the program in producing skilled graduates is very high. Many FETP graduates have assumed positions in local health agencies and national public health institutes. A critical part of sustainability is the buy-in from various stakeholders at all level. Overall, there is significant motivation and buy-in for the

program. Stakeholders at all level understand the critical need of building capacity in field epidemiology to protect the country. Many participants of the FETP noted that the experience with the 2014 Ebola epidemic as a key motivation to improve the public health surveillance in the country.

Results from the SWOT analysis showed that threats were associated with unstable compensation of the public health workforce. Inconsistencies in salary have been a key factor in staff attrition and the decrease in the public health workforce. The program is facing the issue of retraining surveillance officers at county and districts level because many graduates seek other avenues to maintain their families. For the program to be sustainable, it is important to assess and address these weakness and threats.

Overall, themes from the qualitative study identified three main areas influencing the Liberia FETP: the financial environment; and the characteristic of the program and the political environment. Each area covered determinants found in the available framework. Out of the three areas, the program had challenges with finances. As mentioned, through a cooperative agreement, CDC is funding the program for five years. However, the funding period is almost over. Now more than ever, securing funding for the continuation of the program is critical. The strength of the internal characteristic of the program was emphasized by all partners. The organization and quality of the trainings has been well maintained. The onboarding of local epidemiologist created a solid foundation of sustainability.

The goal for sustainability of FETPs is through institutionalization of the program in national health institutions. The Liberia NPHI has taken steps to institutionalize the program by developing a partnership with the University of Liberia in the establishment of the advance level. Liberia FETP now have two local epidemiologists facilitating training sessions and serving as mentors to participants of the program. The step of onboarding local epidemiologist seeks to facilitate a smooth transition from foreign implementer to local led and run Liberia FETP.

Limitations

The study had limitations. The literature review only included English articles and the study comprised of in-depth interviews and one focus group. The focus group had 22 participants. The focus group size was not set by the researcher. Participants in the focus group were chosen based on their participation in the second intermediate workshop of the FETP. The size of the focus group should have been smaller to foster participation from everyone. In the beginning of the focus group discussions, male participants dominated the conversation. Facilitator probed and requested responses from women in the group. In this situation, gender specific group is not necessary because women in Liberia tend to be vocal. The size of the group might have the reason for slow participation. In-depths interviews were conducted with key stakeholders in the program. Some participants had access to the interview guide prior to interview session. Prior preparation might have yield different results. The study focus on one program. While that is good for assessing the program, multiple programs would allow for results to be generalized. The literature review and the interviews were conducted simultaneously. Conducting the literature review prior to the interviews would have informed the interview guide.

Recommendation

Overall, studies have shown that sustainability planning before interventions is important. One of the weakness found in the Liberia's FETPs is the lack of action oriented sustainability plan from the inception of the program. Thus, we recommend that the FETP bring together all partners to develop a sustainability plan. This plan will serve as a roadmap for the long-term continuation of the program. A detailed action oriented plan that designate roles and responsibility of each partner in achieving action items. Each indicator in the plan will serve a tool for accountability. Funding instability is a major threat to the sustainability of the program. Partners should come together and determine the best way forward in terms of institutionalization of the program. Assessing similar programs that have been institutionalized in limited resource environments. Best practices from these program will help inform a strategic plan for institutionalization of the program.

Additionally, quality of the FETP will impact its long-term stability. Thus, the program should continue its effort of maintaining the quality in all facet of the program, form leadership, training curriculum to mentorship.

Future Research

The determinants addressed in this study are based on currently available literature and result from one case study. A larger study assessing multiple programs of different sizes and intervention areas will help inform a more comprehensive model of determinants of sustainability. The study can use a mixed-method approach to developing the model and evaluate the extent each determinant influences sustainability. This would improve the strength of the framework and create a roadmap that program implementers can use to assess and improve the

sustainability of their programs. To further assess the Liberia FETP, another study should be done after the 5-year CDC funding ends. This longitudinal study can be used to compare results to this study and examine the effectiveness of strategies that were implemented to promote sustainability.

Reference

1. *Congressional Budget Justification Department of State, Foreign Operations and Related Programs*, Department of State, Editor.: US Department of State
2. Alexander, J.A., et al., *Sustainability of Collaborative Capacity in Community Health Partnerships*. Medical Care Research and Review, 2003. **60**(4_suppl): p. 130S-160S.
3. Ashwell, H. and L. Barclay, *Challenges to achieving sustainable community health development within a donor aid business model*. Australian and New Zealand Journal of Public Health, 2010. **34**(3): p. 320-325.
4. Association, A.P.H., *Strengthening Health Systems in Developing Countries*. 2008.
5. Bennett, S., et al., *Monitoring and evaluating transition and sustainability of donor-funded programs: Reflections on the Avahan experience*. Evaluation and Program Planning, 2015. **52**: p. 148-158.
6. Bennett, S., et al., *Sustainability of donor programs: evaluating and informing the transition of a large HIV prevention program in India to local ownership*. Global Health Action, 2011. **4**(1): p. 7360.
7. Blair, R.A., B.S. Morse, and L.L. Tsai, *Public health and public trust: Survey evidence from the Ebola Virus Disease epidemic in Liberia*. Social Science & Medicine, 2017. **172**: p. 89-97.
8. Brinkerhoff, D.W. and A.A. Goldsmith, *Promoting the sustainability of development institutions: A framework for strategy*. World Development, 1992. **20**(3): p. 369-383.
9. Burger, P., et al., *Strategies for Sustainability: Institutional and Organisational Challenges*. Sustainability, 2014. **6**(11).

10. Ceptureanu, I.S., et al., *Community Based Programs Sustainability. A Multidimensional Analysis of Sustainability Factors*. Sustainability, 2018. **10**(3).
11. Downie, R., *The road to recovery: Rebuilding Liberia's health system*. 2012.
12. Elayah, M., *Lack of foreign aid effectiveness in developing countries between a hammer and an anvil* Contemporary Arab Affairs, 2016. **9**(1): p. 82-99.
13. Foundation, B.M.G. *Annual Report*. 2017 [cited 2019 February 2,]; Available from: <https://www.gatesfoundation.org/Who-We-Are/Resources-and-Media/Annual-Reports/Annual-Report-2017>.
14. G., S.E., et al., *Qualitative research to make practical sense of sustainability in primary health care projects implemented by non-governmental organizations*. The International Journal of Health Planning and Management, 2004. **19**(1): p. 3-22.
15. Luke, D.A., et al., *The Program Sustainability Assessment Tool: A New Instrument for Public Health Programs*. Preventing Chronic Disease, 2014. **11**: p. E12.
16. M.P Kieny, D.B.E., S. Gerard, S Kadandale, *Health-system resilience: reflections on the Ebola crisis in western Africa*. Bulletin of the World Health Organization, 2014. **92**(850).
17. Mader, C., *Sustainability process assessment on transformative potentials: the Graz Model for Integrative Development*. Journal of Cleaner Production, 2013. **49**: p. 54-63.
18. Moore, J.E., et al., *Developing a comprehensive definition of sustainability*. Implementation science : IS, 2017. **12**(1): p. 110-110.
19. Najafizada, S.A.M., R. Labonté, and I.L. Bourgeault, *Stakeholder's perspective: Sustainability of a community health worker program in Afghanistan*. Evaluation and Program Planning, 2017. **60**: p. 123-129.

20. Patrick O'Carroll, M.K., Kip Bagget, Dionisio Herrera, *Thr Global Field Epidemiology Roadmap*. 2018, The Task Force for Global Health.
21. Pluye, P., L. Potvin, and J.-L. Denis, *Making public health programs last: conceptualizing sustainability*. *Evaluation and Program Planning*, 2004. **27**(2): p. 121-133.
22. Pluye, P., et al., *Program sustainability: focus on organizational routines*. *Health Promot Int*, 2004. **19**(4): p. 489-500.
23. Reddy, K.S., et al., *Redefining public health leadership in the sustainable development goal era*. *Health Policy Plan*, 2017. **32**(5): p. 757-759.
24. Sarriot, E.G., et al., *Advancing the application of systems thinking in health: sustainability evaluation as learning and sense-making in a complex urban health system in Northern Bangladesh*. *Health Res Policy Syst*, 2014. **12**: p. 45.
25. Sarriot, E.G., E.A. Swedberg, and J.G. Ricca, *Pro-sustainability choices and child deaths averted: from project experience to investment strategy*. *Health Policy Plan*, 2011. **26**(3): p. 187-98.
26. Sarriot, E.G., et al., *A methodological approach and framework for sustainability assessment in NGO-implemented primary health care programs*. *Int J Health Plann Manage*, 2004. **19**(1): p. 23-41.
27. Scheirer, M.A., *Linking sustainability research to intervention types*. *Am J Public Health*, 2013. **103**(4): p. e73-80.
28. Scheirer, M.A. and J.W. Dearing, *An agenda for research on the sustainability of public health programs*. *Am J Public Health*, 2011. **101**(11): p. 2059-67.

29. Scheirer, M.A., G. Hartling, and D. Hagerman, *Defining sustainability outcomes of health programs: Illustrations from an on-line survey*. Evaluation and Program Planning, 2008. **31**(4): p. 335-346.
30. Scheirer, M.A., et al., *Dimensions of sustainability for a health communication intervention in African American churches: a multi-methods study*. Implement Sci, 2017. **12**(1): p. 43.
31. Schell, S.F., et al., *Public health program capacity for sustainability: a new framework*. Implementation science : IS, 2013. **8**: p. 15-15.
32. Science, C.f.P.H.S. *Program Sustainability Assessment Tool*. 2012 September 2012 [cited 2019].
33. Shediak-Rizkallah, M.C. and L.R. Bone, *Planning for the sustainability of community-based health programs: conceptual frameworks and future directions for research, practice and policy*. Health Educ Res, 1998. **13**(1): p. 87-108.
34. Shekelle, P.G., et al., in *Global Health Evidence Evaluation Framework*. 2013: Rockville (MD).
35. Shigayeva, A. and R.J. Coker, *Communicable disease control programmes and health systems: an analytical approach to sustainability*. Health Policy and Planning, 2015. **30**(3): p. 368-385.
36. Tabak, R.G.P., RD; Duggan, Katie RD, MPH, MS; Smith, Carson MPH; Aisaka, Kristelle BA; Moreland-Russell, Sarah PhD, MPH; Brownson, Ross C. PhD, *Assessing Capacity for Sustainability of Effective Programs and Policies in Local Health Departments*. Journal of Public Health Management and Practice, 2016. **22**(2): p. 129-137.

37. Turner, M., *Determinants of Sustainability in Community Development: Progress, Challenges and Opportunities in Global Health*. 2008, Emory University Rollins School of Public Health: Emory University dissertation repository.
38. USAID, *Foreign Aid Explorer*, U.s.E.A.a.D. Services, Editor. 2018: USAID.
39. Patrick O'Carroll, M.K., Kip Baggett, Dionisio Herrera, *THE GLOBAL FIELD EPIDEMIOLOGY ROADMAP: A Report of the Meeting held at the Rockefeller Foundation Bellagio Center*. 2018, The Taskforce for Global Health.
40. Bradley EH, Taylor LA, Cuellar CJ, Management matters: a leverage point for health systems strengthening in global health. *Int Health Policy Manage*. 2015; 4(7): 411-415.
doi:10.15171/ijhpm.2015.101
41. FETP, L. *Liberia field Epidemiology and Training Program*. 2018; Available from: <http://liberiefetp.com/about/>.
42. Hacker, K., et al., *Community capacity building and sustainability: outcomes of community-based participatory research*. *Progress in community health partnerships : research, education, and action*, 2012. 6(3): p. 349-360.
43. Development, K.C.f.C.H.a. *Planning for Sustainability*. 2018; Available from: <https://ctb.ku.edu/en/table-of-contents/sustain/long-term-sustainability/overview/main>.