Evaluation of the Fogarty International Research Collaboration Awards (FIRCA) Program: A Feasibility Study

Contract # 263-MD-217306

Final Report

March 5, 2003

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Executive Summary

The purpose of this feasibility study was to assess the viability of a full-scale outcome evaluation of the NIH-supported Fogarty International Research Collaboration Awards (FIRCA) program. Our specific objectives were to examine program data to determine their sufficiency and integrity, design additional data collection instruments, conduct a pilot test of data collection instruments and procedures, and assess if an outcome evaluation is appropriate and cost-effective.

A comprehensive logic model was developed based upon a preliminary review of FIRCA program materials and interviews with program leadership. This logic model, in turn, was used to guide historical data analysis and protocols for case studies. Using these approaches, this feasibility study examined (i) questions of data validity and integrity and (ii) our ability to reach and communicate effectively with awardees. We developed a stratified purposive sample with representation from a wide range of cohorts, scientific disciplines, NIH Institutes of parent grants, and regions of the world. For each of these four dimensions, a sample of 15 candidate awards was chosen in order to adequately represent the various sub-groups. Upon implementation of the case studies, we received responses from 42 grantees representing 32 grants. Data were gathered on both AIDS-FIRCAs and non-AIDS FIRCAs at the feasibility stage.

Our findings span two levels. Methodologically, we found that FIRCA-related databases contain sufficient and reliable information, and can be integrated, albeit painstakingly, across platforms to create a single seamless database of FIRCA awardees. We also found that FIRCA program records are complete and updated enough that tracking of US-based Principal Investigators and International Research Collaborators is feasible and cost-effective. Finally, preliminary data collection demonstrated that FIRCA program outcomes and impacts are varied and substantive enough to attempt a systematic catalog of the program's characteristics.

Substantively, the feasibility study revealed interesting features about the program. For example, with respect to research capacity development in the developing country partners, the case studies lead us to believe that FIRCA grantees, as a group, are productive researchers, publishing their FIRCA project results in both in-country and international peer-reviewed journals. Award outcomes appear fairly substantive in the international context, ranging from improved understanding of scientific and clinical principles in the partner country, to development of techniques to prevent, detect, diagnose, and treat region-specific diseases, to training of researchers. Longer-term impacts, especially in the arena of public health, were less obvious. These findings led to the development of the blueprint of a questionnaire that could be used as starting point for a census survey for an outcome evaluation.

It is noteworthy that observations regarding program performance reported in this study are based on responses from a small group of awardees. A full evaluation – one that incorporates responses from awardees *and* unbiased observers – is required to ensure that the findings are generalizable to the wider program. Review of other capacity-related issues – such as participation of women in the program or of IRCs from developing countries underrepresented in the current FIRCA award population – are recommended as well. The full evaluation also needs to take into account external factors that influence the extent of outcomes and impacts in the partner countries. Finally, the evaluation needs to explore programmatic and management issues to make the FIRCA program more responsive to NIH, FIC and research community mandates.

In conclusion, based on our methodological and substantive findings, we believe an outcome evaluation is feasible, and vital to assess the full impact and future directions of the FIRCA program.

Acknowledgements

The authors would like to thank all those who participated in this study, especially the researchers and leaders in academia, both in the United States and in developing countries, who agreed to be interviewed and surveyed and who shared their insights and experiences in the field.

We would like to give special thanks to the project team at the Fogarty International Center, including Drs. Linda Kupfer, Karen Hofman, Kathleen Michels, Kenneth Bridbord, Jeanne McDermott, and Ms. Archana Mohale who provided ongoing information and technical support integral to our data collection and analysis. Without their involvement, many aspects of our research would have been difficult, if not impossible.

Support for this study was provided by the National Institutes of Health through contract number 263-MD-217306.

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1.0 Introduction

1.1 Phase I Evaluation: Context

The Fogarty International Research Collaboration Awards (FIRCA) program was initiated in 1992 by the Fogarty International Center (FIC) to foster international research partnerships between NIH-supported US scientists and their collaborators in countries of the developing world. The program funds 3-year research partnerships between practicing scientists and physicians in the United States and abroad. Geographically, the emphasis is on partnerships between US scientists and their colleagues located in developing countries, countries of the former Soviet Union, and those located in the former East bloc. The program aims to benefit the research interests of both the US principal investigator (USPI) and the international research collaborator (IRC) while increasing research capacity at the international site. The program has evolved since its inception with progressively more focus on the capacity development aspects of the award. In 1994, an AIDS-specific award, not restricted to developing or transition countries, was added.

Both programs use the R03 small research project grants mechanism. Awards are selected in light of various considerations, including: diverse scientific disciplines; various biomedical applications and disease targets; innovative research methodologies; potential products; and capacity development.

The FIRCA program has now completed its first decade of operations, and the FIC wishes to document the performance of this program, examine its overall operations, and make recommendations concerning the future of FIRCA. But before we itemize this study's goals and activities, it is instructive to review the context within which this study was conducted.

The NIH operates under two broad evaluation frameworks that directly pertain to this project.

- First, the *NIH Program Evaluation Guide: How to Develop a Proposal for One Percent Evaluation Set-Aside Funding* [1] sets forth prescriptions concerning the program to be evaluated, specifications for the need for evaluation, evaluation design, data collection and analyses, and the products of evaluation.

- Second, NIH is also subject to the requirements as set forth under the Government Performance and Results Act (GPRA) of 1993. Each year, NIH specifies its plans for meeting various evaluation and strategic planning requirements as called for under GPRA[2]. In general terms, under GPRA, NIH is obligated to identify program strategies and objectives of its sponsored research, prepare a series of related performance measures, document progress toward those objectives, make appropriate policy and programmatic responses, and ensure dissemination of information to key stakeholders.

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[1] Prepared by the Office of Evaluation, Office of Science Policy, Office of the Director, National Institutes of Health, January 2, 2001.

[2] 2003 NIH GPRA Performance Plan as specified on http://www1.od.nih.gov/gpra/fy2003final.pdf

The approach to evaluation developed in this project is guided by the application of these dual requirements in the context of the FIRCA program. Specifically, our evaluation rationale and design, proposed data collection and analysis procedures, and reporting plans respond to these requirements.

But even as we conform to these guidelines, we recognize that it is a challenge to evaluate programs whose missions include basic and clinical research using objective/quantitative performance goals preferred under GPRA. Strictly numeric goals and measures (e.g., publications, citations, and patents) are neither feasible nor sufficient to capture the breadth and impact of the FIRCA program. As a result, in approaching the feasibility study, we proceeded with the following understanding:

- Outcomes of FIRCAs will be difficult to foresee with any degree of accuracy;
- The full value of any FIRCA supported research finding will only barely be visible at the time of discovery, and may reach fruition only after many years; and
- The downstream impact of FIRCA-supported research will depend on substantial further development of new knowledge by private industry, other public sector researchers, or other economic actors.

Accordingly, this assessment process recognizes these difficulties and strives to conduct an analysis that accounts for the full picture of accomplishments.

1.2 Objectives of the Feasibility Study

The overall goal of the feasibility study is to assess the viability of a full-scale outcome evaluation. Specifically, the study has four objectives:

- to examine existing program data to determine its sufficiency and integrity,
- to design additional data collection instruments,
- to conduct a pilot test of new data collection instruments and procedures, and
- to assess if an outcome evaluation is appropriate.

In addition, we were asked to provide FIC with examples of FIRCAs and their accomplishments as we uncover them in the course of our data collection, to be included in the FIC 30th Anniversary Report. These can be obtained from FIRCA staff members.

1.3 Methodology and Procedures

The feasibility study was initiated with the development of a logic model that guided the development of the information requirements for the study, informed the sample selection process, guided the development of a case study protocol, and facilitated the analysis of the findings. If determined feasible, these steps led to an "update" of the logic model for use in guiding a more comprehensive Phase II outcome evaluation of the entire program.

The model, a "living" guide to the feasibility study, was followed by the development, in parallel, of an integrated database of the entire FIRCA dataset, and a case study sampling strategy and protocol. The database was used to completely characterize the universe of FIRCA applicants and awardees, and to test the validity and integrity of the data. The sampling strategy ensured representation from the various cohorts of FIRCA investigators, scientific disciplines and disease categories, NIH institutes of the parent grants, and capacity development goals. The case study protocol, consisting of questions regarding the context, goals, activities, outputs, outcomes, and impacts of selected FIRCAs, was meant to assess the viability of and to prepare for a survey of a representative sample of FIRCA grantees. A sample case study protocol is attached as Appendix A. Eight sets of the protocol were administered to a sample of FIRCA awardees and their international collaborators. Returned information from the case studies was entered into a relational database, coded, summarized and analyzed.

In this preliminary evaluation, no attempt was made to perform inferential analyses (e.g., identify the effects of discipline, disease category, or country on various outcomes and impacts). Rather, we used the results to identify the types of outcomes and impacts, and other awardee characteristics, and the implications of these findings for the further development of a potential Phase II outcome evaluation. The database and case studies were supplemented by review of secondary data about the program, and select interviews.

1.4 Organization of this Report

The remainder of this report is organized as follows. In Chapter 2, we discuss the methodology used in the Feasibility Study. Chapters 3 and 4 summarize our findings from database and case study analyses, respectively. In Chapter 5, we synthesize the findings, ending the report with Chapter 6, our conclusions and recommendations for the future. The report includes three appendices. Appendix A includes one of the eight case study protocols. Appendix B includes a draft of questions that might be considered as the starting point for a future closed-ended survey of FIRCA awardees. Appendix C lists the CRISP keyword terms used to identify fields of science associated with the FIRCAs.

2.0 Methodology

In the most general sense, a good evaluation will not only measure outcomes as they relate to goals, but also answer detailed questions about how a program operated over time. Case studies are therefore a useful tool in evaluations and help clarify what happened in the course of implementing specific research projects; how it happened; and how various decisions were made that, subsequently, had impacts on the project and its outcomes.

Given the preliminary character of this feasibility study, case studies of individual awardees were the primary vehicles (in conjunction with database analyses) in providing contextual information for an evaluation of the FIRCA program. The case studies themselves were guided by a comprehensive logic model of the FIRCA program. Inasmuch as the logic model played a pivotal role in development and implementation of the study, we first discuss the steps that led to its development, then review the model itself, and finally turn to a discussion of the case study design and implementation.

2.1 Review of FIRCA Documents and Databases

At the outset of the project, project staff obtained and reviewed various FIRCA program documents, including a series of program guidelines issued between 1992 and 2002, along with award jackets, various memoranda and other historical documents issued during this same period. In addition, several NIH and FIC databases that contained data pertaining to (or relevant to) the present study were explored. From these documents, a set of information specifications was established for development of a logic model, and for construction of a new project database that contained all electronic data available on the individual awards.

2.2 Conduct of FIRCA Expert Informant interviews

Shortly after completion of our program information and awards data review, several discussions were held with the FIC staff, FIRCA staff, and other knowledgeable parties concerning both the history of the program, and the objectives of the Phase I evaluation. In addition, the project staff reviewed hard-copy files pertaining to the program and to individual awardees. Further data gathering activities included observation of a FIRCA Advisory Committee meeting convened for the purpose of selection of a new round of awardees. Information from these various conferences and related documents contributed further to the development of the overall study design.

2.3 Database Development and Analysis

Information for applications and awards were made available to us via two sources: the Fogarty International Reporting and Scientific Tracking (FIRST) data system, and a spreadsheet prepared by FIC from NIH-wide databases IMPAC II and ECB/QVR. Both FIRST and the spreadsheet were incomplete, inconsistent, and not fully reliable on their own. FIRST was slow, and initial queries produced outputs that were not replicable. The FIC spreadsheet did not have all the variables of interest and information within these variables was only partially available. Painstakingly, we were able to construct a complete database, with the exception of records from 1992, where only successful applications were recorded. Analyses were performed using the statistical analysis package Stata.

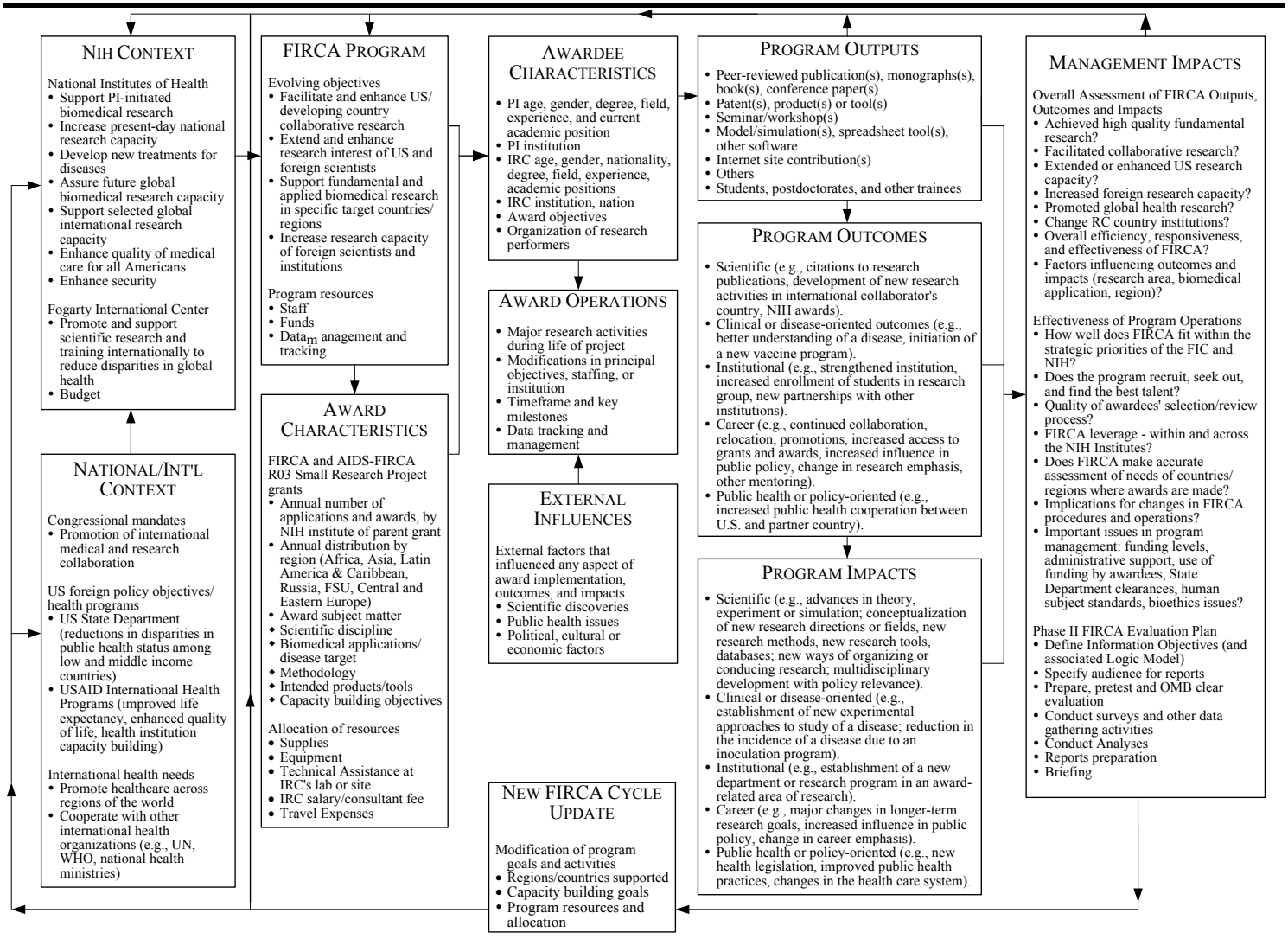
2.4 Development of a FIRCA Logic Model

The case studies were conducted using case study protocols to help to document the relative contributions of various factors that account for FIRCAs' outcomes and impacts. The logic model was the key methodological foundation in the case studies.

The logic model had several basic components, e.g., context, a problem statement, project activities, outputs, outcomes and impacts. It explored antecedent conditions critical to the establishment of the project, and variables that may have mediated its outcomes and impacts. The logic model used for the study is attached in Figure 2.1 below.

Figure 2.1

Phase One FIRCA Outcome Evaluation Logic Model



2.5 Drawing the Case Study Sample

Given that the goal of the case studies was to explore salient issues for the development of a comprehensive survey, a sample of awards was drawn so as to attain maximum representation of FIRCA grantees. Cases were selected using four dimensions all directly relevant to assessing program outcomes:

- Regions of the World: Countries were grouped under four regions, including: Africa, Asia, Latin America and the Caribbean, and states of the Former Soviet Union, and Eastern and Central Europe.

- Scientific Disciplines: Disciplines were chosen from keywords provided on the NIH CRISP database website. They included: pharmacology, genetics, chemistry, math, physiology, cellular research, clinical, epidemiology, and others.

- Research Capacity Development[3]: Award jackets retrieved from FIC were reviewed to assess their stated capacity development goals at the individual, institution, country, levels, or no explicit capacity development goals.

- NIH Institutes: The sample was drawn to get wide representation across as many Institutes as possible. This last parameter served as a proxy for disease category (with the exception of NIGMS – which funds more disciplinary-oriented research).

A stratified, purposeful sample of 60 awards was drawn. For each of these four dimensions, a sample of 15 candidate awards was chosen (or 60 awards) in order to adequately represent the various sub-groups found under each dimension. It was assumed that we would locate 12 of the candidate awards drawn, and achieve a 75% response rate thereof, for a total of nine respondents per dimension, or 36 awards in all. Many candidate names were offered by NIH that were duly considered in the sampling methodology. Due to an error in a NIH database, one of the awards was removed from the sample, leaving 59 awards. Across these four independent variables, the sample was as follows:

- Region:
    - 8 for Africa
    - 10 for Asia
    - 17 for Latin America and the Caribbean
    - 24 for the Former Soviet Union, Eastern, and Central Europe

[3] For the purpose of this study, capacity development was operationally defined as "the process by which individuals, groups, organizations, institutions and societies increase their abilities to: 1) perform core functions, solve problems, define and achieve objectives; and 2) understand and deal with their development needs in a broad context and in a sustainable manner." Research capacity, in the narrowest sense, was referred to the capacity to identify, plan and implement research. More broadly speaking, it also includes other resources – material, human and intellectual – that are available for doing and using research, together with the ways in which these resources are brought to bear.

- NIH institute:
    - NIAID – 19
    - NCI – 10
    - NHLBI – 5
    - NINDS – 5
    - NICHD – 4
    - NIDDK – 4
    - NIDCD – 2
    - NIDCR – 2
    - NIMH – 2
    - NIGMS – 2
    - NIA – 1
    - NIAMS – 1
    - NIDA – 1
    - NCRR – 1

- Scientific disciplines (For those available. Each award may have multiple disciplines):
    - genetics – 27
    - cell biology – 18
    - epidemiology – 11
    - mathematics – 5
    - chemistry – 17
    - physiology – 14
    - pharmacology – 9

In addition, we selected awardees so as to distribute them over the first ten award years of the FIRCA program approximately as follows.

- 17 for FYs 92-95
- 20 for FYs 96-98, and
- 22 for FYs 99-01

Table 2.1 presents a summary of the distribution of the awards by region and NIH institute.

Table 2.1

Allocation of Case Studies by Region and NIH Institute

Region/NIH Institute	Africa	Asia – Middle East	Latin. America – Caribbean	FSU – Europe	Total
NIAID	6	2	7	4	19
NCI	-	-	-	10	10
NHLBI	-	2	1	2	5
NINDS	-	2	3	-	5
NICHD	-	1	2	1	4
NIDDK	-	-	2	2	4
NIDCD	-	1	-	1	2
NIDCR	-	-	2	-	2
NIMH	-	2	-	-	2
NIGMS	-	-	1	1	2
NIA	1	-	-	-	1
NIAMS	-	-	1	-	1
NIDA	1	-	-	-	1
NCRR	-	-	-	1	1
TOTAL	**8**	**10**	**17**	**24**	**59**

Sources: Based on Abt Associates Inc. analyses

2.6 Developing the Case Study Protocol

Table 2.2

Sub-Protocols by Investigator

Sub-Protocol	USPI	IRC
Region/Country	Reg-USPI	Reg-IRC
Scientific Discipline	SciDisc-USPI	SciDisc-IRC
Institute/Disease	Inst-USPI	Inst-IRC
Research Capacity Development	CapD-USPI	CapD-IRC

Based on the sample and logic model presented above, the case studies operated under a master protocol, or interview guide. The guide was first split into two – one customized to the USPI and other to the IRC. Each questionnaire was further customized to account for influences from region, scientific discipline, institute, and capacity development goals. As Table 2.2 shows, each of the four protocols for each USPI/IRC pair varied according to these four independent variables.

Therefore, there were eight protocols in total. For each award chosen, one USPI and one IRC were asked to provide information on his or her award and experience. The corresponding protocols emphasized that information appropriate to each type of respondent (i.e., the USPI or the IRC), regarding each of the key parameters (i.e., region/country, scientific discipline, or institute/disease, research capacity development) was to be provided. One sample protocol appears as Appendix A of this report.

After all the projects were selected, the contact information for the USPIs was compiled along with their respective IRCs.

2.7 Case Study Implementation

After sending preliminary letters to 59 USPIs inviting them to participate in the study and requesting names and contact information for their IRCs, we found that we did not have a working e-mail address for 2 of the USPIs. Of the 57 USPIs, we received successful confirmation of receipt of FIC's request from 40. Using information provided by the USPIs, FIC, and Internet searches, we were able to find e-mail addresses for 32 IRCs. Of the 32 IRCs, we received successful confirmation of receipt of FIC's request from 26 of the investigators.

Of the 40 USPIs, we received completed questionnaires from 25, giving us a response rate of 62.5%. Of the 26 IRC addresses, we received completed questionnaires from 17 investigators, giving us a 65% response rate.

It should be noted that the use of a purposive sample, and a relatively small 'n' for the eight categories, precludes generalizing the findings from the case studies to the entire population. However, for purposes of Phase II study design, and developing inputs for a subsequent survey instrument, the response rates (62.5% and 65% for USPIs and IRCs respectively) were satisfactory.

Table 2.3

Number of Possible Case Studies and Completed by Protocol Type

Category	Number of Possible Case Studies		Number of Case Studies Completed	
	USPI	IRC	USPI	IRC
Region/Country	10	8	7	6
Scientific Discipline	13	9	8	6
Institute/Disease	9	4	6	3
Capacity Building Development	8	5	4	2
Total	**40**	**26**	**25**	**17**

Sources: Based on Abt Associates Inc. analyses

Table 2.3 above summarizes, for each protocol type, the number of possible case studies and number of case studies that were completed and received.

2.8 Case Study Documentation and Analysis

To store, view, and analyze data collected from the case studies, we developed a relational database in Microsoft Access. As completed questionnaires were received, we verified and updated current investigators' contact information, and transferred answers to the appropriate fields created. The database format enabled us to manipulate and organize data in various ways. We could, for example, compare answers to a single question across all investigators, and more easily detect patterns and trends. This convenient format of slicing, dicing, and viewing data made analysis a much less labor-intensive and more thought-provoking process.

The Figures below are screenshots from the database. Figure 2.2 shows the form used to input both USPI and IRC data along with the award information, and receipt status of the questionnaire.

Figure 2.2

Form used to input both USPI and IRC data, award information, and receipt status of the questionnaire

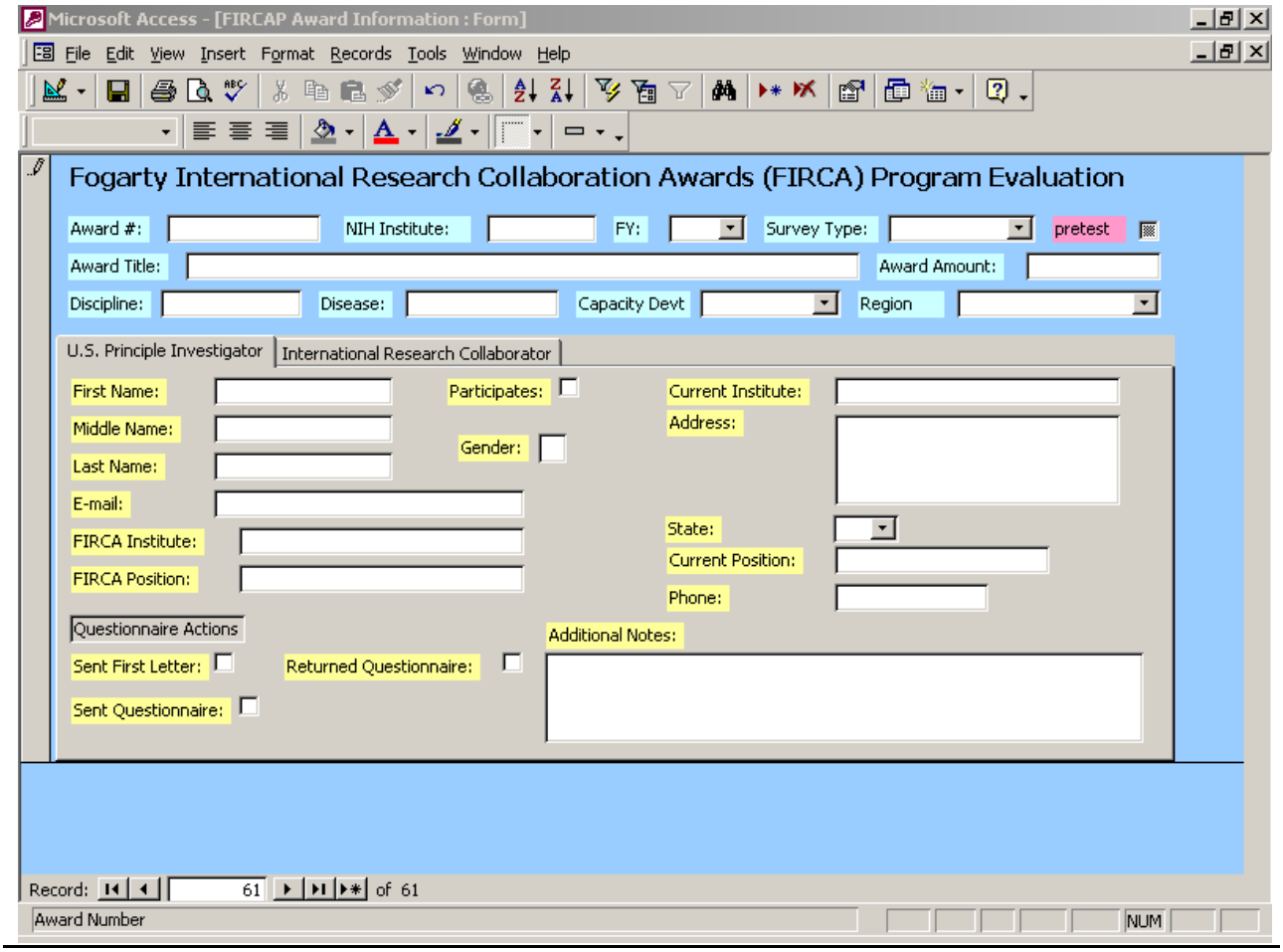
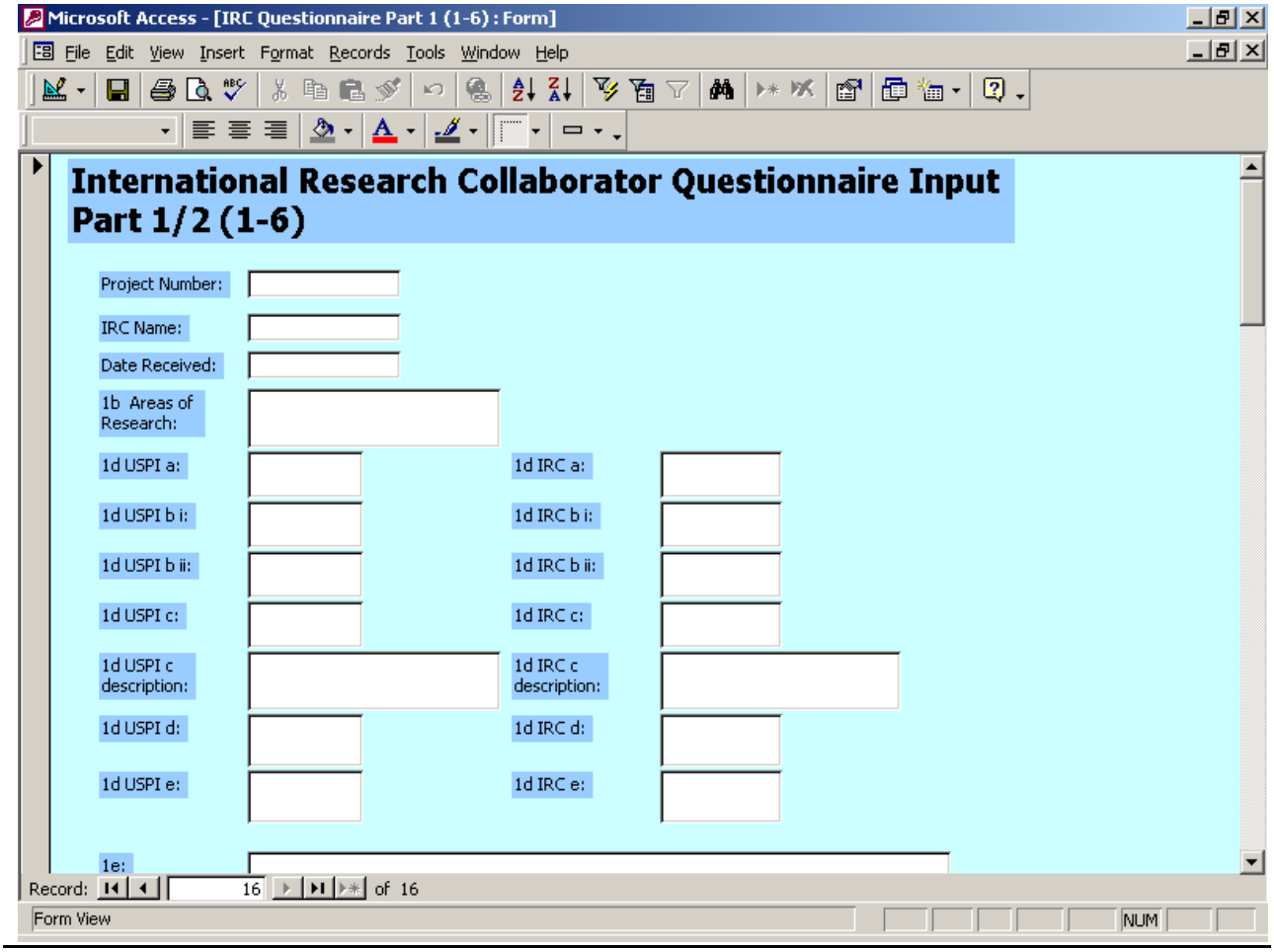


Figure 2.3 shows part of the input screen for the IRC responses. The USPI responses were inputted into its respective form.

Figure 2.2

International research collaborator form used to input questionnaire responses



3.0 Characteristics of FIRCA Applicants, Awards and Awardees

We used information provided by NIH's FIRST database and spreadsheet prepared by FIC in order to analyze and learn the characteristics of the FIRCA applicants, including the their geographical locations, and the nature of their awards.

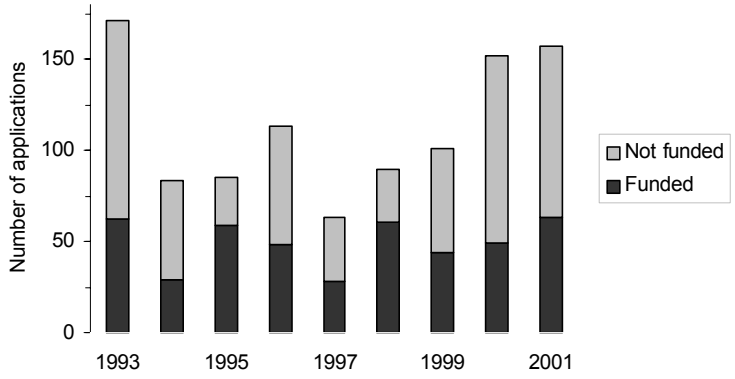
3.1 Applicant Pool

In an average year, FIC receives more than one hundred initial applications for FIRCAs (Figure 3.1). Apart from 1993,[4] which had an exceptionally large number of applications, the FIRCA program has seen a slight upward trend in the number of applications processed. On average, the number of applications has increased by 2½ percent per year[5].

In all, since 1993, the FIRCA program has received a total of at least 1,057 applications[6]. Of these, 930 were FIRCAs and 127 were FIRCAs restricted to AIDS research. Details of AIDS-FIRCAs are provided in Section 3.4.

Figure 3.1

FIRCA applications and awards, by fiscal year



Sources: Abt Associates Inc. analysis of FIRCA data.

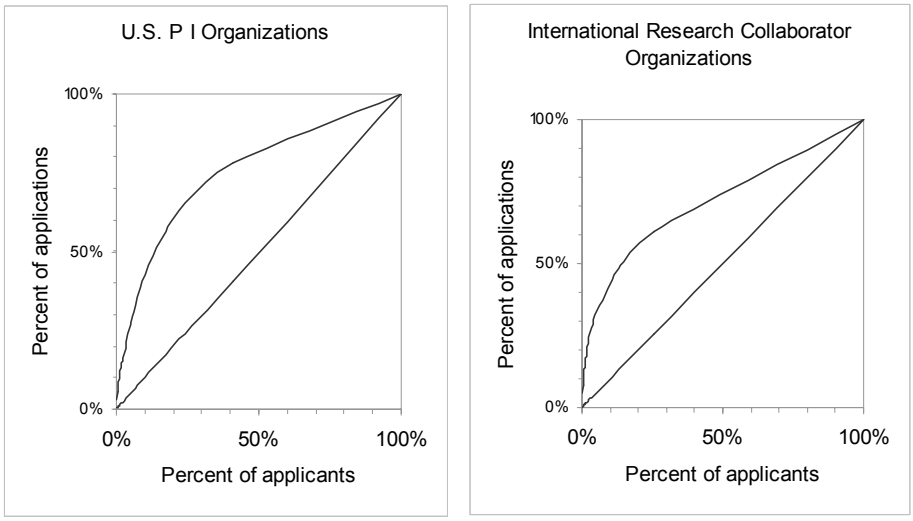
[4] We have no data on applicants from 1992.

[5] This increase is statistically significant at the 0.05 level (z=1.94).

[6] Data on the number of applications in 1992 is unreliable.

Figure 3.2

Concentration of organizations applying for FIRCA funding: 1993-2001



Note: Figure shows the percent of total applications submitted by organizations that ever applied for funding.

Sources: Abt Associates Inc. analysis of FIRCA data

Geographical Distribution and Affiliations of FIRCA Applicants. Over the period from 1993 to 2001, one quarter of USPIs of all applications for initial funding considered by FIRCA panels came from 17 US universities or other organizations (Figure 3.2). Sixteen percent of US organizations that applied for FIRCA funding submitted at least one application every two years. Such organizations accounted for half of all applications.

Among the IRCs, applicants came from 87 countries, representing 552 universities and other research organizations. International collaborators' home organizations are about as concentrated as those of USPIs.[7] Fourteen organizations accounted for a quarter of all applications, and one-sixth of the international organizations accounted for half of the applications. Table 3.1 lists the top foreign applicant institutions.

[7] The FIRCA database inconsistently records the identity of international collaborating organizations. We manually reviewed the names of the organizations and attempted to regularize the spelling, but the data in this paragraph almost certainly understate the extent of concentration because we probably failed to recognize some synonyms among the names. In addition, we resolved all ambiguities by assuming that two similar names were different if we were not reasonably sure they were the same. Different departments of the same university were treated as a single organization. On the other hand, various institutes of (for example) the Russian Academy of Sciences were treated as different organizations. Had we counted them as one organization, the level of concentration would have been considerably higher.

Universities in six states (California, New York, Massachusetts, Pennsylvania, Maryland, and Texas) accounted for half of the applications considered during this period. Geographical distribution of applicants is similar to that of awardees. The awardee distribution is shown later in Figure 3.5.

Table 3.1

Major International Collaborating Institutions, 1993-2001

Organization	Number of Applications
Russian Academy of Sciences	53
Moscow State University	29
Academy of Sciences of the Czech Republic	24
University of Zagreb	22
Universidad de Buenos Aires	18
Polish Academy of Sciences	17
Universidad de Chile	14
Russian Academy of Medical Sciences	13
Semmelweis Medical University (Hungary)	12
Universidad de la Republica (Uruguay)	12
Charles University	11
Universidade Federal do Sao Paulo	11

Sources: Abt Associates Inc. analysis of FIRCA data

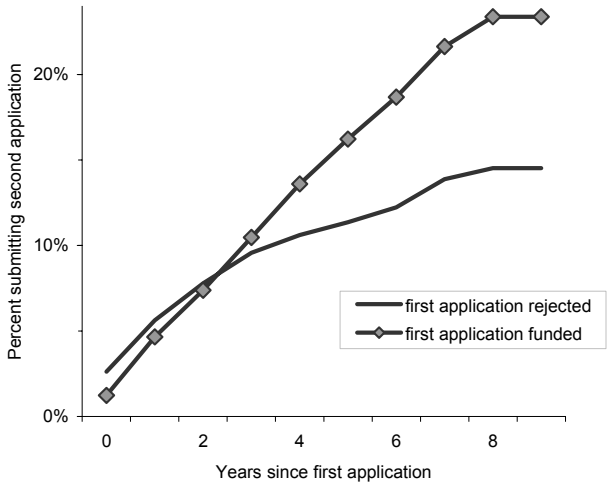
Award History of Applicants. Individual applicants rarely applied for more than one award during the period covered by our data. Five percent of the USPIs applied for a second award within the fiscal year immediately after their first application.[8] Two to three percent of the USPIs applied in each subsequent year. Combining the application rates for each year, we estimate that about 14% of USPIs reapply within five years of an initial application. Very few of the reapplications involve the same team of international collaborators.

In any given year, USPIs who have previously won an award are about 40% more likely to apply for a new award than applicants who had previously applied and been rejected. About 17% of winning USPIs reapplied within five years, compared with 11% of losing applicants (Figure 3.3).

[8] Our history of applications covers only 1993-2001. In this context, "first" award means the first occurring during this period.

Figure 3.3

Cumulative percent of applicants who apply for a second FIRCA award within 1 to 9 years after first application, by decision on first application



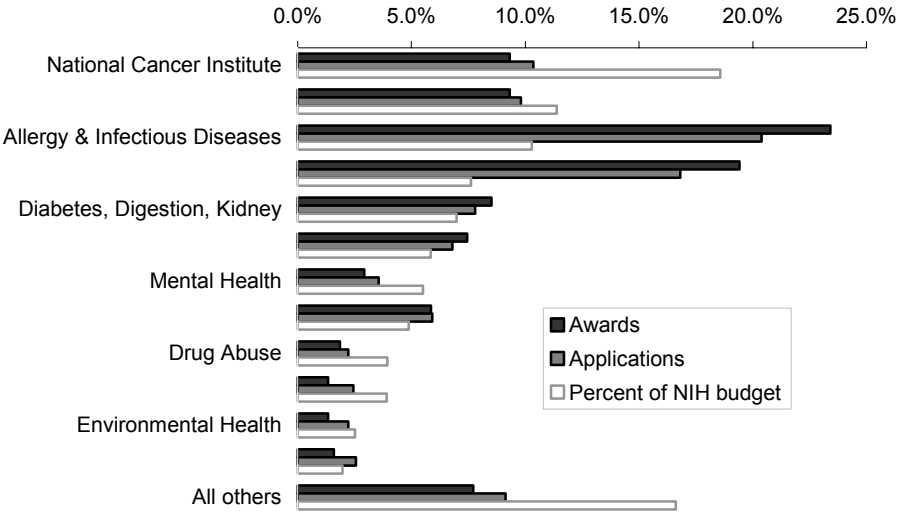
[a] Curves are based on a survival analysis of the time from first application to second application, if any. Each point in the curve is based on the previous year's point plus the application rate during that year of initial applicants with data for that year. The sample size decreases by about 10% each year.

Sources: Abt Associates Inc. analysis of FIRCA data

NIH Institute of Parent Grant of the USPI. Only investigators who have received another NIH research award are eligible to apply for FIRCA funding. Investigators with parent grants from the Institute of Allergy and Infectious Diseases (20%), the National Institute of General Medical Sciences (17%), and the National Cancer Institute (10%) were the basis of the largest numbers of applicants (Figure 3.4). These institutes also are three of the four largest institutes in the NIH budget for fiscal 2001. Compared with the budget size, the National Cancer Institute is somewhat under-represented among applicants, while the other two are somewhat over-represented.

Figure 3.4

NIH Institutes Associated with Parent Grants of FIRCA Applicants and Awardees, 1992-2001



Note: NIH budget figures are for fiscal year 2001, and exclude the Office of the Director.

Table 3.2A

NIH Institutes of Parent Grants by Type of Program[a]

	Program		
Institute of Parent Grant	**Regular**	**AIDS-FIRCA**	**Total**
Aging	5		5
Allergy & Infectious Diseases	58	35	93
Arthritis, Musculoskeletal & Skin	7		7
National Cancer Institute	37	5	42
Drug Abuse	4	3	7
Deafness & Communication	6		6
Dental	7		7
Diabetes, Digestion, Kidney	31	1	32
Environmental Health	6		6
National Eye Institute	5		5
General Medical Sciences	79	1	80
Child Health & Development	24	2	26
Heart, Lung & Blood	46		46
Mental Health	9	2	11
Neurological Disorders & Stroke	33		33
Nursing	1		1
National Center for Research Resources	7	1	8
Alcohol Abuse	2		2
Human Genome Research	2		2
No Parent Grant Listed	44	22	66
Total	**413**	**72**	**485**

a For all years. Note that AIDS-FIRCA did not start till 1994

Sources: Abt Associates Inc. analysis of FIRCA data

3.2 The Award Decision

On average, each year, about 64 applications (fewer that half submitted) are approved for funding, sometimes after revision or deferral for up to one year. The approval rate has fluctuated with no discernable trend during the period covered by our data, ranging from 69% (in FY 1994) to 32% (in FY 2000).

We did not find much systematic structure in the probability of awards. The institutions that submitted large numbers of applications had average funding rates no higher than those that submitted one or two in the period. Among individual investigators who submitted more than one application, those whose first application was successful were slightly more likely to be funded on their second attempt, but the difference is not statistically significant, and could be due to chance alone. Applicants with parent grants from all NIH institutes were about equally likely to be funded.

Institutions in a few states (California, Oregon, Iowa, Pennsylvania, and New Jersey) were more successful than average in getting their applications funded (Figure 3.6).[9] Three other states (Florida, Louisiana, and Maryland) experienced lower than average success rates. The geographic location of IRCs was completely unrelated to success rate. In other words, it appeared that no country or region was favored over another.

Table 3.2B below summarizes the number of FIRCA and AIDS-FIRCA applicants and awardees by year.

Table 3.2B

Number of FIRCA applications and awards, by fiscal year and program, 1994-2001

	Applications			Awards		
Fiscal year	Non-AIDS	AIDS	Total	Non-AIDS	AIDS	Total
1992	-	-	-	42	-	42
1993	171	-	171	62	-	62
1994	77	6	83	27	2	29
1995	63	22	85	46	13	59
1996	88	25	113	35	13	48
1997	55	8	63	24	4	28
1998	63	27	90	44	17	61
1999	88	13	101	37	7	44
2000	138	14	152	42	7	49
2001	145	12	157	54	9	63
Total	888	127	1015	413	72	485

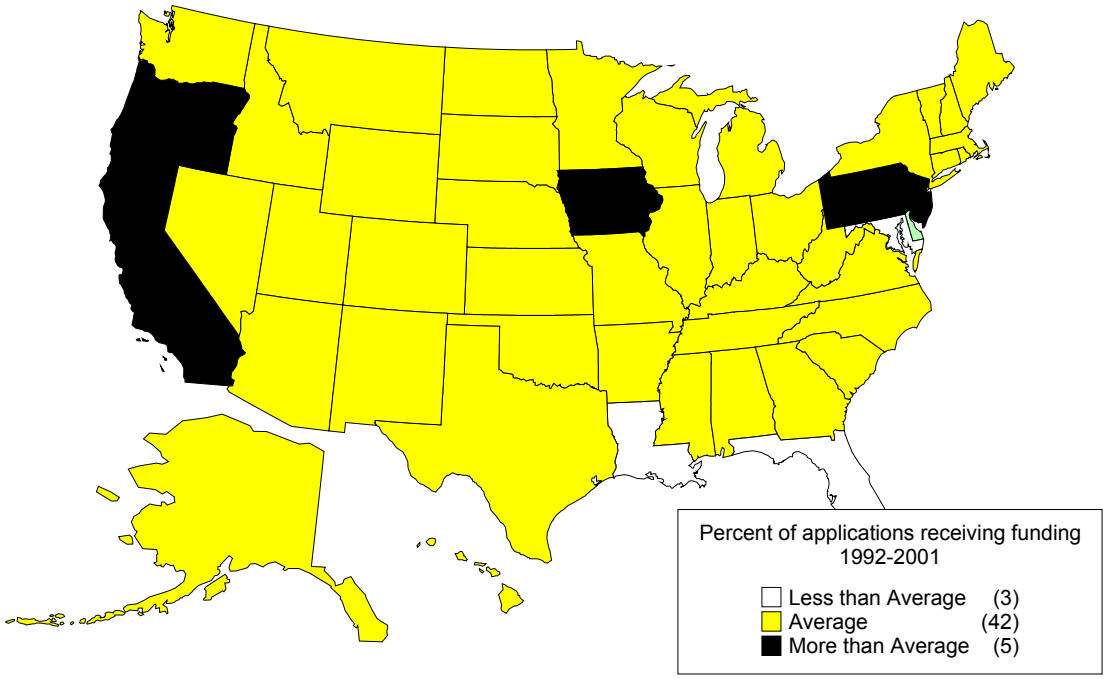
Note: AIDS FIRCAs were not made before 1994. Table includes an unknown number of unsuccessful applications in 1992. Total numbers of applications are for 1993-2001. Total number of awards is for 1992-2001.

Sources: Abt Associates Inc. analysis of FIRCA data

[9] This is based on two-sided t-tests comparing individual state success rates with the US average. In each case, $p<0.05$.

Figure 3.5

Percent of FIRCA Applications Resulting in Awards 1992-2001, by state



Note: States identified as different from average are statistically significant at the 0.05 level.

Sources: Abt Associates Inc. analysis of FIRCA data

3.3 Characteristics of Awardees

Geographic distribution of IRCs. Between 1992 and 2001, NIH awarded 485 FIRCA grants reaching researchers in 60 countries (Figure 3.6). Twenty one percent of these went to the Russian Federation, and an additional 21% were about evenly divided among Hungary, the Czech Republic, and Poland. More than half the countries (34) are represented by only one award during this period. Over the years, awards to Eastern Europe and The Russian Federation have decreased significantly, while awards to other regions have increased. A full list of awards by country of IRC is presented in Table 3.3. Figure 3.7 shows awards to transition countries decreasing in recent years, a trend we cannot explain using information in the database.

Table 3.3

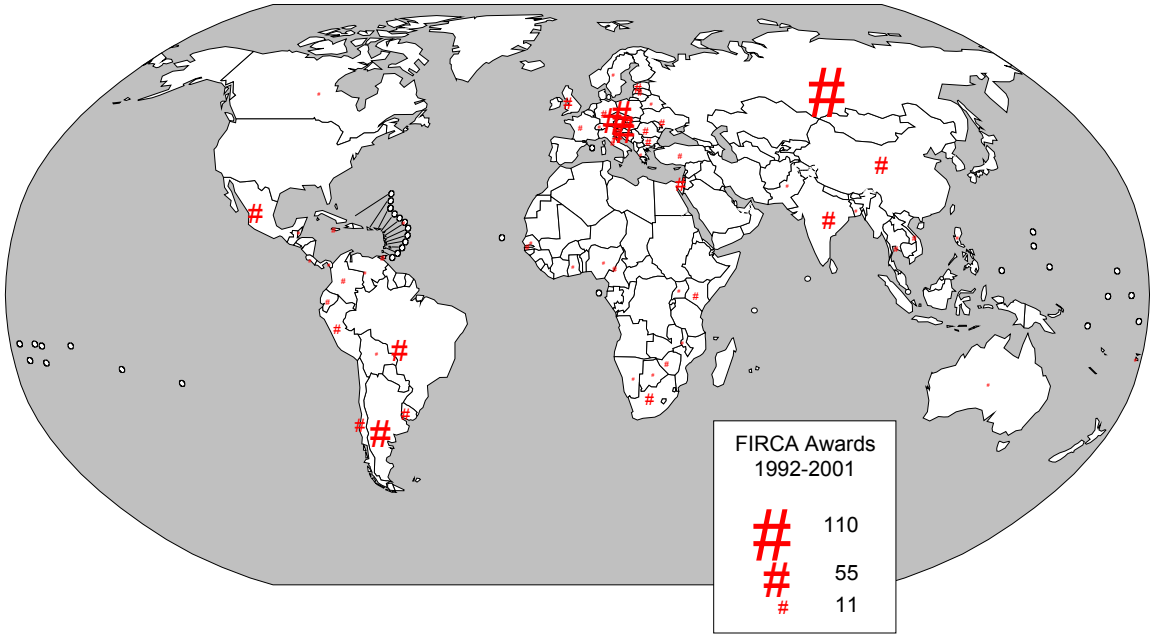
Number of FIRCA and AIDS-FIRCAs, 1992-2001, by Country of International Research Collaborator

	Non-AIDS FIRCA	AIDS-FIRCA		Non-AIDS FIRCA	AIDS-FIRCA
Latin America and the Caribbean	**111**	**13**	**Western Europe**	**1**	**20**
Argentina	34	2	France	0	2
Belize	0	1	Germany	1	3
Bolivia	1	0	Greece	0	1
Brazil	21	2	Italy	0	3
Canada	0	1	Sweden	0	1
Chile	12	0	Switzerland	0	1
Columbia	3	0	United Kingdom	0	9
Costa Rica	1	0	**Africa**	**14**	**13**
Ecuador	1	1	Botswana	0	1
Guadeloupe	0	1	Cameroon	1	1
Jamaica	2	0	Gambia	0	2
Mexico	19	1	Ghana	1	0
Panama	0	1	Kenya	4	1
Peru	4	3	Malawi	0	1
Trinidad	3	0	Namibia	0	1
Uruguay	9	0	Nigeria	0	1
Venezuela	1	0	Senegal	1	0
Country Name Unknown	**1**	**1**	South Africa	5	3
			Uganda	1	0
			Zimbabwe	1	2
Eastern Europe	**244**	**8**	**Asia – Pacific**	**42**	**17**
Belarus	1	0	Australia	0	1
Bulgaria	4	0	Bangladesh	1	0
Croatia	11	0	China	13	1
Czech Republic	30	3	Fiji	1	0
Estonia	6	0	India	12	5
Hungary	32	2	Israel	10	2
Latvia	2	0	Pakistan	1	0
Poland	31	1	Philippines	1	0
Romania	4	1	Taiwan	0	3
Russia	103	1	Thailand	0	3
Slovak Republic	9	0	Turkey	3	0
Slovenia	6	0	Vietnam	0	2
Ukraine	5	0			
TOTAL	**413 (Non-AIDS)**			**72 (AIDS)**	

Sources: Abt Associates Inc. Analysis of FIRCA data

Figure 3.6

Location of International Research Collaborators, 1992-2001

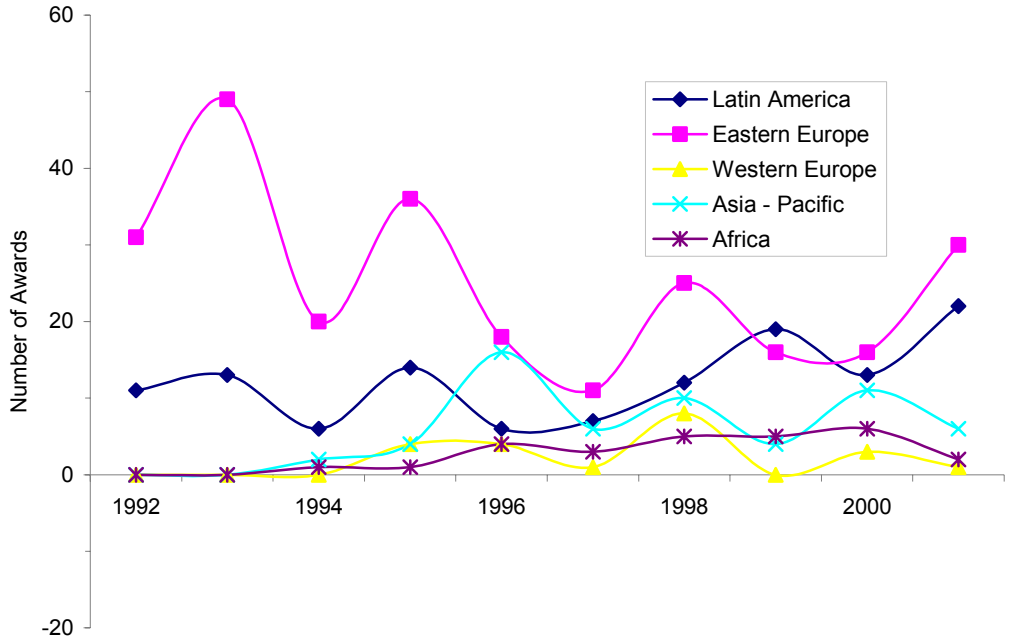


Note: China includes The People's Republic of China and Taiwan

Sources: Abt Associates Inc. analysis of FIRCA data

Figure 3.7

Number of FIRCAs, by Region: 1992-2001



Sources: Abt Associates Inc. analysis of FIRCA data

Scientific Content. For awards made after fiscal 1996, we were able to describe the scientific contents of the research based on keywords in NIH's CRISP database. We roughly classified the grants according to the occurrence of certain phrases in these keywords. For example, if the letters "DNA" or "gene" occurred in a keyword, we inferred roughly that the research involved some aspects of genetics. About half of all awards were classified as involving genetics by this definition (Table 3.4). Grants could – and often did – involve more than one field of science. Between 1996 and 2001, the number of fields of science mentioned in keywords increased significantly. We cannot say whether this increase reflected an actual shift toward multidisciplinary research or a move toward more inclusive coding practices at NIH. It seems likely, however that at least some of the observed shifts are real. Genetic research was mentioned in a quarter of the grants in 1997, compared with 60 to 80 percent in 1999-2001. Terms associated with physiology occurred in only seven percent of the 1997 awards, but in half of the awards for fiscal 2001.

Differences across regions by scientific content. The kinds of funded scientific research differ systematically among the countries (Table 3.5). Clinical studies[10], for example, are significantly more likely to take place in countries that have received only one or two FIRCAs than in countries that frequently provide collaborators (Figure 3.8). Only three or four percent of the studies in Russia and

[10] This analysis of scientific content is based exclusively on keywords associated with the awards in the CRISP data base. If one of these terms was "clinical studies" or a synonym, we counted the grant as a clinical study.

Argentina (major collaborators in FIRCA) involved clinical studies, while about a third of the research in countries with fewer than 8 awards involved a clinical study. Collaborators in Poland and the Czech Republic (and perhaps Uruguay) were more likely than average to participate in research involving chemistry or biochemistry.

Table 3.4

Fields of Science Mentioned in FIRCA Project Descriptions, 1997-2001

Field of Science	1997	1998	1999	2000	2001	All awards
Genetics	25%	36%	67%	88%	60%	47%
Chemistry	10%	32%	42%	50%	60%	35%
Cell Biology	15%	30%	44%	50%	48%	34%
Physiology	7%	20%	28%	33%	52%	25%
Clinical Studies	15%	18%	28%	17%	14%	18%
Epidemiology	5%	8%	14%	8%	12%	9%
Pharmacology	7%	6%	12%	4%	7%	7%
Mathematics	3%	5%	7%	0%	7%	5%

Note: See appendix C for definition of fields of science.

Sources: Abt Associates Inc. analysis of FIRCA data

Table 3.5

Fields of science referenced by FIRCAs 1997-2001, by country

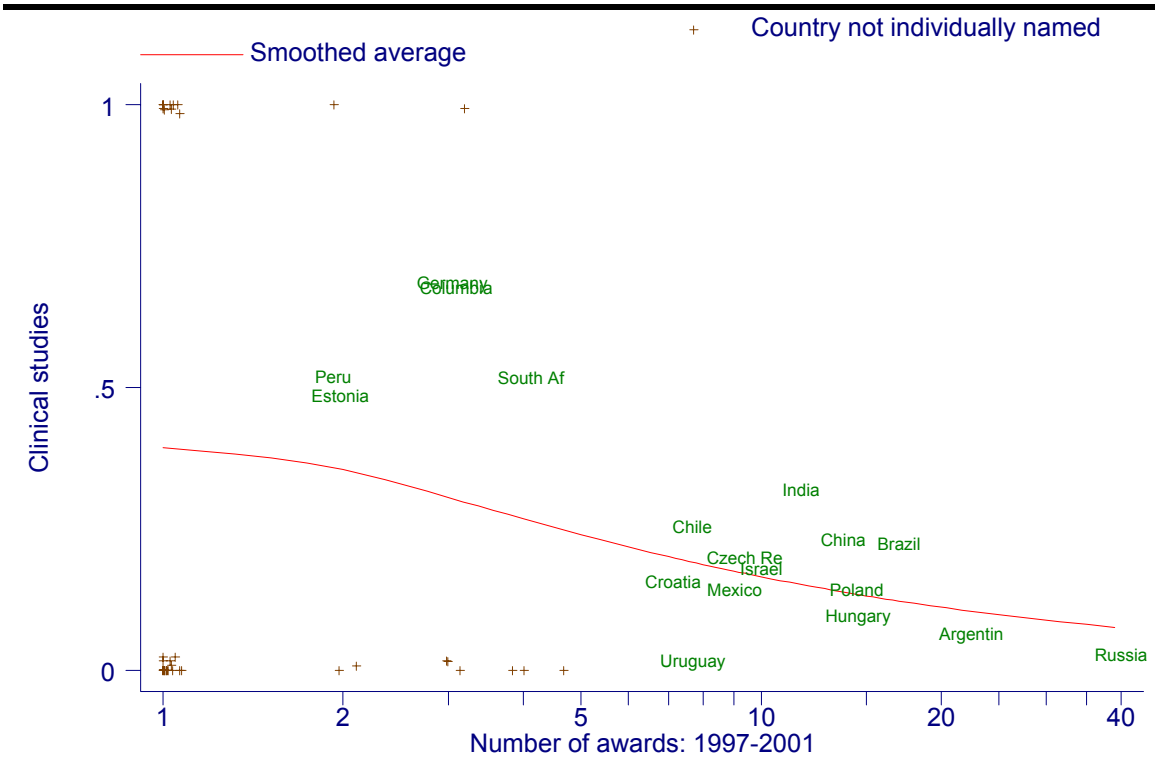
	Clinical studies[a]	Chemistry[b]	Physiology[c]	Genetics[c]	Number of awards 1997-2001
All countries	**18%**	**35%**	**25%**	**47%**	**258**
Russia	3%	36%	23%	49%	39
Argentina	4%	22%	48%	52%	23
Brazil	24%	35%	12%	53%	17
Hungary	7%	33%	13%	40%	15
Poland	13%	53%	20%	33%	15
China	21%	21%	43%	57%	14
India	33%	17%	17%	42%	12
Czech Republic	20%	50%	20%	80%	10
Israel	20%	30%	20%	50%	10
Mexico	11%	22%	22%	67%	9
Chile	25%	13%	25%	63%	8
Uruguay	0%	63%	50%	13%	8
All Others	31%	41%	22%	42%	78

[a] $p = 0.001$ [b] $p = 0.026$ [c] $p < 0.10$

Sources: Abt Associates Inc. analysis of FIRCA data

Figure 3.8

Fraction of Awards that Involve Clinical Studies 1997-2001, by Country



Note: Each point represents one country. The horizontal axis shows the number of FIRCAs made to that country during the period. The vertical axis shows the fraction of all awards to that country that mention clinical studies. Most countries with fewer than five awards are shown only as + marks; others are individually named.

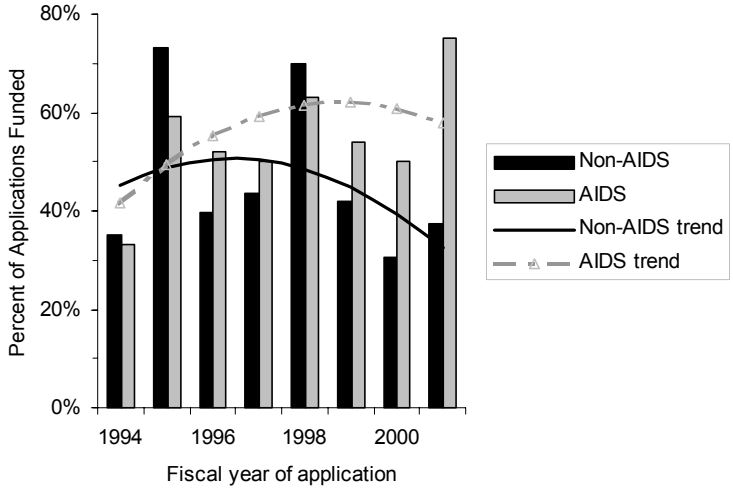
Sources: Abt Associates Inc. analysis of FIRCA data

3.4 Observations on AIDS-FIRCAs

In 1994, NIH began soliciting AIDS-related research as a special category of FIRCA grants. The next year, a quarter of the applications fell in this category (Table 3.2). By 1998, thirty percent of all FIRCA applications were AIDS-related.

Figure 3.9

Percent of FIRCA Applications that Received Funding 1994-2001, by year and AIDS-related content



Sources: Abt Associates Inc. analysis of FIRCA data

Since then, the number of AIDS-related applications has fallen to less than 10% in fiscal years 2000 and 2001. Statistically AIDS-related applications are generally more likely to receive funding than other FIRCA applications, especially in recent years (Figure 3.9). In fiscal 2001, three-quarters of the AIDS-FIRCA applications were funded, twice the rate (37%) of non-AIDS applications. The probability that an AIDS-related application will be funded has risen significantly since the category was introduced, while the probability of funding non-AIDS-related research has fallen.[11]

AIDS-FIRCAs have gone primarily to countries that did not receive large numbers of conventional FIRCAs (Table 3.6 and Figure 3.10). Among the 11 countries with the largest number of total FIRCAs, only India and China received more than 20% of their awards from the AIDS-FIRCA program (Table 3.7).

Nearly 40% of total FIRCAs to the remaining countries were funded by the AIDS-FIRCA program. Notable among these other countries are the United Kingdom, where all nine awards came under the AIDS program, Germany (three out of four), Peru (three out of seven) and South Africa (three out of eight).

[11] We tested these differences by logistic regression. The odds of funding for an AIDS FIRCA are 122% of the odds of non-AIDS funding ($z=2.83$, $p=0.005$). The overall odds of funding have fallen by about 8% annually ($z=-2.74$, $p=0.005$), and AIDS FIRCA funding has followed a different trend from other FIRCA applications ($z=1.84$, $p=0.065$).

Of the 66 international research organizations involved in AIDS-FIRCA, only four (listed in Table 3.6) received two awards. None received more than two.

Table 3.6

Countries and Institutions of AIDS-FIRCAs, 1994-2001

	Number of AIDS-FIRCAs	Institutions with two awards [b]
United Kingdom	9	University of St. Andrews
India	5	
Czech Republic	3	
Germany	3	
Italy	3	
Peru	3	
South Africa	3	
Taiwan [a]	3	
Thailand	3	Chiang Mai University
All Others	37	Medical Research Council Labs (The Gambia) University of Zimbabwe

[a] There was 1 AIDS-FIRCA awarded to the People's Republic of China

[b] No institution had more than two AIDS-FIRCAs.

Source: *Abt Associates Inc Analysis of FIRCA data*

Table 3.7

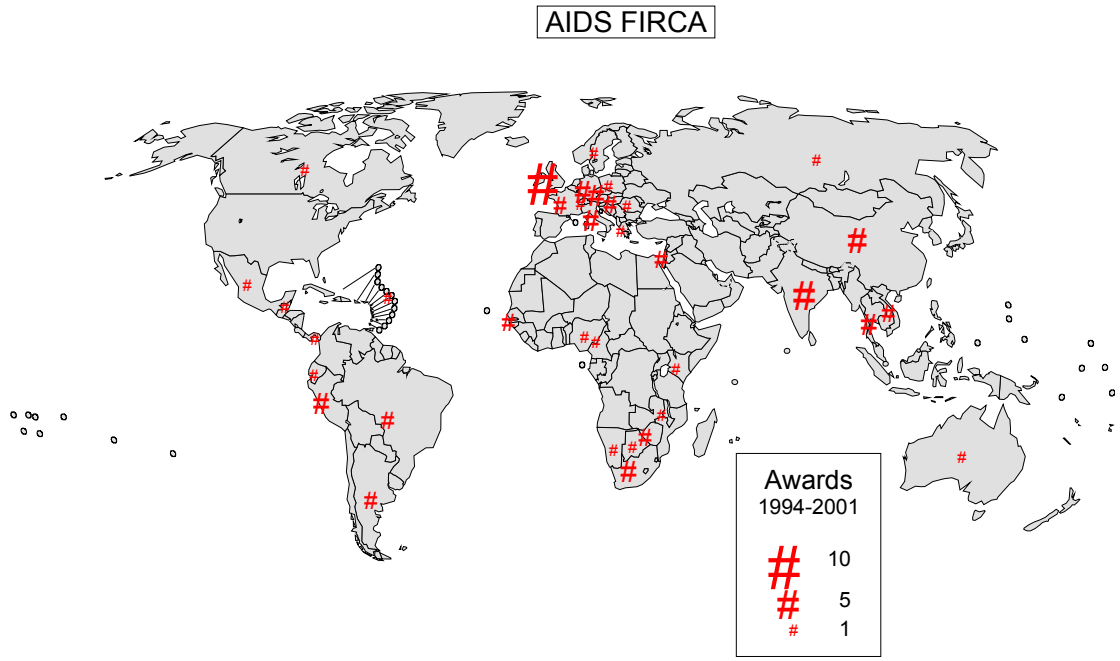
Percent of all FIRCAs that are AIDS-FIRCA, by Country of International Collaborator, 1994-2001

	Number of FIRCAs	Percent of total that are AIDS FIRCAs
India	17	29%
Israel	12	17%
Czech Republic	33	14%
Brazil	23	11%
Hungary	34	9%
Argentina	36	8%
China	14	21%
Mexico	20	6%
Poland	32	4%
Russia	104	2%
Chile	12	0%
All Others	148	39%

Source: Abt Associates Inc Analysis of FIRCA data

Figure 3.10

Location of International Research Collaborators in AIDS FIRCAs, 1994-2001



[a] Data for China include two awards in Taiwan and one in the People's Republic of China.

Source: Abt Associates Inc Analysis of FIRCA data

Among the fifty AIDS-FIRCAs whose parent grants we could identify, 35 (70%) were predicated on an award from the National Institute of Allergy and Infectious Diseases (Table 3.5). Nearly half of all FIRCAs to NIAID investigators were AIDS-related. Half of the awards to NIAID investigators (3 out of 6) also were AIDS-related. For NIH as a whole, about one in six awards fell under the AIDS-FIRCA program during this period.

Table 3.8

Number of AIDS-FIRCAs, by NIH institute associated with Parent Grant, 1994-2001

NIH Institute	Number of AIDS-FIRCAs [a]	Percent of Institute's total FIRCAs that are AIDS-related
Allergy & Infectious Diseases	35	47%
National Cancer Institute	5	17%
Drug Abuse	3	50%
Diabetes, Digestion,	1	4%
General Medical Sciences	1	2%
Child Health & Development	2	10%
Mental Health	2	20%
National Center for Research Resources	1	4%
All Institutes	50	16%

Note: excludes awards for which parent grants could not be identified. Also excludes non-AIDS FIRCAs in years before 1994

Source: Abt Associates Inc Analysis of FIRCA data

More than half of all AIDS-FIRCAs were classified as clinical studies by CRISP coders (Table 3.6). This is significantly higher than the rate of clinical studies among non-AIDS-FIRCA research. AIDS-FIRCAs were significantly less likely than others to involve genetics or chemistry as a scientific discipline.

Table 3.9

Fields of Science Associated with AIDS-FIRCAs, 1997-1999 [a]

	AIDS	Non-AIDS
Pharmacology	22%	7%
Genetics	30%	68%
Chemistry	19%	51%
Mathematics and computer science	4%	7%
Physiology	15%	36%
Cell biology	37%	46%
Clinical studies	56%	19%
Epidemiology	19%	11%
	(n=27)	*(n=166)*

[a] Data on fields of science were not available in earlier years..

Source: Abt Associates Inc Analysis of FIRCA data

4.0 Experiences of FIRCA Recipients

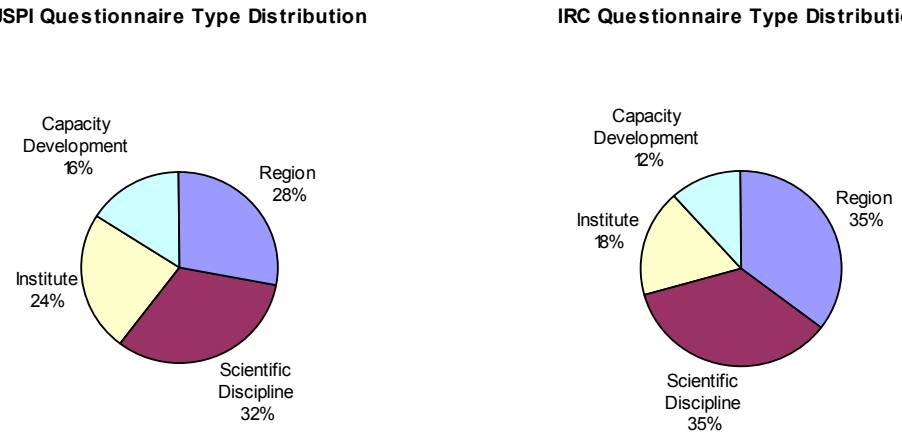
The purpose of this section is to report findings from the case studies of participating investigators regarding the context, goals, activities, outputs, outcomes, and impacts of selected FIRCA awardees. However, before we discuss the results, we review the case study methodology in brief. As discussed in Chapter 2, using a detailed sampling strategy we identified a small sample of FIRCAs to investigate in depth. Eight case study questionnaires were created; four tailored to the USPIs and four tailored to their IRCs. Within each set, different questions were tailored to explore influences on outcomes and impacts. Influence categories were: region of the world, scientific discipline, parent grant institute, and capacity development goals.

Of the 40 USPIs with whom we made successful contact (meaning we are aware that they received questionnaires), we received completed case studies from 25, giving us a response rate of 62.5%. Of the 26 IRCs with whom we made successful contact, we received completed case studies from 17, resulting in a 65% response rate. Among these responses, there were 10 USPI-IRC pair case studies. In other words, we gathered information on 32 awards from a total of 42 researchers.

Figure 4.1 below shows that the percent distribution of the questionnaires we received from both USPIs and IRCs was similar. It also shows that we received a relatively balanced set of responses from grantees in each of the four groups of questionnaires, with a slight preponderance of respondents from the scientific discipline group.

Figure 4.1

Questionnaire Type Distribution



Sources: Abt Associates Inc Analysis of FIRCA data

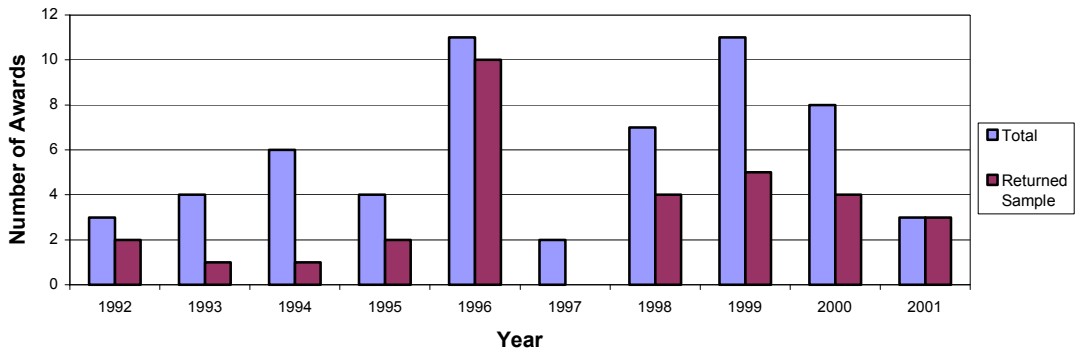
4.1 Respondent Characteristics

We were interested in learning about the evolution of the award since the early 1990s, and our sample reflected a representative distribution across all years. However, as seen in Figure 4.2, we found that most of the respondents came from the 1996-1999 cohort. Responses were skewed towards more recent years (16 awards since 1998, and only 6 before 1996). This was to be expected; recent awardees are more likely to remember the awards and have contact with collaborators than older ones. The drawback of this distribution is that we learned far more about FIRCA activities in more recent years than earlier ones (and consequently less about the impact of the evolution of the program).

The geographical distribution of the responding IRCs is consistent with our findings in Chapter 3, that a large fraction of the awards were received by USPIs collaborating with researchers in Eastern Europe and the Former Soviet Union (FSU). Figure 4.3 below shows the relative distribution of the respondents, with Eastern Europe and FSU leading, followed by Latin America and the Caribbean, followed by Africa and Asia.

Figure 4.2

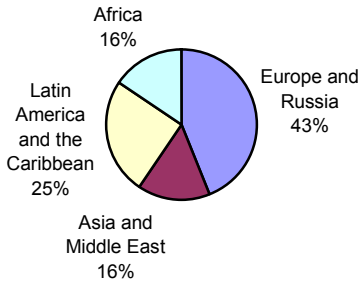
Distribution of Awards by Fiscal Year in Returned Sample



Sources: Abt Associates Inc Analysis of FIRCA data

Figure 4.3

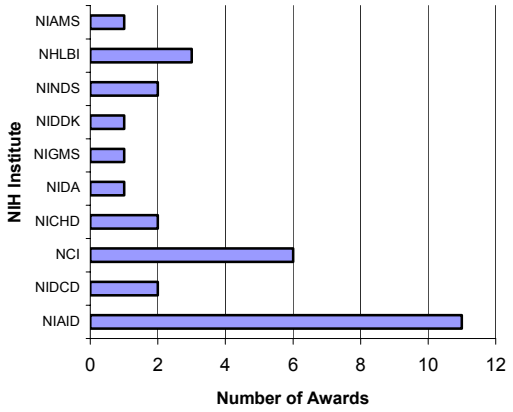
Number of Awards by Region



Sources: Abt Associates Inc Analysis of FIRCA data

Figure 4.4

Number of Awards by NIH Institute



Sources: Abt Associates Inc Analysis of FIRCA data

While the respondent patterns mirror the actual distribution of awards, it is likely that the response rate may be influenced by the relative advancement of Internet technology in the region. During the course of the case studies, we found that some IRCs had server issues that would not allow them to receive or send e-mail attachments.

Above in Figure 4.4, we see that an overwhelming number of respondents had parent grant awards from NIAID. This large number can be explained in that most of the FIRCAs were awarded to grantees of NIAID and an overwhelming number of applicants to FIRCA (and NIH) are from NIAID. We also found that most researchers in Africa in our case study sample were studying diseases and had a clinical focus, while those in Eastern Europe and FSU were conducting more fundamental or basic research.

Among the respondents, women constituted a third of the total respondents (16 women, or 38%). Over half of USPIs (13, or 52% of all USPIs responding) and 18% of responding IRCs were women. There were two female-female projects. Of the women, three-quarters focused on projects in Asia/Middle East and Africa.

4.2 Award Conduct

In the remainder of this chapter, we will discuss the responses to the case study questionnaires. The comments of the researchers helped us better understand the performance of this program, its overall operations, and its influence on downstream outcomes and impacts. These inputs will not only help determine if a full-scale outcome evaluation is viable, i.e. if there is more to the program than meets the eye and is worth measuring systematically, but also help to design an appropriate survey questionnaire in the event of an outcome evaluation.

4.2.1 Award Context

We were interested in learning more about the context of the award. Specifically:

- How the investigators learned about the FIRCA program and why they decided to participate in the program;
- The background and nature of the collaborations; and
- Whether the goals of the projects were consistent with the goals of FIC.

Discovery of the FIRCA Program

> *I have known of FIC and the FIRCA program since the beginning of time.*

Unlike the response from this USPI, we found that most USPIs had no previous knowledge of this program and that they learned of the FIRCA program from other colleagues and investigators in the year that they applied. Interestingly, there were some USPIs who learned about the program from their own international research collaborators. When not by word of mouth, USPIs report having learned of the program from the NIH and FIC Web sites and announcements. On the whole, IRCs learned of the awards from the USPIs with whom they had previous relationships (either ongoing or past collaborations).

Initial Contact

Based on awardee responses, it appears that FIRCA funds were small enough that they could not enable creating new partnerships and relationships, but large enough to extend and cement existing relationships. Most USPIs therefore used FIRCA funds to supplement ongoing or recently completed collaborations.

Many of the IRCs had histories of studying at or visiting the USPIs' labs. As stated above, the USPIs overwhelmingly wanted to support the research of and collaboration with their IRCs, most of whom they already knew and had previous working experience with. One IRC stated:

> *We began corresponding on common interests by e-mail. [Name], from our laboratory, visited the US laboratories for three months. Then, both groups decided to apply for funding through Fogarty in order to continue the collaboration.*

There were only a few cases where new contacts were made. For example, one IRC, "contacted me [USPI] after reading several of our publications." In another case, contact made decades before collaboration was re-ignited. "I had met him at a meeting in 1984 and we have similar research interests. We then re-connected when I was in New Delhi in 1995 since he was also a friend/colleague of my department chair"

Reason to Participate

As expected, we found that the most common motivations for USPIs to participate in the FIRCA program were to collaborate with and support the research of international colleagues of ongoing or past acquaintance. In the words of one USPI:

> *[I chose to participate in the FIRCA program] To allow [IRC] to continue to work in Croatia on projects that had been initiated while he was in my lab in the USA. The funding situation in Croatia after the civil war was dire, and he [IRC] could not have performed science at an appropriate level without extra help.*

Likewise, another USPI describes a situation that his IRC was in when the collapse of the Former Soviet Union led to a collapse of infrastructure and support for biomedical research. This USPI wanted to help his IRC maintain his laboratory.

> *At that time these grants only provided minimal support for supplies and travel and not for salaries, and the investigators in the FSU were paid barely enough to feed their families, so most left for other countries. [IRC] needed to stay because his daughter was a first rate pianist who was studying in Moscow.*

We found several investigators were also concerned with encouraging research in parts of the world. Another USPI stated:

> *[I wanted] To help support basic research of my long-time collaborator in Hungary. I was also pleased to be able to help support research in an Eastern European country with talented scientists and few resources.*

Another USPI realized that this grant was an opportunity to, "develop a new collaboration that was not ready for a major NIH grant application."

The most common motivation among IRCs was to continue current research. Similar to their US colleagues, several IRCs decided to participate in the FIRCA program in order to support or initiate their international collaboration and to build up their research capabilities and infrastructure. One IRC said that in addition to supporting his prior fundamental research, the, "project proposed to our team was interesting and gave us the opportunity to build for the first time collaboration with a US-based group." For some researchers, it was the only way to continue research in a war-torn country. One USPI recalls:

> *This was one of the few areas of high quality research going on in his country at the time. I was the first foreign scientist to visit Croatia at the end of the war and it was obvious that they deeply appreciated our support. I received a personal call from the director of the Croatian Academy of Science thanking me and the NIH for our valuable support. There is no doubt that the award and our collaboration have helped to cement relations between the two countries.*

Due to their prior working experiences, the investigators were each familiar with the others' backgrounds, research skills, and knowledge in the area of research. We found that the USPIs decided to collaborate with their IRCs mostly due to their knowledge in the area of interest and their research skills. One USPI described her collaborator as having, "clear conceptual thinking, creativity, excellent training in neuroscience and therefore a great potential to perform original research and build up a research group of her own." Several responded that their decision was based on their previous working relationships and

their personal interactions. For one USPI decided to work with the her IRC "shortly after our first meeting, when it was clear that we had major interests in common and that the collaboration would be between equals – and fun!"

On the other side, the IRCs seem to have made their decisions to collaborate with their USPIs based on? their previous working relationships with their collaborators. One IRC described his collaborator as a, "previous mentor during my postdoctoral fellowship in the early nineties, a long time collaborator, brilliant scientist and good friend." Other IRCs were impressed by their USPIs' reputations, research skills, knowledge in the area of interest, and their resources.

> *We knew [USPI] and his team toward his international notoriety and research capacity studying emerging disease. His strong background studying emergence and mechanisms of zoonotic disease… is unequivocal.*

The Proposal Process

Most FIRCAs began as teacher-student and mentoring relationships. In most cases, the USPI and the IRC reported contributing equally in developing the ideas of the proposal. One team spent 3 intensive days together writing and developing the proposals, preparing it for application. In the actual writing of the proposal, however, the USPI was the lead. This appeared to be a rational distribution – USPIs may typically be more comfortable with writing a proposal in English and more familiar with the US grant-writing process. There were a few instances where the IRC was the primary writer of the proposal. In these cases, it appeared that the IRC was more familiar with the research he wanted to pursue in his country.

FIRCA Project Goals

The overall mission of the FIRCA program is to promote and support scientific research and training internationally to reduce disparities in global health. It was instructive to observe the extent to which FIRCA project goals meshed with FIRCA program goals. We present below some of these project goals by FIRCA goal categories:

- ***Extend and enhance research interest of US and international research scientists;***

All FIRCA projects in the case studies were extensions of the investigators' previous interests.

> *My work in the area of nitric oxide/oxygen radical interactions and human pathology was already recognized at the time of the FIRCA award, which allowed me to extend and provide larger int'l impact to our overall working hypothesis.*

> *At the time of the award we had new results – isolated and characterized for the first time k-casein gene. We established the involvement of the NF 1 factor in the regulation of expression of the bovine b-casein gnee and probably of the c/EBP-a factor.*

At the time of the award, I was interested in membrane recycling by means of endo- and exocytosis, the mechanisms that were (and still are) important for maintaining and modifying plasma membrane composition in eukaryotic cells…A crucial role of endocytic vesicles in these processes as widely recognized and studied in many cell biology laboratories world wide. My FIRCA project, in which we aimed to isolate endocytic vesicles from different renal regions and to study their structure and function, completely fitted this research scope.

- ***Support fundamental and applied biomedical research in specific target countries/regions***

Research projects that had a regional focus tended to focus on understanding diseases specific to a population or a region. The disease specific goals targeted a number of diseases that ranged from malaria and HIV/AIDS to Alzheimer's disease and cardiovascular disease. In our sample of investigators, only on a few occasions (in cases such as HIV/AIDS) did more than one collaboration study a particular disease?. Most grantees were interested in better understanding the disease.

The main goal was to investigate the ecology of anopheline mosquitoes in Trinidad and to examine factors influencing their vector potential for malaria transmission.

The key disease-specific goal of this project was to test hypothesis that smoking and alcohol might potentiate sympathetic and tachycardic responses in patients with hypertension and congestive heart failure.

Our goal was to develop new strategies to reduce signaling through the IgE receptor of basophils and mast cells, resulting in a reduction of symptomatic allergies and asthma.

Many regional or country-specific research projects nonetheless had international implications (sometimes in ways they helped to test models or simulations).

Contribute to the elimination of cryptosporidiosis as a medical and veterinary disease. There are broad implications for finding a drug in case of waterborne and food borne outbreaks for the Czech Republic, as in other countries.

Trypanosoma cruzi the agent of Chagas' disease or American trypanosomiasis is a major public health problem among poor rural populations in Latin America, where 16-18 million persons suffer from this disease, and 90 million are at risk. The proposal focused on gaining a deeper understanding of the mechanisms and role of nucleic acid binding proteins that could be related to the regulation of gene expression and could finally lead to innovative projects for drug design.

To evaluate the probability that urban dengue would re-emerge from sylvatic cycles in Senegal should the urban viruses be eradicated through vaccination.

- ***Increase research capacity of foreign scientists and institutions***

The capacity development goals of the projects revolved mainly around transfer of technology and techniques, and training. They expressed hope that their research would give their IRCs experience in data collection, and in studying design methods and modern techniques. The IRCs were also interested in the transfer of technology and training to develop research protocols and methods in their labs.

To raise the awareness of Chinese scientific community on significance of molecular studies on Alzheimer disease and to train the students for future research activities.

To establish a research lab and to develop my own research group in my hometown/institution after returning from the US, and this way to generate local conditions for performing a competitive research in basic science (physiology, cell biology and toxicology).

The capacity development goals for the FIRCA project were to enhance the research on protein-nucleic acid interactions and specifically in the area of the protein studies, which has now resulted in the development of the Laboratory of Molecular Interactions at our Institution.

4.2.2 Project Organization and Conduct

In order to understand if there were any major issues in the conduct of the FIRCA project, both to frame questions for the outcome evaluation and to begin to identify issues around program operations, we asked the investigators about project conduct and challenges therein. In particular, we were interested in learning more about:

- Organization of the project;
- Relationship between the USPI and the IRC during the course of the project;
- Methods of distributing and transferring funds;
- Roles of the NIH institutes in the project; and
- Any challenges the USPIs and IRCs faced in the course of their collaboration.

Project Organization

There were two models of project organization. The first was a joint research effort where the two PIs and their teams worked together closely and addressed different aspects of the research problem. The second was where the USPI played a consultative role, answering questions and resolving problems at the IRC's discretion. Both cases involved reciprocal visits between the collaborators. The latter arrangement (USPI as consultant, expert, or mentor) was more common. Only in one case we observed that the foreign site did most of the data collection, with the USPI leading the analysis.

Operations in the partner country appeared relatively unconstrained. One USPI comments, for example, that he envisioned that the IRC, "would identify appropriate persons to assist in the research. She has done an outstanding job!" In the consultative model, the USPI guided and provided consultations to the research. One USPI observed that, "the US partners would provide direction and consultation, but the project would be primarily run by our Indian collaborators." One IRC states:

> *[Name of USPI] helped us choose the main questions among all possible ones. In the course of the research we constantly had consultations with him and received his valuable assistance, as everything we did was for the first time.*

While many projects started this way, i.e. with the USPI as the intellectual lead, the relationship evolved during the course of the project. Several USPIs noted that their mentor role changed into one of equal co-collaborators. One USPI enthusiastically writes, "At the outset, I was a mentor, but over this period, I have been delighted to see that we are now equal collaborators. That is certainly what I had hoped, and that hope has been realized." Interestingly, in at least one case, while the IRC identifies himself as an equal co-collaborator, the USPI and his lab appear to mentor the Russian lab. This suggests that several investigators may not view these terms as mutually exclusive.

> *I consider my role in the project as a role of equal co-collaborator. The US principal investigator, [USPI name], is one of the leading researchers in the world in the field of generation and using of transgenic frog lines for investigation of mechanisms of development. In the project, he and researchers of his lab have organized work with transgenic embryos. Also, they taught Russian collaborators how to make and maintain transgenic frog lines.*

Another USPI was very impressed by the collaboration between the two research groups. He commented on the two-way exchange between the research groups.

> *[IRC] and I were equal co-collaborators. His students were role models for mine and raised our productivity during their visits. They were typically less productive in their home laboratory, reflecting the difficulty of doing science in Mexico.*

In one particular case, the USPI said that while he was an equal co-collaborator with his IRC, he nevertheless sought to introduce his IRC to the scientific world.

> *In addition I also acted as a partial mentor to introduce [Name of IRC] to the scientific community in the USA by proposing him as a peer reviewer for some journals, nominating him for societies such as the American Physiological Society, inviting him to be co-author on some invited reviews that I was asked to write, and suggested him as a speaker in meetings and symposia. I also nominated him as an editorial board member for AJP Cell Physiology…*

These relationships are encouraging, for they show that there was collaborative growth between the USPI and the IRC. While many of the relationships started as mentoring relationships, they developed into more sophisticated relationships that demonstrated that it is not entirely unreasonable for both PIs to be colleagues with capabilities of equally contributing to the research.

Regardless of project organization, travel to the counterpart's site was common to all awards. PIs and IRCs found the exchange visits useful. According to one USPI, "I made arrangements with the FC [foreign collaborator] to have 2-3 months working visits to my lab every year. This was the most important and successful component of our planning." Another UPSI comments;

> *The FIRCA grant supported his [IRC's] travel and living expenses while in Boston. He visited every year for 3 years, as planned. One of his colleagues also visited the lab for an extended period to learn new techniques and import them into the Croatian facility.*

Resource Allocation

As directed in the FIRCA program announcement, most of the award funds go to the IRCs. The funding distribution varied from 80% to 100%. The IRCs tend to channel the funding not toward investigator salaries or student support, but rather toward supplies and specialized equipment. In one case, the funds were divided 50-50 between the US and international site. The US lab retained a significant portion of the funding to purchase equipment and supplies to send overseas. In many of the reported cases, FIRCA funds were also used for travel and salaries for the IRC and supporting staff.

When transferring the funds, most teams found it most convenient to either utilize a subcontract method or a direct wire transfer. In several cases, due to problems with transfer of funds to the foreign labs, the US labs would purchase supplies and equipment and send them over to the IRC. Also in several cases, funds were held in the US for the collaborator to spend time in the US.

Except for one project where there were some methodological and administrative issues that led to changes in the funding of the research, the rest of the respondents reported that the projects were funded in accordance with their original goals.

Institutional Support and Impediments at the IRC Home Institutions

In many cases, IRCs received supplementary support and resources from their home institutions. The resources the institutes offered most often were research space and specialized equipment. Examples of other resources the institutes offered included: personnel, salaries, infrastructure, and accounting and auditing facilities. The USPIs in particular, found the IRC institutions' willingness to offer any assistance they could during the course of the award commendable, and a sign of institutional commitment to the program.

For many of the investigators, the IRCs' institutes did not present any impediments. However, several USPIs and IRCs alike were unhappy with the unavailability of financial resources, the problems encountered when trying to transfer funds from the US to the foreign country, and the lack of

infrastructure to enable communication by Internet. One USPI spoke of a particular issue of the institute not assuming responsibility for customs problems, but fortunately this problem seems to have worked itself out.

> *Our principal impediment was the difficulty of sending perishable items to UNAM [IRC institute]. Because the grant resided in N[ew] M[exico], UNAM never accepted responsibility for customs problems, resulting, at least initially in the spoilage of several shipments of sensitive (and expensive) antibodies.*

Support and Impediments Posed by the IRC's Home Country

In addition to benefits and challenges posed by the home institutions of the IRCs, there were also benefits and challenges unique to the countries where research was being conducted. The benefits ranged from access to certain populations, to infrastructures already established in the country.

Some of the benefits mentioned:

> *Excellent registry of familial cancer resources and very interested and committed colleagues.*
>
> *The opportunity to apply our research methods using the ethnically diverse populations in South Africa.*
>
> *Abundance of malaria in Kenya. They also have a developing network of individuals interested in tracking drug resistance (East African Network for Monitoring Antimalaria Treatment, EANMAT)…*
>
> *Ministry of Health facilitated access to the field sites and worked interactively with our research team.*

Some researchers did speak of challenges. In Russia, for example, there appears to be a theft problem, which gave one group a particularly difficult time ordering equipment and materials. Another team was in the middle of regional conflict:

> *The second Intifada began in the middle of our project, making travel between Israeli and Palestinian areas much more difficult. We developed successful ways to visit our participants and to see each other anyway.*

One research team in Mexico reported that the project was interrupted several times by financial crises, but fortunately, the project worked out. He listed the dramatic barriers that included:

> *…Devaluation of the peso by 50% over 2 weeks in 1996; the closure of UNAM for more than 6 months by striking students in 1999; and an*

explosion in a Chemistry lab adjacent to the [IRC] lab that again closed operations for 6 months in 2000. Unfunded extensions helped protect our funds while these issues were worked through.

There were also challenges not directly related to the country, but cross-border procedures and bureaucracy. One of the most common challenges was importing supplies, especially clearing customs. Due to the long process, there were examples when supplies including live culture were ruined because of this process.

After 9/11, we have encountered more delays in shipments, and sometimes, the refusal of airlines to ship certain frozen commercially available reagents (e.g. enzymes for molecular biology work) because of their "suspicious" nature, even though we have official permission. We have lost several thousand dollars worth of reagents during our three year project, because of delayed shipments that have thawed.

Another USPI working with a Mexican researcher comments that "Customs was a nightmare and resolved primarily by driving across the border and shipping from the nearest DHL office."

While FIC may not be able to help overcome these barriers, nonetheless, recommendations were made. For example, several IRCs who had problems with the fund transfer recommended that FIC provide successful examples of how to transfer funds between different countries.

4.3 Award Accomplishments: Outputs, Outcomes, and Impacts

4.3.1 FIRCA Project Outputs

We asked the participants about the outputs of their FIRCA research projects providing clear definitions of outputs (as distinct from outcomes):

- Outputs refer to the immediate, observable products of research activities on the individual and/or institution, such as publications or patent submissions, degrees conferred, faculty appointments, etc.

And providing examples of possible outputs…

- Outputs include peer reviewed publication(s), model/simulation(s), spreadsheet tool(s), other software, monograph(s), book(s), conference paper(s), seminar/workshop(s), patent(s), product(s) or tool(s), internet site contribution(s).

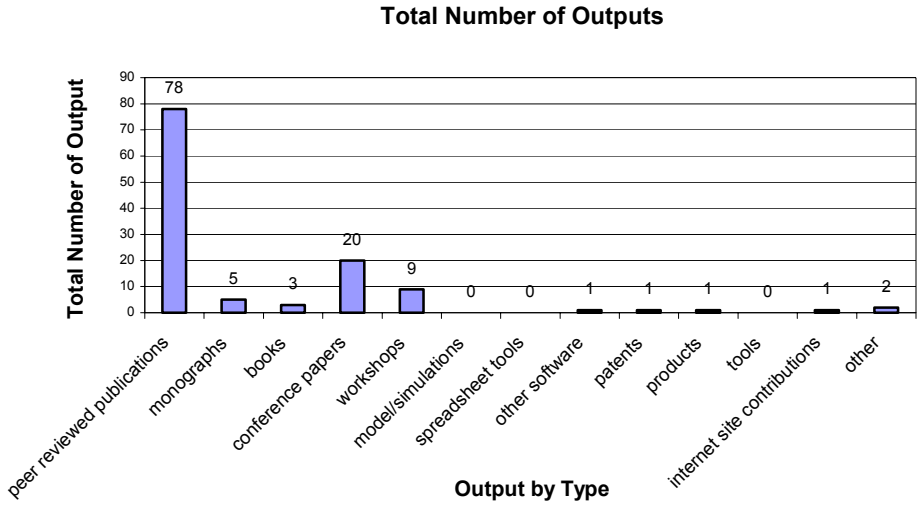
It is possible that several of the investigators did not have publication information readily available, and together with our small and possibly skewed sample (towards the more successful participants), output-related information should only be seen as directional rather than representative of the outputs achieved by the projects.

As seen in Figure 4.4 below, the investigators were most prolific in the use of traditional academic dissemination models, i.e. peer-reviewed publications and conference papers. Most of the peer-reviewed publications listed were in international journals, though there were several in in-country journals as well.

On average, each award reported two peer-reviewed publications most of which had been written jointly between the USPI and the IRC. However, two grants did not produce any peer-reviewed publications. Some awards, including 2 PI-IRC pairs, reported 7 or more publications. The remainder reported between 1and 5 publications.

Figure 4.4

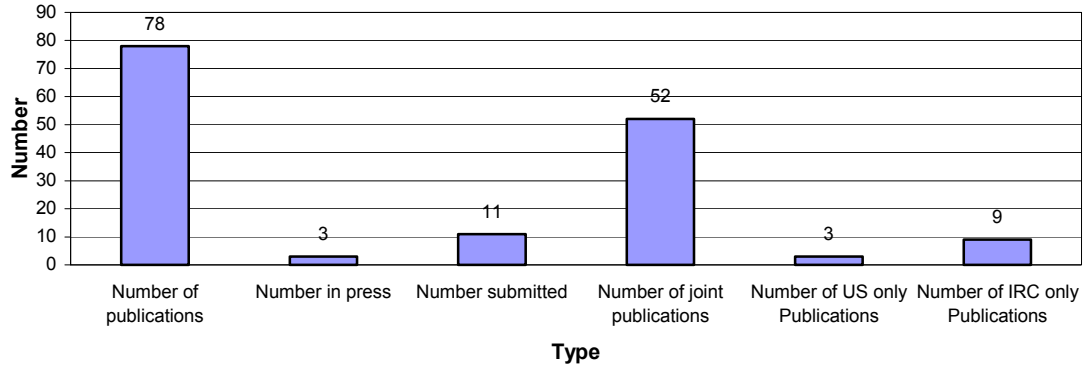
Total Number of Outputs



Sources: Based on Abt Associates Inc. data

Figure 4.5

Peer-Reviewed Publication by Type



Sources: Based on Abt Associates Inc. data

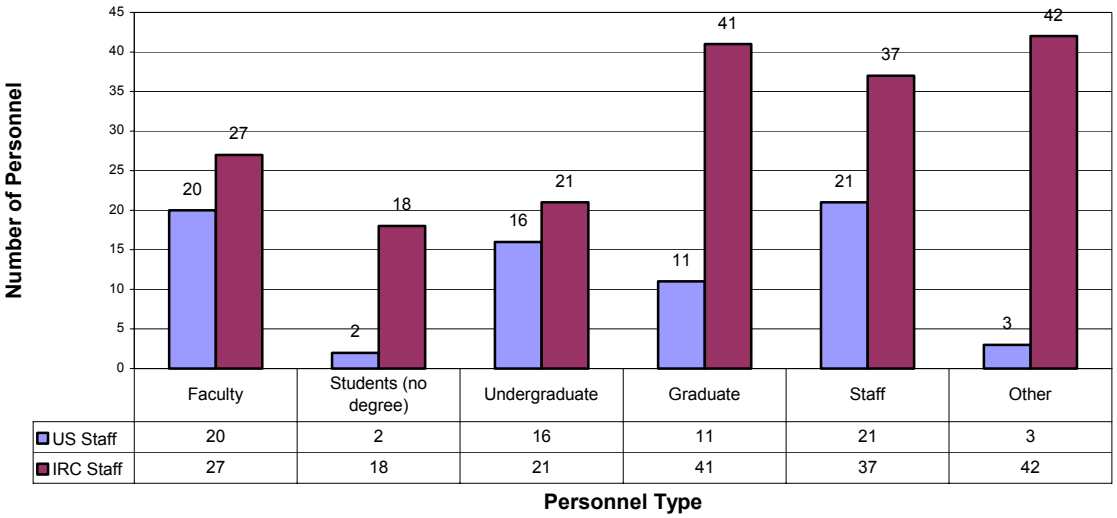
Figure 4.5 shows that most of the publications were jointly written by the USPI and the IRC, but in some cases, there were also publications published solely by one investigator. In most of these cases, it was the IRC publishing alone rather than the USPI, lending credence to the hypothesis that the IRC was not simply collecting data for the research agenda of a USPI.

A very small fraction of the researchers report outputs that include data collection instruments, new theories, patents and establishment of equipment.

Project outputs included not only "products" such as papers, but also participation of students and other personnel in FIRCA projects. In the number of students involved in FIRCA research (with our without financial support), as expected, there was greater participation at the IRC site than the US site. As seen in Figure 4.6, the IRCs' labs also supported a high number of faculty and staff. For one project, the IRC reported 40 survey personnel, which accounts for the unusually high number of staff in the "other" category.

Figure 4.6

Number of Personnel Associated with FIRCA Projects



Sources: Based on Abt Associates Inc. Data

Project Outcomes and Impacts

We asked the investigators to report on the outcomes and impacts of their collaboration. To facilitate their responses, we first defined what we meant by the terms and gave examples.

- Outcomes refer to the results for which a program is designed to contribute, such as strengthened research capacity within the US and foreign laboratory, effective transfer of scientific principles and methods, success in obtaining further international support.
- Impacts refer to the total consequences of the program such as influence of research activities on clinical and public health practice or health policy, success in establishing a sustainable career structure. Impacts are typically longer-term and larger scale effects that relate to project outcomes (and that may have been the consequence of several causal factors).

Next, we split outcomes and impacts into 5 categories of interest: scientific, clinical, institutional, public health, and career. We also asked investigators to judge the extent to which they would attribute these outcomes and impacts to the FIRCAs *per se*.

In general, the PIs, both the IRCs and the USPIs were unanimous in their view that their collaborations were extremely successful on several different levels. Some viewed the collaborations that developed successes; others viewed the scientific outcomes as markers for future success. It was important also that

all the benefits were not just for the IRCs, but for both sides. Some of the statements of the PIs are quoted below.

> *This grant enabled us to strengthen the collaboration with recognized researchers in the field…It also provided us with the funding to continue going deeply into the molecular basis of gene regulation in T. cruzi. Globally the proposed specific aims are being achieved.*
>
> *[IRC]*

> *The project was highly successful; it established excellent relations between our labs and institutions and answered an important scientific question. It also improved the expertise of the foreign collaborator and exported technology to the foreign institution.*
>
> *[USPI]*

> *I consider that this collaboration was extremely successful. As a result of it, Russian researchers got excellent opportunity to attempt powerful technique of generation and using of transgenic frog lines in one of the leading labs in this field. On the other hand, US partners got an access to a set of novel fluorescent in vivo reporters developed in the Russian partner's Institution.*
>
> *[IRC]*

In the sections below, we focus on outcomes and impacts along dimensions of interest. Table 4.1 summarizes these outcomes and impacts.

Scientific Outcomes and Impacts

Several researchers listed citations to their publications as the major outcome of their research. Other outcomes reported were discovery or improved understanding of new scientific principles, and development of new tools, lab techniques, methods or procedures. Some of the scientific outcomes reported include:

> *A number of novel in vivo fluorescent protein reporters suitable for using for various purposes (cell and protein labeling, tracing of gene expression) during many biomedical experiments were discovered. A method of functional analysis of genes promoters based on using of the double-reporter (bi-color) vector was developed.*

> *The FIRCA program enabled me to: 1)introduce new research methods, 2) provide new equipment, 3) introduce new thematic approaches, not possible previously, 4) organize and develop research in my own research group, 5) organize an effective collaboration with other research groups in Europe.*

We observed three types of scientific impacts. For some investigators, it was development of new theory. One investigator stated that one of the impacts of the project was the, "Discovery of a previously unknown regulatory step in immunoreceptor signal initiation, enhancement of interdisciplinary, programmatic research in both the US and Mexican institutions." Another type was identification of new research directions with the possibility of creating a new or interdisciplinary research field. In the words of an IRC, "Owing to the project, my longer-term goals now are the analysis of the role of RNA-binding proteins in regulation of gene expression in MG cells and improvement of the antibacterial activity in milk." A smaller fraction of grantees mentioned receipt of follow-on awards or support, either by the PIs themselves or other researchers in the field. For example, one USPI stated that, "The FIRCA project helped prepare the ground-work for the currently funded R01 grant."

One USPI concludes:

> *Clearly, the FIRCA collaborators will be thinking in new research directions following this FIRCA. Already plans for structure-based drug design pilot studies and identifying new enzyme/antigen targets using computer modeling and molecular methods, are in various stages of planning and research.*

Clinical Outcomes and Impacts

Clinical outcomes mirrored scientific outcomes, and included: discovery or improved understanding of new or existing diseases, and development of new tools, lab techniques, methods or procedures to detect, diagnose, treat, or prevent disease. Examples of clinical outcomes are:

> *Better understanding of the epidemiology and ecology of the disease often in Africa where a little is known about the mechanism of circulation of the disease and mean to predict its emergence.*

> *We have expanded our understanding of the range of risk and protective factors for drug use and sexual risk behaviour that pertain to adolescents in South Africa.*

Clinical impacts were harder to document, but we found several researchers noting that FIRCA-funded research had helped to (or was helping to) improve the detection and diagnoses of diseases. For example, one project, "Improved prediction of the potential for sylvatic arboviral diseases to establish urban transmission cycles," and another wrote that their "findings will be used in the development of prevention programs."

Another impact observed albeit with much lower frequency was developing treatment for disease. For example, one USPI stated that his project addressed, "new avenues that contribute to melanoma resistance to treatments."

Institutional Outcomes and Impacts

Institutional outcomes, relating to FIRCA's influence on the IRCs' universities, laboratories, or organizational settings, can be classified into three sub-categories: FIRCA's role in creating networks or promoting collaboration between labs or research groups, building infrastructure, and providing critical mass (e.g., through increased enrollment of students in a research group). One grant led to a follow-on collaboration with researchers in New Zealand. Other examples of institutional outcomes include:

> *The Hereditary Cancer Center at PAM has grown substantially during 2000-2003 and is planning a journal and hosting international meetings, led by [IRC]. The FIRCA project contributed to the success of this Hereditary Cancer Center.*

> *A number of Ph.D. students in the [IRC's] lab doubled during the course of the FIRCA project. These students were able to learn new techniques, which were developed by using the financial help of the FIRCA project. The grant also provided training possibility for one of the faculty members of the [IRC] lab at the US site. Three new PhD. students have joined [USPI's] lab to do research in the area of the R01/FIRCA collaboration.*

> *A new research, the Unit of Molecular Toxicology, has been founded within the Institute, and 2) a collaboration with related research groups in Germany and Switzerland has been organized.*

> *The FIRCA project helps me to establish a new cochlear blood flow laboratory. Hopefully we can start a new PhD program in this research area and we can involved more students and scientist colleagues.*

The grants led to institutional impacts for a small fraction of the participating investigators. In some cases, they led to establishment of political support for the institution/project, and in others, establishment of the IRC's lab as a reputable regional research center. For example, [as a result of the FIRCA] the, "University of the Philippines, has gained national prominence in the Philippines, gained the attention of political leaders, and possible new commercial industrial partners (e.g. pharmaceutical companies)."

> *[Weekly project meetings] enabled us to …identify a core research-oriented group. This group later formed a registered NGO in Delhi named HRIDAY [heart]. The NGO is now collaborating with Ministry of Health and Family Welfare, government of India, World Health Organization (SEARO) and Confederation of Indian Industries in many health promotion projects.*

Public Health Outcomes and Impacts

It was gratifying to observe that most grants produced outcomes in the public health arena (but few had lasting impacts). Many grants led to the creation or expansion of public health infrastructure (e.g., center, diagnostic tools, screenings). Examples include:

A Sino-American Center for Alzheimer Research was established as a direct consequence of the collaboration.

Others led to the creation of disease detection/control programs. One IRC reported that the FIRCA led to

...Improved knowledge of the transmission cycles of dengue in Senegal and enhanced ability to institute control measures.

Yet others helped in awareness raising (e.g., through campaigns, creation of NGO, websites). Examples of the outcome are:

It was realized that it is important for school students – whose future health is determined by present policies – to speak up and voice their views. The recognition of this need and the potential impact of such a movement led to the birth of SHAN (Student Health Action Network) in 1998.

Development of the web site directed at general public [that] addresses important cardiovascular risk factors that potentiate hypertensive cardiovascular damage, such as smoking and alcohol.

Finally, some led to better surveillance and control of prevalent diseases. One person reported that there has been, "better surveillance and control for malaria in Trinidad."

Impacts on public health are generally easier to perceive as they typically lead to changes in health outcomes (e.g., lowering of infant mortality due to increased vaccinations) or changes in behavior (lowered use of illegal drugs). With this definition of impacts, FIRCAs had little impact in the public health arena. Given most of the respondents were recent awardees, it will take some time before impacts occur. The only one that passed muster was support of public health decisions. Examples of this impact was observed in a few responses:

The effect of asymptomatic malaria parasitemia on immune response to measles vaccine is increasingly been taken into consideration, mass measles vaccination campaign in Cameroon is been done during the dry season when malaria transmission is low. At individual level, treatments for malaria are given to children before measles vaccination.

Certainly in Poland, [IRC] has had a huge impact on the increase of screening for familial cancers.

Career Outcomes and Impacts

As can be expected, the most profound outcomes and impacts of FIRCA grants were on the careers of the participating researchers, especially for the IRCs. For most, receiving mentoring and guidance from a senior USPI was key to their future research efforts. Many spoke of training opportunities for themselves, and for their students and staff as important. Several spoke of promotions and receipt of prizes/awards as

the key outcomes of their FIRCA project. For example, one IRC was rewarded with his country's State Award for Science and one of his post-docs was awarded with his country's Young Investigator Award.

We observed several categories of career impacts as well. For a small fraction, the grant led to change in career emphasis. Some examples of these changes are:

> *…I have shifted my main research interests from physiology and cell biology toward molecular toxicology.*
>
> *Change in career emphasis towards the molecular mechanisms of disease.*
>
> *..research now focuses more on HIV risk behaviours that are associated with substance use.*

But for most investigators, the biggest impact was on their reputation in the research community and increased recognition of their work. One USPI responded that the, "National Filariasis Control Program has taken notice of our efforts, and is cooperating tremendously in field activities to evaluate the utility of new diagnostic tests." One IRC mentioned his relocation to better lab or research setting as a direct outcome of his FIRCA participation. He was given the, "capability to build new space of collaboration …a criteria that our Institution evaluates its scientist." Another investigator replied that, "more emphasis is given in the Department of Biochemistry and Molecular Biology of the Debrecen University to the retroviral research."

Almost all investigators give the FIRCA project direct credit for their accomplishments.

The open-ended nature of questions around outcomes, impacts and attribution gave us a better sense of the range of accomplishments to expect. Table 4.1 provides useful inputs for a survey of all FIRCA grant recipients. The attribution question is complex, as neither an open-ended approach nor a Likert scale approach is likely to elicit good answers.

Table 4.1

Classification of Outcomes and Impacts Attributed to FIRCA Grants

Outcomes	Impacts
Scientific Outcomes ▪ discovery/ improved understanding of new scientific principles ▪ development of new tools, lab techniques, methods or procedures	**Scientific Impacts** ▪ established new theory ▪ created new research directions/ interdisciplinary field ▪ follow-on awards
Institutional Outcomes ▪ create networks, promote collaboration between labs or research groups ▪ build infrastructure (lab, department, research group) ▪ provide critical mass (e.g. through increased enrollment of students in research group)	**Institutional Impacts** ▪ establishment of political support for institution/project ▪ establish lab as reputable regional research center
Career Outcomes ▪ received mentoring from senior PI ▪ groundwork for future research ▪ training opportunities ▪ opportunities to network, showcase research ▪ promotions ▪ prizes/awards	**Career Impacts** ▪ change in career emphasis ▪ improved reputation ▪ recognition ▪ relocation to better lab or research setting
Clinical Outcomes ▪ discovery/ improved understanding of new or existing diseases ▪ development of new tools, lab techniques, methods or procedures to detect, diagnose, treat, or prevent disease	**Clinical Impacts** ▪ improved detection and diagnoses of diseases ▪ developed treatment for disease
Public Health Outcomes ▪ creation of public health infrastructure (center, diagnostic tools, screenings) ▪ creation of disease detection/control programs ▪ awareness raising (campaigns, creation of NGO, websites etc) ▪ led to better surveillance and control of prevalent diseases	**Public Health Impacts** ▪ supported public health decisions

Post-Project Collaborations and Continuation

In this section, we are concerned with post-award activities. These give us a glimpse into the lasting impact of the FIRCA grant. If the collaborations were truly successful, we would expect that the collaborations would continue either with future FIRCA grants, NIH or other international grants.

Table 4.2 gives the tally of post-FIRCA collaborations. We asked recipients if they had applied for future FIRCA or other grants to continue their research. For most IRCs, their research continued using funds from other sources. However, only for one pair did continue with FIRCA funds (in general, FIRCA grantees do not reapply for the FIRCAs). Some examples of post-FIRCA sustainability include:

> *Our research initiated by FIRCA project is supported by Russian Foundation of Basic Research.*
>
> *Thanks to our continuous collaboration and to the results achieved in the 1st FIRCA award, we managed to achieve another FIRCA award.*
>
> *The Ministry of Health and Family Welfare and World Health Organization supported HRIDAY-SHAN programme to continue in schools since 1999 and also supported its expansion to 3000 schools and 10 colleges in Delhi.*

Unfortunately not all have been able to find additional funding. One IRC states, "I am continuing the research in Trinidad without funding which is making the work increasingly difficult to complete and may stop in 2003 if funding is not found."

Respondents observed that it would be very helpful for them if FIC could organize and coordinate some sort of effort to help the recipients network.

Table 4.2

Summary of Post-FIRCA Collaborations

Research continued		
- Yes:	21	
- No:	0	
- FIRCA still in progress:	5	
using FIRCA funds:		
- same PI:		5
- new collaborator:		2
w/other grants (NIH, R01 for example):		
- same PI:		6
- new collaborator:		3
No other grants :		5

Note: Of the 32 awards, we did not receive post-FIRCA collaboration information from 6 awards.

Sources: Based on Abt Associates Inc. data

4.4 Other Comments by Investigators

In the last section of our case study questionnaire, we were interested in probing how the recipients of the awards viewed the program: (1) whether they felt, based on their own experiences, that FIRCA was achieving its goals, and (2) if they had any recommendations for the program.

Funding Amount

We asked the investigators if they thought the funding was adequate, and if not, what amount would have enabled them to achieve the desired goals in the given time frame. The majority of the investigators replied that funding was inadequate to achieve their desired goals. The suggestions for how much the award should be increased ranged from no change to $100,000 more per year. One USPI comments:

> *The amount was adequate to allow the development of interest and establish a working group. It in retrospect was insufficient to assure that a rather ambitious project was to be completed. More of my time and a more prolonged direct interactions would have been necessary, but the funding was not adequate to allow me to spend time there. It is very difficult to do collaborative research with limited contact.*

An IRC writes:

> *With more funding much more could have been achieved. The size of the grants should be increased to circa $100,000 to enable both the US and developing country scientist to benefit. There is need for salary support for the developing country scientist as well as the US investigator.*

With the additional funding, investigators listed several activities such as travel, training for students, salary support, additional research, and equipment that could be expanded. When commenting on how additional funding could have helped his IRC, once USPI states:

> *He would have been able to hire additional personnel to carry out more work, and he would have been able to purchase additional equipment. For example, he managed to obtain an old Zeiss microscope (about 30 years old) which he used for fluorescence microscopy. However, a new microscope with modern lenses etc. would have been of tremendous benefit to his research.*

The corresponding IRC confirms:

> *I would have bought additional equipment, which was crucially important for my work (for example, a good fluorescent microscope with a digital camera), and I would have rewarded more the work of Ph.D. students and their attendance to the domestic and international congresses. This way I would have attracted good students to stay in science.*

International Research Capacity Development

Both the USPIs and the IRCs were unanimous in their conclusions that the FIRCA program leads to and increases international research capacity[12]. Capacity development occurred in areas discussed above – in terms of producing scientific outcomes and impacts, institutional development, in the arena of public health, and on the careers of participants. Table 4.3 below lists some instances of capacity development as reported by the researchers, by general categories of interest.

[12] Capacity Development was defined for the respondents as such: Capacity development is "the process by which individuals, groups, organizations, institutions and societies increase their abilities to: 1) perform core functions, solve problems, define and achieve objectives; and 2) understand and deal with their development needs in a broad context and in a sustainable manner. Research capacity, was defined for the participants too, as the capacity to identify, plan and implement research. More broadly speaking, it also includes other resources – material, human and intellectual – that are available for doing and using research, together with the ways in which these resources are brought to bear.

Table 4.3

Examples of Research Capacity Building in Developing/Transition Country

Resources to conduct/continue research	*I believe that [IRC] would probably not be in Croatia performing research without the critical support provided y FIRCA during the early stages of his post-USA career in that country. At the time he returned there was virtually no money available for research. He supported his lab by breeding and selling rats to other investigators!*
	The laboratory in Uruguay might not have survived this past year considering their economic problems if the FIRCA was not in place
Establish links with other groups[13]	*The performed cloning of the mammary gland antibacterial factor became a basis for international cooperation (New Zealand)*
Improve reputation for researcher or research group	*The recognition within the institution and Poland generally has been extremely favorable.*
	It definitely helped science going in [IRC] lab in the Czech Republic since the prestige of the award allowed him to obtain funds from Czech sources.
Improve laboratory, supplies or facilities	*The FIRCA allowed me to make small changes in the labs and insectary* *The FIRCA was instrumental in developing a novel, productive and high profile research facility at our institution.*
	This funding allowed [IRC] to expand his technical infrastructure by the purchase of equipment (such as a PCR machine) that would not otherwise have been possible. Thus, his lab was able to expand into the molecular biology arena in large part due to supplies and equipment purchased from the FIRCA award. This in turn attracted more promising young investigators into his lab, since they were mostly interested in learning new molecular and cellular techniques.
Improve training of students or staff	*The PhD students trained in the project benefited from a 3-month fellowship in the US to learn immunological techniques applied to Malaria and Measles. The two pediatricians involved in recruitment of babies and sample collection also traveled to the US to exchange views and experiences with other scientists*
	The project provided training of researchers in empirical techniques to address health issues.
Create new lab/program	*The FIRCA project helps me to establish a new cochlear blood flow laboratory. Hopefully we can start a new PhD program in this research area and we can involved more students and scientist colleagues*
Raising awareness	*[by] raising awareness of the disease [Alzheimer] in the foreign country [China] and in particular stimulating the mobilization of internal funds and research activity for Alzheimer's at Tongji University and at national level.*

[13] It is worth pointing out that many IRCs spoke of their FIRCAs' roles in helping them network with other research groups in the US, Europe or New Zealand. None spoke of establishing partnerships with other labs in their countries or regions (sometimes referred to as "south-south" partnerships)

Extending and Enhancing Research Interests of US Scientists

On the whole, the investigators did not comment on the impact of the project on the USPI's future career or impact on US science. This may partly be because of miscommunication (perhaps the question was not explicit enough in the protocol) and partly because the USPIs truly did not expect the FIRCAs to contribute to their own development (most seem to see the project as a way to support colleagues in other countries). A small fraction commented on the impact of the FIRCA in advancing the state-of-the-art and in understanding diseases:

> *Novel aspects on the mechanisms underlying the resistance of devastating tumors are expected to help health and policy goals in both countries.*

> *The debilitating condition of Meniere's disease has significant social and economic impact in America and the work we conduct may lead to insight into this disease.*

Many USPIs spoke of the import of certain tropical diseases (as a result of immigration and US travelers to other countries) into the US and therefore the need to understand these diseases here:

> *Dengue causes human disease in Senegal and threatens to emerge in the US It is also a health problem for US citizens traveling to the tropics.*

> *We are studying the changing patterns of drug resistance in malaria parasites in Kenya. This is a pressing problem in all of Africa, and an increasing one here, since travelers are now returning with drug resistant forms of malaria, as well.*

> *Our studies on Chagas' disease is relevant for the US due to immigration from Central and South America and our work on trypansomes in general is important due to increasing international travel and therefore, exposure. It is also important to the US international health policies.*

One USPI commented on the similarities in the population characteristics between certain parts of the US and other countries:

> *The populations of Mexico City and of New Mexico have much in common. Both are predominantly poor, Hispanic, and exposed to environmental pollutants that are relatively less common elsewhere. Asthma seems more common among Hispanics than Anglos, although the difference may be socioeconomic more that genetic. Our program offers the possibility of identifying factors that particularly predispose to asthma.*

Another spoke of the role of FIRCA in improving US relations with other countries:

> *There is no doubt that the award and our collaboration have helped to cement relations between the two countries [US and Croatia].*

Finally, one PI commented on how the FIRCA raised the profile of the US lab within the Latin American research community:

> *This has increased our collaboration with the lab in Uruguay and increased the US lab's profile internationally (and in fact, another laboratory has contacted us from Brazil with a request for a collaborative project).*

4.5 Revisiting AIDS-FIRCAs

FIC has expressed an interest in identifying any differences that might exist between the two populations of awards included in our sample: AIDS-FIRCAs, and standard FIRCAs. One-fifth of our sample was AIDS-FIRCAs. All were recent (since 1998). This is a small but promising number of awards to examine and identify differences.

Before commenting on differences between these two award groups, however, three caveats to making such comparison need to be specified.

- First, as per our database, of the total number of AIDS-FIRCAs made, almost one-third (22 out of 72) went to USPIs whose IRCs were located in Western Europe, Canada, or Australia. Thus, where differences actually do exist, they might merely reflect differences attributable to differences in the IRC country of origin.

- Second, it turns out that our sample of seven AIDS-FIRCAs were all located in FIRCA eligible countries (i.e., none of the IRCs in our sample were located in an industrialized country). Therefore, any differences that might actually exist between these two populations might not be found in our unrepresentative sample of AIDS-FIRCAs.

- Finally, as is true for the entire sample of case studies, since we used a stratified purposive sample to select awards, any such differences that were identified between these two groups could not be generalized to the larger populations.

These caveats notwithstanding, any differences that might be identified could legitimately provide the basis for formulating hypotheses about unique features of the two populations that subsequently could be tested in a Phase II study in the future.

Keeping these three caveats in mind, we reviewed the responses of all seven AIDS-FIRCA awardees in our sample in order to determine whether any differences appeared to exist according the principal logic model criteria (i.e., AIDS-FIRCA operations, outputs, outcome, or impacts).

In reviewing these grants, it was apparent that there were some excellent scientific underpinnings to the research, interdisciplinary teams were involved, the undertakings were often quite ambitious, and important publications came out of the projects. In our examination of the AIDS-FIRCA projects, we considered the spectrum of characteristics across the awards, and how these compared to those of the standard FIRCAs. Based upon this review, the following are our principal conclusions:

- In terms of research and other project activities, AIDS-FIRCA projects appeared to involve a similar range to those reported by the standard FIRCA projects (i.e., technical assistance provided to IRC, use of labor, facilities and equipment at IRC site, training activities).

- Both sets of awardees produced a similar range of outputs as measured by number of articles published in peer-reviewed journals.

- In terms of award outcomes, as was true of standard FIRCAs, a number of promising examples were cited, including development of new research models, transfer of statistical and other methodological innovations to the IRC country, establishment of new country samples, opening of clinics, and furtherance of research capacity in the IRCs' countries).

- Finally, with respect to impacts, there did not appear to be any substantial differences in the range of impacts reported by the two groups.

Since we did not have developed country AIDS-FIRCAs, it is possible that such characteristics as the provision of technical assistance by the IRC to the USPI, or the contributions to US research from the IRC would have been far less likely to occur than were we to have examined several Western European award pairings.

In summary, we did not identify any clear differences between AIDS-FIRCA and regular FIRCA award characteristics in this limited sample of cases. However, were a more robust sample of AIDS-FIRCAs to become available, and were questions explicitly addressing such differences to be addressed, it is entirely possible that important differences in activities, outputs, outcomes and impacts might be found.

5.0 Synthesis of Findings

This chapter synthesizes our findings from the database and case study analyses, and organizes them as itemized in the logic model. For each section below we present the data collection approach used, our preliminary findings, and next steps.

5.1 Characterizing FIRCAs and Awardees

5.1.1 Data Collection Approach

Data describing FIRCAs was extracted from multiple NIH and FIC databases. Our goal in the feasibility study was to create an integrated database from these disparate ones, test its validity and integrity, and extract some preliminary information about the FIRCAs.

5.1.2 Preliminary Findings

Since its inception in 1992, the FIRCA program has provided almost 500 3-year grants to over 450 USPIs and counterparts in primarily developing and transition countries. These investigators were selected out of over a thousand applicants. Over the years, interest in FIRCA has increased with the number of applications going up slightly each year since 1993. Other findings include:

- FIRCA applicants and their collaborators come from a relatively small pool. In the 10 years of data examined, 49 US institutions contributed half the applications. Among IRCs, 14 institutions submitted a quarter of applicants, with the Russian Academy of Sciences leading with 53 applications.

- Awardees include collaborators from 60 countries around the world. While Eastern Europe and the Russian Federation are involved in a large number of awards (42%), their overall share in the awards has been declining in recent years.

- Several developing countries with significant health problems and large populations – India, China, Indonesia, and some countries in Africa – seem under-represented.

- Half of all awardees have parent grants in one of the three largest NIH Institutes: Institute of Allergy and Infectious Diseases, the National Institute of General Medical Sciences, and the National Heart Lung and Blood Institute. Overall, grantees have parent grants in 17 of the 27 NIH institutes.

- Most awards involve more than one scientific/clinical discipline, with interdisciplinarity increasing in recent years. Countries that have won fewer grants – typically more underdeveloped countries in Africa – tend to focus more on clinical studies than basic research.

- FIRCA awardees tend not to reapply to the program; only 25% applied for another FIRCA even after 10 years. We found that past awardees have a success ratio that is slightly greater than new applicants, yet the program gets little “repeat business.”

Methodologically, we learned about the idiosyncrasies of the various NIH databases, and learned to work with them to create an integrated picture of the FIRCA program. Each analysis revealed flaws in the database, requiring time-intensive fixes. Future work with the database, while feasible and reliable, will continue to be a challenge.

5.1.3 Next Steps and Challenges

Preliminary analysis points to two sets of questions that need to be addressed in a future study. One set seeks clarity on some of the issues raised in the preliminary examination of the data. It will be instructive to explore, for example, why researchers tend not to reapply for FIRCAs (and if FIRCA can do anything about the issues raised). Through interviews with FIC and NIH staff, one can also begin to understand why there is lower participation from some countries such as India or China.

Another set of questions refers to comparative analyses that might lead to further insights about the program. It will be interesting to learn if there are any patterns differentiating research done in Asia, Africa, Latin America, and Eastern Europe. For example, are certain diseases more likely to be explored in certain parts of the world vs. others (e.g. infectious disease research in Africa, but cardiovascular research in the FSU) [14]? Another important issue will be that of distribution of FIRCA resources – by region, disease, scientific discipline, etc.

Answers to these and other questions can be explored through regression and other statistical analyses. The integrated database does not identify diseases, and only contains information about awards made in 2001 and earlier. It will need to be augmented to address some of these questions.

5.2 The FIRCA Program's Role in Promoting High Caliber Biomedical Research

5.2.1 Data Collection Approach

There are two complementary approaches to assessing research quality: convening a panel of experts, and conducting bibliometric analysis of FIRCA supported publications and journals in which the research is published. A third source is a survey of the participants themselves, where they can report on other measures of research quality, such as prizes and accolades won, or follow-on awards.

Neither a bibliometric study nor an expert panel was employed at the feasibility study stage. However, through case studies, we received lists of peer-reviewed publications, which helped to assess the range and volume of publications and journals, and thereby the viability of a bibliometric study.

5.2.2 Preliminary Findings

While we asked researchers to describe their research goals and activities, as well as list their research publications, this information and our ability to evaluate it is not sufficient to make any conclusions regarding the quality of research supported by the FIRCA program. Case studies did reveal that most

[14] Our approach to assigning scientific or disease labels to grants can be bolstered by more comprehensive review of the grants. The current approach was based on CRISP keyword allocation, which may have been too generic.

FIRCAs led to at least one peer-reviewed publication, many of these in international journals. Some grants appear to be significantly more productive (as measured by number of publications) than others. Some IRCs have received national-level prizes for their FIRCA research, while others have received follow-on funds to continue their research.

Data collected on research publications points to a robust and reliable bibliometric analysis in a follow-on to this study, as well as questions on other quality-related metrics for a closed-ended survey of a larger sample of FIRCA recipients. It is not clear yet if an expert panel would be needed.

5.2.3 Next Steps and Challenges

The quality of research supported by FIRCA was not addressed in the feasibility study and will be explored in a full outcome evaluation. We propose using a survey to probe PIs regarding research accomplishments, as well as a bibliometric study to assess the quality of publications.

The survey will help to compile a list of publications for bibliometric analysis. The key challenge here will be to ensure that investigators list only those publications that they can attribute to the FIRCA. This was a challenge in the case studies (some PIs listed publications that preceded their FIRCA award, or whose link to the award was tangential at best).

There are some secondary research issues that merit exploration in a follow-on study of research quality. The first is, why do certain grants have more publications than others? Do grants that focus more on tool- and technique-transfer produce fewer publications than those that focus on more basic research? What is the impact of that, i.e., the prospect that the grant may not lead to any publications, on a USPI's incentives to participate in the program? Another is, are there regional differences (do researchers in Africa collaborate differently than research in Asia, are there factors that influence whether the research project is more clinical vs. basic research-oriented, etc)? Pointed questions in a survey are the best way to address these questions.

5.3 The FIRCA Program's Role in Research Capacity Development

5.3.1 Data Collection Approach

The mechanisms for obtaining this information are primarily surveys of USPIs and IRCs posing both qualitative and numerical questions, and interviews with selected personnel in IRC institutions. A secondary tool is to examine comparable programs, in the US and Europe as benchmarks and for incorporating best practices and lessons learned.

In the current study, we explored research capacity development through detailed questioning of PIs in the case studies. We did not conduct any interviews in the IRC countries to validate IRC responses regarding capacity development, especially at the institutional or public health levels.

Preliminary Findings

The case studies showed that the program has a fairly well-defined model for research capacity development. The program: supports one-to-one interactions rather than institution-level support; uses

research rather than other means (such as transfer of equipment and supplies alone, or education and curriculum development alone) to accomplish its capacity development mission; makes performing high quality research an equally important goal as capacity building; has projects that are investigator-initiated rather than driven by focused programs or forced political alliances; and finally, emphasizes a relation of equality between the investigators.

Based on our sample, and with the caveat that the finding is not generalizable across the FIRCA program, our preliminary impression regarding the role of the FIRCA program in research capacity development is positive. Most IRCs credit FIRCA for (i) advancing their careers in their home countries by giving them access to funds to perform high-quality research, (ii) networking with colleagues in their country and abroad, and (iii) learning to use state-of-the-art equipment and supplies. They also report that their FIRCAs influenced not only their research, but also the (iv) development of institutions in their home countries, both within academia (via development of laboratories, departments, Centers, and other semi-permanent institutions) and in the arena of public health (creation of screening programs and diagnostic tools). So it appears, though it must be validated through a more representative study, that the FIRCA program's model of capacity development is quite successful.

Methodologically, the study helped to establish that the program may lead to measurable and formidable outcomes for the partner country, and there is a need gather normative data if any pronouncements are to be made around the program as a whole. USPI and IRC responses on the case studies helped to begin formulating closed-end options for the survey. The case studies also helped recognize that on certain points (such as investigator assessment of the *role* of his FIRCA on achievements, or on the balance of intellectual leadership between investigators) investigator opinions need to be tempered and supplemented with other sources and more objective queries.

Next Steps and Challenges

The Study did not seek input from experts outside of the FIRCA program. Our data sources were either grantees of the program or personnel involved with the management or evaluation of the program. We did not talk to public health officials in partner countries, or peers of FIRCA researchers to investigate the impact of the program as viewed by potentially unbiased observers. The feasibility study also did not examine other research programs that fund international research, or external factors that mediate capacity building. An example of the latter is that of Bolivia, which in the 1990s was emerging from a dictatorship that had effectively destroyed university-based research. What was the impact of a collaboration with a Bolivian researcher at this stage?

A survey of a representative sample of investigators as well colleagues of IRCs and others familiar with the impact of their work is the best way to collect normative data about the capacity building accomplishments of the program. Participation of women, especially at the IRC end, is critical to measure. Certain questions may need to be explored obliquely. For example, instead of asking if the two investigators were equal contributors on the project, the evaluation needs to explore their relative roles on various technical aspects of the tasks. Also, instead of asking if they would attribute success to FIRCA (or even ask for the extent to which they could make an attribution), one needs to ask for the type of role FIRCA played, and make the attribution independently in conjunction with interviews with IRC peers and colleagues.

5.4 Extending and Enhancing Research Interests of US Scientists

Data Collection Approach

Questions posed to USPIs, current and past FIRCA officials, members of the National Academies and other experts, will help to clarify precisely how the FIRCA project helped enhance US research interests. The feasibility study addressed this question generally in the case studies seeking impact on the USPIs' careers and on the field in general.

Preliminary Findings

It would be fair to note that, on the whole, the USPIs did not see FIRCA as an instrument to develop their own research interests *per se*; rather they saw it as a way to help current or former colleagues in developing/transition countries. For example, when queried about the outcomes and impacts of their projects, they almost universally listed those relevant for the developing country partner. Some commented on the need to understand tropical diseases (especially in light of immigration and increasing foreign travel by Americans). But on the whole, results of the feasibility study are inconclusive with regard to the impact of FIRCA on extending and enhancing the interests of US scientists. This may be an important issue for the outcome evaluation to address.

The case studies helped establish a range of areas where US research interests were served, which will form the basis of closed-ended questions in a future survey of the FIRCA awardees.

Next Steps and Challenges

A key question for Phase 2 of the evaluation is clarifying what comprises US scientific interests (a start is made in Section 4.4.3). For example, they could refer not only to training and career development for the USPIs, or advancements in biomedical research, but also to developing skills among US researchers in doing collaborative research with scientists who come from different cultures, speak different languages, and offer different abilities and perspectives. In the new age of globalization, our ability to work with foreign scientists may be an important metric of success, and one that FIRCA may want to develop among NIH researchers. Once a definition is established, data collection may be quite straightforward through surveys and interviews.

Another important question in the context is: to what extent ought serving US interest be an important (and competing) goal for the program? For the program to be a success, benefits need to accrue to both sides, else the program may lose participation from top researchers. Questions around the future mandate of FIRCA have been raised several times in this Chapter and the next, and an outcome evaluation should address them.

When commenting on contribution to US research interests, an important piece of contextual information is the career stage of the participating researchers. Are the USPIs always the senior researchers mentoring junior IRCs (especially to be investigated in the earlier cohorts? If not, and the IRC is the seasoned researcher, is the impact on US research different?

Once some of the contextual issues are settled, surveys and interviews will be the primary data collection instruments on the topic. As we found out in the case studies, the challenge in the surveys will be to help USPIs focus on examining the role of FIRCA on themselves and on the advancement of the state-of-the-art (rather than the IRC). Closed-ended questions will help with that.

5.5 The FIRCA Program's Role in Sustaining Collaborations

5.5.1 Data Collection Approach

The FIRCA program can influence international collaborations in three ways – bring together investigators who have complementary interests but have not worked together before, promote high quality collaborations during the grant, and enhance downstream collaborations between the international collaborator and US investigator. In the feasibility study, through queries through a case study, we examined all three types, albeit superficially.

Preliminary Findings

Regarding collaborations, our case studies revealed that

- The FIRCA program seems to *sustain* collaborations but not *create* them. Almost all investigators had worked together in the past (e.g., the IRC was a postdoctoral fellow at the USPI's lab). Given the small size of the award, it seems to be a sound strategy.

- Investigators laud their 3-year association as being highly collaborative, despite the fact that in many cases, the USPI plays the role of a mentor or consultant in the process

- Most collaborations continue past the 3-year award (in fact none of the investigators reported that their collaboration with USPIs had ended since their FIRCA). Several IRCs received further FIRCAs or other awards (say, an NIH R01 grant) with the same PI to continue their research.

Methodologically, it was straightforward to assess the degree of pre- and post-award collaborations. The open-ended questions may have generated overly positive responses regarding degree and quality of collaborations during award period.

Next Steps and Challenges

The high degree of collaborations found in the group examined cannot be generalized to the program without a survey of a more representative FIRCA population. Regarding initiation of collaborations, metrics and measurements are easy, but the question is programmatic: should FIRCA be an agent to establish new partnerships (as opposed to nurturing existing ones). Regarding collaborations during the award, the challenge is in posing questions that elicit more objective answers. Regarding post-award collaborations, again, the measures are relatively straightforward. For example, an important measure of follow-on collaborations might be the number of IRCs who were able to leverage the FIRCA into a larger award (such as the NIH R01 grant). Bibliometric analysis can also point us to some general conclusions regarding networking and co-authorship patterns among FIRCA grantees.

5.6 The Role of AIDS-FIRCAs

5.6.1 Data Collection Approach

In the feasibility study, we did not focus specifically on AIDS-FIRCAs but rather treated them as a special subset of regular FIRCAs. We did attempt a characterization of the awards through database analysis and review of the seven AIDS-FIRCA grantees that were part of the case study sample.

Preliminary Findings

Despite their importance in the program, AIDS-FIRCAs comprise less than 15% of all FIRCAs. Applications to the program have declined since the program began. There may be several reasons for the decline. It is possible that the FIRCA amount is no longer competitive with other grant programs that support AIDS research, or the program isn't as well-advertised as it used to be. Whatever the reason, it has become easier to win an AIDS-FIRCA than it used to be.

As discussed in Section 3.4, AIDS-FIRCAs are quite concentrated, and often go to IRCs in industrialized countries. Almost half the awards have gone to IRCs in only nine countries.

Regarding investigator experiences and grant outcomes and impacts, we are unable to comment on any systematic differences between the standard and AIDS FIRCAs, but that is very much a consequence of our sample (none of the case study candidates were from Western Europe, Australia or Canada, three regions of the world that have won a third of the AIDS FIRCA grants).

Methodologically, we found AIDS-FIRCAs different enough from FIRCAs that they should be considered a separate group.

Next Steps and Challenges

We recommend an independent and systematic inventory and evaluation of AIDS-FIRCAs in the outcome evaluation – a parallel component of the non-AIDS FIRCA evaluation. Key questions to be addressed with respect to outcomes are: does the program accomplish high caliber AIDS research, does it create new and different kinds of partnerships, and does it develop research capacity in AIDS research in the counterpart country? Programmatically speaking, the questions are: Is the AIDS-FIRCAs amount appropriate, and should the program continue in its current form, or should it be run more on the lines of the FIRCA, i.e., with the primary goal of enhancing capacity in developing and transition countries.

6.0 Overall Conclusions and Recommendations

The purpose of this evaluation was to determine whether it is feasible to conduct an outcome evaluation of the FIRCA program. To do so, specifically, we

- Examined existing program data to determine their sufficiency and integrity;
- Designed and conducted a test of data collection instruments and procedures via case study protocols;
- Examined program context, researcher experiences, outputs, outcomes, and impacts of a sample of FIRCA awardees through these protocols; and
- Assessed if an outcome evaluation is appropriate.

In the preceding sections, we have discussed our findings from a review of FIRCA program data and case studies of a sample of FIRCA awardees. In this section, we present our conclusions on the need, appropriateness, and readiness of an outcome evaluation.

6.1 Data Quality and Integrity

As discussed in Chapters 3 and 5, FIRCA-related databases contain sufficient and sufficiently reliable information that they can be integrated across platforms to create a single seamless database of FIRCA awardees. In a future study, this integrated database would allow an in-depth historical exploration of the FIRCA program. In this feasibility study, we were able to successfully integrate the FIRST and FIC databases to create a database that included all variables of interest since the inception of the program. This database passed quality and integrity tests when summary statistics were performed as well as when a sample of case study candidates was successfully drawn from this group.

Further, we found that FIRCA program records are complete and updated enough that tracking of PIs and IRCs is feasible and reasonably cost-effective. In the case study candidate selection process, about half of the candidates' contact information was accurate. For the remaining, the information was only one 'job' behind.

6.2 Data Collection Instruments

Preliminary data collection demonstrated that FIRCA program outcomes and impacts are varied and substantive enough to attempt a systematic catalog of its characteristics.

As discussed in Chapter 4, we designed a set of case study protocols to examine program context, researcher experiences, outputs, outcomes, and impacts. We also conducted a pre-test and subsequently implemented the protocols to collect data from a selected set of FIRCA awardees. Responses to these questions were high (62% for USPIs and 65% for IRCs) given our goal to do in-depth studies of a small group of participants. The quality of responses, though varied, and slightly skewed (because of more recent awardees dominating the respondent list) had sufficient information that we were able to design the

blueprint for a subsequent representative survey of a wider group of participants. The case studies provided sufficient inputs and direction to determine: (i) if investigators, especially IRCs, could be contacted, (ii) if they would respond to questions, (iii) if there were sufficient outcomes and impacts to justify a larger study, and, (iv) a basis to develop rational closed-ended options in the event of a full-scale survey.

6.3 Recommendations

Based on this study, recommendations can be made along three dimensions: methodological – is a full program assessment viable; programmatic – what issues must the program consider; and operational – in the event of an outcome evaluation, what were the lessons learned that must be applied going forward. Once again, we temper these recommendations, especially the programmatic ones, with the caveat that they are based on an unrepresentative sample of participants and may be considered directional at best.

Methodological: Appropriateness of an Outcome Evaluation

Given availability of data on project participants, willingness of awardees to participate, quality and range of program outcomes and impacts, and specific issues identified in the preceding section of this study, we recommend that a full outcome evaluation of the program is feasible and appropriate. Tools recommended for the evaluation include: historical review of the program, database analysis, interviews with key stakeholders, and bibliometric[15] assessments. We do not believe a control group strategy will be useful or cost-effective. And for the moment, it is unclear if a peer review panel will be required.

The evaluation will help to collect normative data on FIRCA's impacts in the international biomedical community, and provide guidance on FIRCA policies, program management, processes, and future form.

Programmatic: Preliminary Considerations for Changes in FIRCA Program

Preliminary analysis of data raised many questions regarding the functioning of the FIRCA projects and the program as a whole. A full outcome evaluation may be able to address many of these questions in detail, but they are worth considering even before one. These are summarized as such:

- *Widening the Applicant Pool.* We observed in preceding sections that FIRCA applicants – USPIs and IRCs – come from a narrow set of institutions. Should the program consider expanding its outreach, and trying to get a wider participant base? Could program guidelines encourage prospective PIs to broaden their network to more countries, especially those underrepresented in the program?

- *Increasing Award Amount.* The small award amount raises important questions as well. Should the award amount be increased? If that is not feasible, should FIRCA change its role, for example, from a research grant into a planning grant for R01 grants? This question is especially relevant for the AIDS-FIRCA program where applications have been declining since the mid-1990s.

[15] A bibliometric study might also explore issues beyond quality of research. For example, it could investigate networking or co-authorship patterns among FIRCA awardees, even past the award period.

- *The Future of AIDS-FIRCA.* The AIDS FIRCA program needs to be examined in its own right. Given significant funding of AIDS-related research around NIH, what is the role of AIDS-support within FIC? Does it serve a unique role – such as capacity development – and therefore must be sustained? Should its geographical focus be constrained similar to regular FIRCAs?

- *Initiating Collaborations.* What can the program do to initiate collaborations rather than sustaining existing relationships (which may not last past the FIRCA project)? Would providing resources for pre-proposal preparations encourage networking and collaborations?

- *Awardee Support.* Both US-based and international scientists cite logistics challenges as a problem with their FIRCA project**.** There appears to be no collective memory, every grantee reinvents the wheel and discovers the process for him/herself. Should the FIRCA consider some procedures – such as a best practices manual – to help with smoothing some of the logistics challenges?

- *Improving Incentives to Reapply*. FIRCA awardees tend not to reapply to the program. Are there impediments or disincentives to program participation that keep awardees away from reapplying?

- *A More Active Role for FIRCA*. Researchers learn about the program serendipitously and participate opportunistically with former colleagues in other countries. Could FIRCAs be more directive? Should it coordinate with other parts of NIH or other donor programs (e.g. USAID)? Again, would it be more realistic for FIRCA to be a planning grant to be given to an international team to develop a collaborative research agenda for a larger grant?

The feasibility study did not address most aspects of FIRCA program management and these must be addressed directly in an outcome evaluation. Other issues that will benefit from greater clarity include: role of FIRCA within NIH and FIC, awardee selection process, and other important issues in program management, e.g. administrative support, use of funding by awardees, State Department clearances, human subject standards, and bioethics. These can be addressed explicitly in full-scale surveys of FIRCA awardees, and interviews with FIRCA, FIC, and NIH personnel, both current and former.

Operational: Designing an Outcome Evaluation

We recommend that there be two parallel outcome evaluations, split along FIRCA's two components – FIRCA (non-AIDS) and AIDS-FIRCA. One study cannot do justice to two programs that have different goals, expectations, and geographical foci. Other issues that deserve special attention in a future assessment include:

- *High response rates.* To ensure that findings and analyses are generalizable to the entire program, response rates must be high, especially for IRCs. Since many USPIs lose contact with the IRCs, extra resources must be devoted to locating participants and sending reminders. Response rates may also improve if the surveys are not very time-intensive. For example, if they are primarily closed-ended, online, and offered in multiple languages (Spanish, Portuguese, French, and Russian).

- *Broad representation.* Similarly, to ensure generalizabilty across the program (e.g., across years; earlier cohorts were operating under different program guidelines, and also more time has elapsed for impacts to become apparent), it must be ensured that there is equitable representation across all award categories – years, scientific disciplines, NIH Institute of parent grants, clinical focus, etc. One way to ensure broad representation is to perform a census of the population.

- *Objective data collection.* Also, given the need to obtain more unbiased and factual information, we recommend that a survey of USPIs, IRCs, and others (e.g., employers of IRCs) be supplemented by historical review of the program, database analysis, interviews with key stakeholders, and bibliometric assessments. Based on availability of resources, an expert panel may also be considered. Response quality may also improve if the surveys present closed-ended options that are more sophisticated than sliding scale Likert ratings. For example, instead of querying researchers on the extent to which they attribute FIRCA for their accomplishments, which typically elicits high ranks which may well be spurious, it will be more useful to explore in what way they would make the attribution (e.g., resources, connections, training). Or, instead of querying researchers whether they were both equal co-collaborators, which typically elicit the answer yes, it will be more useful to provide options that will enable the evaluators themselves to assess the sharing of intellectual leadership in the team.