

Strengthening the HIV/AIDS service delivery system in Liberia: an international research capacity-building strategy

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Abstract

Liberia's prolonged post-conflict transition has negatively impacted its health infrastructure, including the functioning of its health care delivery system. Considering the current national health crises, a study was conducted to identify research gaps and the need to propose changes for improving the health care delivery system in the country. The study results clearly demonstrated a lack of HIV/AIDS research infrastructure including organizational structure, linkages, leadership, champions, expertise, resources, and policies and procedures. Alignment of research needs and practice, and research use to support HIV/AIDS service delivery programmes in the country was also limited. An international research capacity-building partnership is proposed as an effective planned change strategy to strengthen HIV/AIDS-related research infrastructure and to inform management and practice within the Liberian HIV/AIDS service delivery system. A proposed capacity-building planning model can also strengthen research infrastructure and the production and use of research to positively impact the HIV/AIDS epidemic in Liberia and other developing countries.

Introduction

HIV/AIDS problem in Liberia

Globally, more than 60 million people have been diagnosed with the human immunodeficiency virus (HIV) infection, including the acquired immunodeficiency syndrome (AIDS), of which 20 million have died (Kates *et al.* 2002). HIV/AIDS is now the leading cause of death in Africa and the fourth leading cause of death worldwide (Mann & Tarantola 1998; Kates *et al.* 2002). Sub-Saharan Africa accounts for the highest HIV/AIDS prevalence and mortality rates in the world (UNAIDS 2001), which amount to more than 70% of all HIV-infected individuals, 90% of all HIV-infected children through mother-to-child

transmission, and 84% of all HIV/AIDS deaths (Panford *et al.* 2001).

Liberia, a country in West Africa, has not escaped the enormous and tragic effects of the HIV/AIDS epidemic. By the end of 1999, according to the Joint United Nations Program on HIV/AIDS (UNAIDS), 39 000 Liberian adults and children were living with HIV/AIDS; 31 000 children younger than 15 years had lost their mothers or both parents to AIDS, of which 20 337 are currently living orphans; and during 1999, 4500 Liberian adults and children had died of AIDS. In 1998, seroprevalence studies conducted in the country revealed that 10% of urban antenatal clinic attendees and 8% of sexually transmitted disease (STD) patients were HIV-positive (UNAIDS 2001). According to the National AIDS/STD Control

Program (NACP), the prevalence of HIV in Liberia has increased by 17-fold over the past 10 years, from 0.5% in 1989 to 8.2% in 1998. Of the 1998 seroprevalence data, females accounted for three times more cases than males; and by occupation, security officers, housewives and petty traders represented 60% of the reported cases (NACP 2000).

Combating the HIV/AIDS crisis in Liberia is compounded by the country being in a prolonged post-conflict transition after nearly a decade of civil war (LDHS 2000; United Nations Children Fund & Inter-Agency Working Group 2000; Otti & Barh 2001). As such, the country is plagued by significant poverty, population displacement, migration, sexual violence and rape, gender inequalities, a low literacy rate, lack of access to adequate health care and increased prevalence of STDs (Bropleh & Taylor 2000; LDHS 2000; United Nations Children Fund & Inter-Agency Working Group 2000; Otti & Barh 2001). Additionally, Cote D'Ivoire – which supports cross-border trade, shares some common cultural practices with Liberia, and serves as a major safe haven for Liberian refugees during the civil war – has one of the highest HIV/AIDS seroprevalence rates in the world (UNAIDS 2000). Various reports, especially from Africa, clearly document that political and social changes, including structural inequalities, propagate the transmission of HIV/AIDS (Sabatier 1987; Mann & Tarantola 1998; Parker 2002) – an implication that HIV/AIDS is indeed a significant public health problem in Liberia. Therefore, effective strategies must be devised to avert the negative public health consequences associated with the spread of this disease.

The Liberian health care delivery system

In Liberia, primary health care (PHC) is the cornerstone of the health care delivery system. Like many developing countries, basic health services have been relatively unattainable. With the emergence of HIV/AIDS, the challenge is even greater for the health care delivery system. In 1998, for example, the public health sector spending per capita, which includes both prevention and treatment services, was less than \$2 per person, based on the overall health budget per total population of the country (Bropleh & Taylor 2000).

To support the HIV/AIDS service delivery system, a partnership with the government health care delivery sector, non-governmental organizations (NGOs), health-related academic institutions, community-based organizations (CBOs), and private health organizations is proposed to coordinate and sustain the activities of this international initiative. These entities were selected because they form an integral part of the health care delivery system in Liberia. For example, the NGOs traditionally support core health activities such as staff development and the provision of equipment, vehicles, HIV test kits, condoms and technical assistance (Bropleh & Taylor 2000). Health-related academic institutions support and sustain the fundamental functions of the national health care delivery system in the following ways: training medical doctors and public health officials; providing public-private sector expertise, resources and technical support; encouraging, supporting and coordinating basic, biomedical, clinical and preventive research activities; serving as reservoirs for eliciting and/or disseminating health-related information to inform policy; and liaising with relevant governmental sectors in order to sustain the country's public health sector. CBOs provide outreach services and referrals to hard-to-reach populations in non-traditional settings and remote rural areas; transport indigent populations to proximal health facilities; support awareness, especially to vulnerable groups; and develop and implement programmes. Furthermore, the private health sectors – besides catering to the economically stable population – also donate medical equipment, drugs and vaccines, laboratory and test kits, ambulance services and other social support to help maintain the public health sector. With the combined health experience of these partners, the objectives of a Liberia-US research partnership will be achieved.

Given the seriousness of the HIV/AIDS problem in Liberia and the inadequacy of the Liberian health care system, this article presents a capacity-building model to strengthen the HIV/AIDS service delivery system through a proposed Liberia-US research partnership that focuses on establishing and strengthening the HIV/AIDS service delivery system infrastructure and enhancing research and application skills of Liberian scientists and professionals. First, we discuss Liberia's research needs in response

to this problem. Second, a conceptual framework provides an overview of a research capacity-building strategy and its intended outcomes. Third, the planning model is presented that connects the following: (1) research needs that have been identified; (2) defined goals and objectives associated with each research need; (3) specific activities outlined to achieve each objective; and (4) anticipated outcomes. A description of the research capacity-building strategy and planning model are highlighted.

HIV/AIDS research needs and gaps in Liberia

In 2002, as part of a larger study, we assessed the gaps and unmet needs relating to HIV/AIDS research in Liberia (Kennedy *et al.* 2002, 2004). Briefly, using a cross-sectional design, this study utilized both structured and unstructured interviews to collect qualitative data from 18 information gathering sessions with individuals and small groups of key informants about barriers to producing useful research on a continual basis for the HIV/AIDS service delivery system in Liberia. The assessment instrument operationally defined key factors found in the literature that are important to successfully implement and sustain innovations (Tri-Ethnic Center for Prevention Research 2001). Participants included key informants from various academic-based health institutions, international donor and NGOs, the government-financed health care delivery system, private health-related organizations and CBOs. In total, 34 key informants provided needs assessment data about activities regarding prevention-based research infrastructure and research production and use in Liberia.

Research infrastructure

The research needs assessment results found five sets of infrastructure needs in Liberia. First, there is the need for additional structure to promote research and innovative practices concerning HIV/AIDS prevention and treatment, which has been found to be important in creating a sustainable health care delivery system. During the needs assessment, we observed that HIV/AIDS-related institutions and organizations in Liberia have produced only limited research and not a single entity is even charged with

the responsibility of producing research for the HIV/AIDS service delivery system. Furthermore, the research produced by various university units was funded primarily by international donor organizations and not by the government health care delivery system.

Second, there are limited formal linkages between agencies in the HIV/AIDS service delivery system and interagency groups that concern the production and use of research to combat HIV/AIDS, which is the final important element for a viable HIV/AIDS service delivery system. Thus, there is a need for inter-organizational linkages to support research and its use concerning HIV/AIDS in Liberia. There are, however, some interagency linkages in existence to support the HIV/AIDS service delivery system, especially among the international donor organizations and local NGOs, which usually partnered with the government health care delivery sector to support various HIV/AIDS-related activities. Also, there is no formal information networking mechanism in place that can effectively link science and practice in the HIV/AIDS service delivery system in the country. Even though there exists some HIV/AIDS-focused interagency service activities, information sharing is still problematic. Therefore, there is an urgent need to engage in activities that will increase sharing of research knowledge/information, transferring knowledge on effective programmes and best practices, and networking in order to avoid duplication of efforts, streamline redundancies, and improve efficiency to help further prevent the spread of the epidemic in Liberia. In addition, we found limited leadership in promoting HIV/AIDS research and its use and only a few champions of research in the scientific community or HIV/AIDS delivery system who actively advocated for increased research and none had engaged in HIV/AIDS research.

Third, opportunities to build research expertise to engage in high-quality HIV/AIDS research and its use – still another important element in sustaining an HIV/AIDS service delivery system – are limited in Liberia. The consequence of the prolonged civil war has been the destruction of the research infrastructure within the country, including the health care delivery system. In addition, the government has not been very successful at effectively restoring

basic services in order to attract, recruit and retain researchers, especially in HIV/AIDS-related research areas (Kennedy *et al.* 2004). As such, there have been limited opportunities to build research expertise, resources and infrastructure to prevent further spread of the disease, such as those seen in other African countries that have experienced social and political changes (Mann & Tarantola 1998; UNAIDS 2000; Parker 2002).

Fourth, resources to support high-quality HIV/AIDS-related research and its use are scarce in Liberia. The civil war destroyed social and physical infrastructures such as libraries, laboratories and research facilities in the country. As a result, only limited research activities have been undertaken by health-related academic institutions such as the University of Liberia. However, activities directed at revitalizing the country's research infrastructure are currently being undertaken by international donor organizations, in collaboration with the local health care delivery system. For example, the university currently has a Demographic Unit that is actively involved in research, as exemplified by its participation in the recently completed Liberia Demographic and Health Survey (LDHS), a cross-sectional multi-stage national household study designed to collect, compile, analyse and disseminate information on socio-economic, demographic, behavioural and social service utilization characteristics in Liberia (LDHS 2000).

One primary reason for limited research productions that surfaced in the information gathering sessions concerned one important resource – the availability of research funding in Liberia. From 1997 to 1999, about \$900 000 was allocated for HIV/AIDS-related activities in Liberia – an average of \$300 000 per year (Bropleh & Taylor 2000). Strikingly, international donor and NGOs accounted for a greater proportion (75%) of Liberia's HIV/AIDS funding and support during that period. As such, there is an urgent need to build the capacity, capability and expertise of Liberian investigators to solicit research funds to address the above gaps and unmet needs. Moreover, a strong need for the country's HIV/AIDS providers and organizations to become competitive in obtaining extramural funding from sources outside of Liberia was simultaneously re-echoed by all participants.

Fifth, there are limited policies and procedures in place in Liberia to ensure high-quality HIV/AIDS-related research, which is another element of a viable system. The NACP was formulated by the government during the mid-1980s to coordinate all HIV/AIDS-related activities within the country (NACP 2000). As part of this needs assessment, the need for national legislations that articulates policies or procedures on HIV/AIDS in the country was observed. With the epidemic entering its third decade, it is worth noting that the country recently drafted the National Multi-Sectoral Strategic Plan of Action for the prevention and control of HIV/AIDS/STDs in Liberia. Its overall goals are to: (1) reduce HIV prevalence by 15% by 2003; (2) mitigate the health and socio-economic effects of HIV/AIDS at individual, household and community levels; and (3) strengthen the national capacity to respond to the epidemic. Despite the above goals, the actual prevalence of HIV in Liberia is currently not known, and relevant epidemiological and behavioural data to answer those questions are also unavailable (Kennedy *et al.* 2004).

HIV/AIDS research production and use

Alignment of HIV/AIDS research needs and the production of new HIV/AIDS research are critical if there is an expectation that research will inform programmes, service, policy development and implementation (Johnson *et al.* 2004). In an effort to identify priority research needs during the 18 discussion sessions, key informants of the various organizations shared information about the HIV/AIDS epidemic and research priorities that needed immediate attention, shared information regarding programmes and strategies geared toward addressing some of those issues, and discussed the challenges of conducting research in Liberia. As well, the participants also discussed the current political and cultural challenges that need to be overcome in order to implement such a collaborative international HIV/AIDS research partnership.

A common theme that had emerged during the needs assessment was that there is a strong necessity for local-level HIV/AIDS-related research to inform programmes and policies, and such information is either unavailable or not well-documented and that

the magnitude of the HIV/AIDS epidemic in the country is definitely unknown. As a result, local partners and stakeholders were very instrumental in identifying several critical research needs and priorities for the country. Some of the priority research needs identified were: (1) HIV/AIDS prevalence rates for the country, including the strengthening of the epidemiological and surveillance system; (2) HIV/AIDS knowledge, attitude and behavioural practices, targeting various susceptible groups; (3) role of traditional medical practices on HIV/AIDS prevention, treatment and/or care; (4) mother-to-child HIV/AIDS transmission; (5) HIV/AIDS and STD pre-/post-test counselling; (6) HIV/AIDS risk factors in Liberia – socio-economic and cultural, traditional practices, drug use, demographic shift, rural vs. urban perspectives, rape and violence, peer pressure and youth; (7) HIV/AIDS-related barriers and coping strategies; (8) HIV/AIDS-related stigma; (9) lack of collaboration/networking among HIV/AIDS institutions/organizations; (10) development of an HIV/AIDS monitoring system; and (11) HIV/AIDS awareness campaign and intervention study. Of these research needs, those viewed as the highest priority concern obtaining information on HIV seroprevalence rates for adult and youth, mother-to-child HIV transmission, role of traditional medical practices and HIV/AIDS-related stigma.

In addition to research production needs, there is limited knowledge about the extent to which research is being used or whether it is being used effectively. For example, the LDHS was undertaken to replenish reliable socio-economic and behavioural-related health data for the country, data that were destroyed during the prolonged civil conflict, and to serve as baseline indicators for formulating national policy as previously described. The findings from this national household study have been systematically documented, yet the findings are not readily available to consumers nor do they even influence local health decisions. Moreover, it became apparent during the needs assessment that basic HIV/AIDS data were not distributed to the HIV/AIDS-related health care sector in a timely manner. Although little empirical knowledge exists about HIV/AIDS in Liberia (Kennedy *et al.* 2004), high interest and eagerness in having research knowledge produced to inform policy and programme development and service

delivery was observed as the result of this needs assessment. Furthermore, the need for collaboration and networking among HIV/AIDS institutions and organizations was repeatedly emphasized as a medium for effectively sharing research knowledge, including requests for customized training and technical assistance packages on transforming research findings into practice and policy.

Conceptualizing an international research capacity-building strategy

Figure 1 presents an international research capacity-building strategy, which is conceptualized as a planned system change to fill the needs and gaps identified earlier concerning research infrastructure and Liberian-based research that can be used to reduce the threat of a major HIV/AIDS epidemic in Liberia. This conceptualization, which presents a prescriptive model based on a set of causal factors, is referred to in the evaluation literature as ‘intervention (programme) theory’. Studies have further presented demonstrations of how an intervention theory can be tested (Bickman 1990; Chen 1990; Johnson *et al.* 1998, 2002; Johnson 1999).

It is anticipated that this international research partnership will impact a set of proximal outcomes relating to positive reactions of participants and infrastructure capacity building. The positive reactions from partnership participants from the worlds of science and practice concern: (1) continued acceptance of the partnership; (2) continued perceived salience, that is, importance/usefulness of its activities and products; and (3) continued receptiveness to engaging in partnership activities and producing or using its products. The importance of creating favourable stakeholder reactions to product producers (who), the product (what) and communication (how), is well documented in the literature (Have-lock 1969; Johnson 1980, 1999; Brown 1995; Rogers 1995).

In regard to capacity building, it is anticipated that the research partnership will increase the capacity of the scientific community to produce high-quality research and the HIV/AIDS service delivery system to use research and to collaborate on issues that are important to the system. The importance of capacity building in planning for change is also well docu-

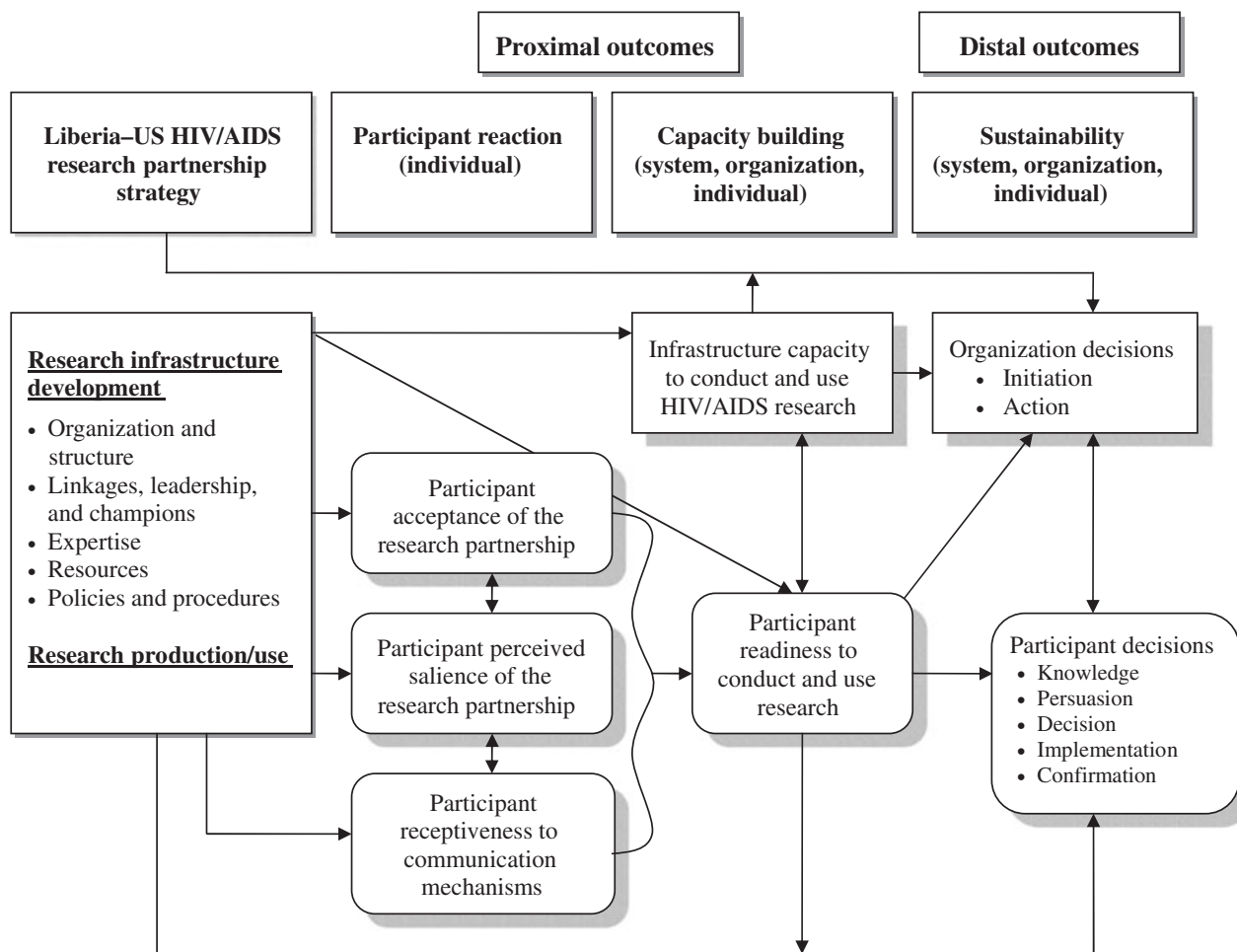


Figure 1 Conceptual view of the Liberia-US research partnership and its outcomes.

mented (Backer *et al.* 1995; Backer 2000). At the organizational level, the partnership strategy is designed to increase infrastructure capacity that includes structure, roles, relationships, resources, policies, procedures, expertise and information networking. When lacking, these factors have been found to inhibit knowledge transfer (Backer 1995; Fishbein 1995; Rogers 1995). At the individual level, the strategy is intended to increase individual readiness [as measured by perceived need, commitment and self-efficacy (self-ability)], and skills to engage in producing and using research to prevent HIV/AIDS and care among adults, youth, women and family. A number of studies have found perceived need (Johnson 1989), commitment (Fishbein & Ajzen 1975; Fishbein 1995), self-efficacy (Bandura 1986,

1989) and skills (Fishbein 1995) to be predictive of these behaviours.

The distal (long-range) outcomes of the research partnership efforts are to influence decisions about sustainability at the organizational and participant levels. The work of Rogers (1995) is used to operationally define these organizational and individual behaviours. Rogers (1995) and Prochaska *et al.* (1992) have provided evidence of a hierarchy of decisions that establishes a five-stage knowledge transfer process among organizations and individuals.

In regard to sustainability at the organizational level, research partnership influence may occur at any one of five stages of the knowledge transfer process. In the initiation phase, (1) agenda-setting decisions are made regarding the need for specific

infrastructure or changes in the organizations or HIV/AIDS service delivery system. Next, (2) matching decisions have to be made; that is, the infrastructure change under consideration has to be linked to a problem or need in the organizational or system agenda. If there is an action phase, decisions usually occur around (3) redefining or restructuring the infrastructure changes to fit the organizational structure, (4) clarification in which the fit is more clearly defined, and (5) routinizing infrastructure changes as ongoing elements in the organization or system (Rogers 1995).

In order to sustain individual behaviour, participants have to acquire knowledge, acquire favourable attitudes, commit to implementation, engage implementation and confirm or maintain being engaged in research production or use activities. The research partnership can play a major role in this five-part process by: (1) providing investigators, policy makers and service providers knowledge and understanding about conducting/using high-quality HIV/AIDS research and collaborating with others; (2) persuading participants toward a favourable attitude about producing/using high-quality research and collaborating with others, and (3) influencing individual decision making about preparing research proposals and continuing to use available research, and continuing to collaborate. The research partnership can also assist in (4) implementation phase (e.g. proposal preparation, initiations of research projects, translating research into practice), and (5) confirmation phase (e.g. providing reinforcement of decisions to engage in proposal preparation, research, or research use) (Rogers 1995).

A research capacity-building planning model

In designing a research capacity-building strategy for the Liberian HIV/AIDS delivery system, we attempted to predict the future and formulated the long-term goals and related distal outcomes. The assumption is that these expectations will produce the outcomes presented in Fig. 1. Thus, the vision statement is as follows:

Five years after the implementation of an international research partnership strategy, Liberia should be able to build, support and strengthen its scientific infrastructure and investigators'

skills to produce high-quality HIV/AIDS research to effectively address the needs of the HIV/AIDS service delivery system at the national, county, community and organizational levels for an extended period of time.

This vision statement, which can be translated into two goals relating to infrastructure development and research production and use, is a point of departure for planning the future of the Liberia HIV/AIDS service delivery system (Landmark Education 1992). Objectives for each of these goals focus on what is needed in measurable terms to achieve this vision, which can be accomplished through a set of prescribed partnership activities and accompanied by anticipated outcomes stemming from the conceptual framework described earlier.

A capacity-building planning model presented in Table 1 provides the framework that includes needs, goals, objectives, project activities and anticipated outcomes. In response to each of the specified gaps and needs and the subsequent objectives specified in the planning model, international research partnership activities are linked to specific objectives and corresponding gaps and needs for the two goals of the international research partnership. Anticipated outcomes are linked to each partnership objective, proximal outcomes (i.e. within 3–5 years) and distal outcomes (i.e. beyond 5 years) which concerns the sustainability of this innovative research partnership model. The partnership activities are discussed in detail below.

Research infrastructure development

In the planning model in Table 1 we specified innovative infrastructure development in column 3. The needs assessment reported earlier found that no research infrastructure exists in the HIV/AIDS delivery system in Liberia (Kennedy *et al.* 2004). Some say it is essential to have dedicated infrastructure to be responsive, effective and efficient (Bossert 1990; Beuerman & Burdick 1997; Chaskin 2001). Beuermann and Burdick (1997) and Lefebvre (1992) further suggest that a new organizational unit, such as this international research centre for Liberia, may be necessary to support innovative practices.

Thus, the plan calls for new research structure in the form of an international research

Table 1 Logic model for the Liberia–US research partnership implementation and sustainability initiative

Goal 1: Build, support and strengthen scientific infrastructure and investigators' skills relating to the production and use of high quality research to combat HIV/AIDS in Liberia for an extended period of time	Research infrastructure development activities	Proximal outcomes (short- to intermediate-term)	Distal outcomes (long-term)
<p>Objectives</p> <p>Objective 1.1: Strengthen research structures to support research and its use concerning HIV/AIDS in Liberia</p> <p>Organized research structure to support research and its use concerning HIV/AIDS in Liberia</p>	<ul style="list-style-type: none"> Establish research infrastructure Establish multi-disciplinary HIV/AIDS scientific cadre Establish formal linkage between the Liberian HIV/AIDS scientific cadre and international scientific bodies 	<ul style="list-style-type: none"> Partnership participants' favourable reaction to the partnership in terms of (a) acceptance of the partnership, (b) perceived salience of partnership activities and products, and (c) communication receptiveness to the partnership Adequate support of the participating organizations support of the partnership structure, roles and relationships Increased participant readiness [perceived need, commitment, self-efficacy (self-ability)], and skills to produce high quality research 	<ul style="list-style-type: none"> Organizational decisions to sustain effective elements of the research partnership strategy Participant decisions to continue to collaborate with others and to engage in future research production and/use activities through the research partnership
<p>Objective 1.2: Strengthen and maintain science to practice information networks, leadership and champions in and outside of HIV/AIDS service delivery system of Liberia</p> <p>Inter-organizational linkages and leadership and champion roles to support multi-disciplinary research and its use concerning HIV/AIDS in Liberia</p>	<ul style="list-style-type: none"> Establish a research consortium Establish by-laws for the consortium Identify and establish regular contact with potential leaders and champions of HIV/AIDS research and innovative practices Establish and maintain an information network directory Publish a semi-annual newsletter 	<ul style="list-style-type: none"> Partnership participants' favourable reaction to the consortium in terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness Adequate support for an information network Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills regarding interagency information networking and establishing and maintaining supportive leaders and active champion 	<ul style="list-style-type: none"> Organizational decisions to sustain an effective network, supportive leaders and champions Participant decisions to engage in future interagency information networking
<p>Objective 1.3: Build and maintain expertise to sustain HIV/AIDS research infrastructure and capability in Liberia</p> <p>Opportunities to build research expertise to engage in high quality HIV/AIDS research and its use in Liberia</p>	<ul style="list-style-type: none"> Conduct training and technical assistance in strategic planning Conduct training and technical assistance in human subjects Conduct research methodology training (e.g. programme evaluation, clinical trials, data analysis) Conduct training in project/grant management, and internet use Conduct training in preparing manuscripts 	<ul style="list-style-type: none"> Partnership participants' favourable reaction to training and technical assistance in terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness Adequate support for the participating organizations regarding expansion of opportunities to increase research expertise Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills regarding training and technical assistance 	<ul style="list-style-type: none"> Organizational decisions to sustain effective training and technical assistance Participant decisions to collaborate and use knowledge and skills in future research production and/use activities

<p>Resources to support high quality HIV/AIDS related research and its use in Liberia</p>	<p>Objective 1.4: Increase resources to support and sustain high quality HIV/AIDS-related research and its use in Liberia</p> <ul style="list-style-type: none"> • Set up secure research facilities • Acquire research equipment such as computers, scientific software and internet services • Acquire library holdings concerning HIV/AIDS, research methods and statistical analysis • Support professional development activities through conferences and professional associations • Develop/advocate for policies and procedures relating to research such as: Human subject requirements By-laws for research partnership Quality assurance for investigators Formal collaboration agreement among HIV/AIDS-related organizations in Liberia 	<ul style="list-style-type: none"> • Partnership participants' favourable reaction to resource enhancements and resource distribution in terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness • Adequate support of the participating organizations regarding resource selection and distribution • Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills relating to effective use of resources • Partnership participants' favourable reaction to proposed policies and procedures in terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness • Adequate support of the participating organizations regarding the proposed policies and procedures • Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills regarding partnership policies and procedures and skills for conducting high-quality research 	<ul style="list-style-type: none"> • Organizational decisions to sustain useful resources • Participant decisions to continue to collaborate and use resources in future research production and/use activities • Organizational decisions to sustain effective policies and procedures • Participant decisions to continue to collaborate and engage in future research production and use activities
<p>Policies and procedures to support high quality HIV/AIDS-related research in Liberia</p>	<p>Objective 1.5: Strengthen policies and procedures to support and sustain high quality HIV/AIDS-related research in Liberia</p>		

Goal 2: Effectively address the HIV/AIDS research needs of the HIV/AIDS service delivery system at the national, county, community and organizational levels in Liberia for an extended period of time

<p>Partnership needs</p> <p>Alignment of HIV/AIDS research needs and the availability of new HIV/AIDS research activities in Liberia</p>	<p>Objectives</p> <p>Objective 2.1: Increase and maintain alignment of HIV/AIDS research needs and the availability of new HIV/AIDS research in Liberia</p>	<p>Research production/use activities</p> <ul style="list-style-type: none"> • Conduct relevant studies focusing on the research needs of the HIV/AIDS service delivery system 	<p>Proximal outcomes</p> <ul style="list-style-type: none"> • Partnership participants' favourable reaction to the consortium terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness • Adequate support of the participating organizations regarding the implementation of research projects • Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills in conducting high quality research 	<p>Distal outcomes</p> <ul style="list-style-type: none"> • Organizational decisions to continue to conduct studies focusing on research needs • Participant decisions to continue to prepare research proposals/conduct high quality research that target high priority research needs
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Effective use of research within the HIV/AIDS service delivery system of Liberia	<p>Objective 2.2: Increase and continue effective use of research within the HIV/AIDS service delivery system of Liberia</p> <ul style="list-style-type: none"> • Conduct training in research use • Provide technical assistance on translating research into policy and practice • Design and implement a monitoring system that tracks research use and its impact 	<ul style="list-style-type: none"> • Partnership participants' favourable reaction to the use of partnership research in terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness • Adequate support of the participating organizations regarding using results from relevant research projects • Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills in using results from relevant research projects 	<ul style="list-style-type: none"> • Organizational decisions to continue using partnership research • Participant decisions to continue to use high-quality research
Funding to support and continue producing research that informs HIV/AIDS prevention and care-related services in Liberia	<p>Objective 2.3: Increase funding to support and continue producing HIV/AIDS research that informs HIV/AIDS prevention and care-related services in Liberia</p> <ul style="list-style-type: none"> • Conduct proposal writing training • Provide proposal development technical assistance • Review proposal drafts • Provide proposal production assistance 	<ul style="list-style-type: none"> • Partnership participants' favourable reaction to proposal writing in terms of (a) acceptance, (b) perceived salience, and (c) communication receptiveness • Adequate support of the partnership organizations regarding preparation of research proposals and conducting research • Increased participant readiness (perceived need, commitment, self-efficacy [self-ability]), and skills in proposal writing and research production 	<ul style="list-style-type: none"> • Organizational decisions to sustain research proposal writing and research production • Participant decisions to continue to prepare research proposals/conduct high quality research

centre established in Liberia to manage and coordinate infrastructure development, interagency linkages, and research production and use activities that link science (i.e. research), policy (i.e. legislation) and practice (i.e. action research).

It is also necessary to create a multidisciplinary scientific cadre of investigators to conduct HIV/AIDS research and proposal development. Findings from the Liberia needs assessment demonstrated that the local investigators have limited HIV/AIDS research experience, yet they do have research skills that could be strengthened, and subsequently applied to future HIV/AIDS research activities (Kennedy *et al.* 2002). In addition, partnership investigators need to be encouraged to identify and join appropriate international health-related associations, which are important for networking, providing opportunities to learn about current state-of-the-art HIV/AIDS research activities, and serving as outlets for information dissemination.

The Liberia needs assessment identified the need to have a mechanism to support inter-organizational linkages within the HIV/AIDS delivery system. We also found there is limited leadership and advocates for HIV/AIDS research and innovative practices in Liberia (Table 1).

The literature discusses the importance of linkages that facilitate cooperation among diverse agencies or organizational units responsible for the effective and ongoing implementation and sustainability of innovations such as an international research partnership (Bauman *et al.* 1991; Schwartz *et al.* 1993; Foster-Fishman *et al.* 2001). In addition, research repeatedly points to the importance of leaders and champions (influential and proactive individuals inside or outside of a system) in the implementation and sustainability of innovative structure and practices. Inadequate leadership buy-in (Buller & McEvoy 1989; Gersten *et al.* 2000) or ineffectual leaders (Bosser 1990; Edwards & Stern 1998; Goodman *et al.* 1998; Goodman 2000; Neville *et al.* 2000; Chaskin 2001) can derail an innovation's sustainability. Formal and informal leaders within adopting systems, as well as champions who proactively promote an innovation from inside or outside of a system, are critical to creating an environment that supports and facilitates sustaining innovations (Calsyn *et al.* 1977; Glaser & Backer 1980; Monahan & Scheirer 1988;

Steckler & Goodman 1989; McLaughlin 1990; Scheirer 1993; Rogers 1995; Streefland 1995; O'Loughlin *et al.* 1998; Shediic-Rizkallah & Bone 1998; Akerlund 2000; Gersten *et al.* 2000; Goodman 2000; Neville *et al.* 2000; Backer 2001).

In response to these needs for linkages, leadership and champion roles, the international research partnership would establish a research consortium comprised of organizational representatives of the research community, national government and the HIV/AIDS service delivery system (Table 1). Six types of institutional representatives would be considered:

- Academic institutions: Key informants derived from health-related academic institutions such as the University of Liberia and other paramedical entities that administer programmes to train health professionals in such areas as nursing, social work and laboratory science.
- Government health sector: Representatives from the government health care delivery system, including the NACP, because they coordinate all health-related activities in the country, including the operation of the Liberian health care delivery system.
- NGOs: Key informants such as health coordinators and project directors from local HIV/AIDS providers and NGOs.
- CBOs: Key informants such as programme directors from a number of CBOs that provides HIV/AIDS-related prevention and care services throughout Liberia.
- Hospitals: Representatives such as nursing and laboratory supervisors and medical directors from both private and public institutions that provide basic medical and preventive services, which may include pre-/post-HIV/STD serology counselling and testing, STD treatment and care, and reproductive health.
- US-based research consortium: The consortium will include several organized research units from private and university settings that engage in international research that includes HIV/AIDS research, technology transfer and sustainability.

As part of the inter-organizational linkage efforts, the partnership will develop an information network and begin regular dissemination and notification of key events and sources of HIV/AIDS materials that

are available. An information network directory will be developed and updated on an annual basis. Getting detailed descriptive information about individual agencies and keeping the directory current will be major challenges for the partnership. The partnership also will publish a semi-annual newsletter that highlights international HIV/AIDS research, science-based prevention and care-giving programmes and strategies, current events, new library holdings and job opportunities.

The Liberian needs assessment found no infrastructure in the form of training and technical assistance that relates to conducting and using HIV/AIDS-related research (Kennedy *et al.* 2002). There is much discussion in the literature about expertise being essential to carry out the functions associated with producing research and using it to influence and sustain legislation, policy and practice (Bossert 1990; Haws *et al.* 1992). Such skills include knowledge of needs assessment, logic model construction, selection and implementation of research-based prevention interventions, fidelity assessment and staging intervention components (Goodman 2000). Knowledge of data collection and interpretation is critical to assure that communities identify prevention interventions to meet the needs of the target population and that organizations implement the interventions with fidelity or make appropriate adaptations (Backer 2001). Knowledge of process and outcome evaluation methods is necessary to assess and understand the effectiveness of the innovation, and communication and data presentation skills are needed to communicate this effectiveness to other key stakeholders (Green & Plsek 2002). Effective curriculum development and training skills are necessary in order to diffuse this knowledge within and across systems levels (Buller & McEvoy 1989; Klingner *et al.* 1999). Leadership skills are also critical to cultivate commitment to the innovation and the sustainability process (Neville *et al.* 2000).

Given these needs, it is essential to provide training and technical assistance regarding topics that are important for developing a strategic research agenda, acquiring research funding, conducting high-quality research studies, and disseminating and using research results. At a minimum, training and ongoing technical assistance will include strategic planning, proposal development, project management, human

regulatory committees, research methods, advocacy and internet usage. A variety of training workshops need to be developed and implemented by the international research centre to increase the skills of the African investigators, HIV/AIDS prevention and treatment professionals, and other key leaders and champions of HIV/AIDS research and innovative practices.

Adequate resources to support research activities are essential to successfully implementing and sustaining the research partnership. Because of the Liberian civil war, there are limited resources for research.

The literature points to the importance of adequate and stable funding for the implementation and sustainability of innovative practices (Scheirer 1993; Jackson *et al.* 1994; Goodman *et al.* 1997; Backer 2000; Goodman 2000; Chaskin 2001) in acquisition of diverse funding schemes (Goodman & Steckler 1987; Edwards & Stern 1998) such as fund-raising through grants (Akerlund 2000), taxes (Beuermann & Burdick 1997), channeling funds to the implementing agency rather than through a brokering agency (Steckler & Goodman 1989), federal funding (Pentz 2000), diverse funding (Goodman & Steckler 1987; Edwards & Stern 1998), and use of both local funding (Edwards & Stern 1998) and non-local funding sources (Goodman & Steckler 1987).

Funding is only one resource among many that are needed; other resources needed to sustain a system include physical, technological and informational resources. For example, technology and data resources are critical to generate information that informs needs assessment, and it is important to have evaluation data that provides effectiveness feedback to the system (Schwartz *et al.* 1993; Lee *et al.* 1995; Goodman 2000; Neville *et al.* 2000).

In response to limited resources for conducting research and building research capacity, grant funds need to be obtained to begin the process of rebuilding the research infrastructure in Liberia. In addition, strategic planning to obtain funding on a regular basis from sources outside of Liberia is needed. These activities can be conducted under the guise of an international research centre in Liberia.

Failure to establish and implement formal policies and procedures can create political obstacles to the implementation and sustainability of innovative

infrastructure and practices, sending mixed messages about the desirability of the innovation and expectations for sustaining it (Beuermann & Burdick 1997). Policies and procedures should assure that the innovation remains part of the routine practice of an organization or delivery system, even after the initial organizers who created an innovation leaves the organization or delivery system. In some cases changes in national laws are required to ensure the integration of the innovation into a national system.

While certain systems have the ability to force members to use an innovation, thereby promoting swifter adoption and greater stability of use (Lawrence *et al.* 2001), most social and health delivery systems, do not have adequate capacity to closely monitor and enforce such compliance. At most, health systems and their member organizations have the capacity to combine incentives, rewards and certification, or to use forms of pressure, to encourage sustained implementation of innovative practices. Such approaches can promote adoption more quickly than attempting to influence through incentives and rewards alone (Lawrence *et al.* 2001). Thus, policies and procedures with clear standards for performance, as well as clear penalties for non-compliance, are important, as is follow-through. Attention to the needs, attitudes and perceptions of adopters is critical to the support of an innovation.

The international research partnership will advocate for the adoption of formal policies and procedures that are essential for sustaining the production of high-quality research. Examples of essential policies and procedures are human subjects certification requirements, by-laws for the research partnership, a quality assurance manual for partnership investigators, and formal collaboration agreement among HIV/AIDS-related organizations in Liberia and internationally. Foremost are policy and procedures for conducting an institutional review of research studies with respect to human subject protections. Currently, there is no written policy that establishes human subjects' regulatory procedures specifying how reviews should be conducted. Explicit written by-laws will be established that formalize the research partnership and set expectations for its membership. Quality assurance guidelines will also be adapted to standardize how high-quality research can be conducted. Finally, collaboration agreements

will be formalized among the network of organizations that participate in the research partnership. These written agreements will help to clarify expectations and commitments.

Research production and use

Another essential element of the international research partnership strategy is alignment of research needs and research production (Johnson *et al.* 2004). That is, the partnership's research agenda will be driven by research needs identified from an in-country needs assessment.

To this end, based on the assessment of the Liberian research needs presented earlier (Kennedy *et al.* 2002, 2004), there are research production needs concerning HIV/AIDS-related problems. They include knowledge regarding (1) HIV/AIDS prevalence rates for the country; (2) causal factors associated with the link between STDs and HIV/AIDS, especially among high-risk populations; (3) reactions of society to people with HIV/AIDS; (4) HIV/AIDS organizational (intra- and inter-) behaviours; and (5) innovative interventions to prevent and care for people living with and affected by HIV/AIDS. Of those research needs, the partnership will consider the highest priority projects and proposal development will commence to address those concerns. Testing of innovative HIV/AIDS prevention and care strategies was not viewed as unimportant; it was that those who were interviewed expressed a need for basic knowledge about the problem needed to be investigated before exploring solutions to the problem.

In addition to research production needs, there is limited knowledge about the extent to which research is being used or whether it is being used effectively (Kennedy *et al.* 2002). In this regard, the partnership will focus attention on developing and implementing research use training that provides basic knowledge and skills for translating research into practice. This training will emphasize knowledge about ways in which research can be used. Furthermore, participants will have an opportunity to develop skills in translating illustrative research results into policy and practice. Follow-up technical assistance will be provided to members of the partnership consortium in connection with using results on a continual basis. Importantly, a monitoring sys-

tem will be designed to capture a minimum set of processes and outcomes for continual use. Some of these activities have been previously described and there is an entire discipline devoted on how to effectively convert scientific knowledge into practice and policy (Havelock 1969; Johnson 1985, 1999; Johnson *et al.* 2003).

Finally, in connection with research production and use, the international research partnership would centre on skill development relating to the acquisition of additional research funding to sustain this innovative international research partnership over a protracted period.

Conclusions

We have presented an international research capacity-building strategy to increase high quality research and innovative practices to combat HIV/AIDS in Liberia. The strategy and its conceptual framework are grounded in an assessment of research needs and the role of research in this country. Based on a gap analysis of needs relating to Liberian research infrastructure, production and use, a two-arm strategy and the related activities is being offered that stems directly from research needs. Anticipated proximal outcomes (i.e. short- to intermediate-term) provide guidance for implementation during a 3- to 5-year period and distal outcomes (i.e. long-term) focus on the sustainability of achievement during the implementation period. This research capacity-building strategy is but one alternative to combating the HIV/AIDS epidemic in Liberia and its implementation should be rigorously evaluated. Only then can the model be recommended for implementation elsewhere in the world, especially in resource-poor societies with significant needs for research infrastructure and resource development.

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