

Chapter 5

Funding Global Health Projects



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Abstract Clinicians and engineers are improving medical practice and healthcare care delivery in low and middle-income countries (LMIC's) through research and innovation using data science and technology. One of the major barriers to translating their ideas into practice is the lack of financial resources. Without adequate funding, many of the critical issues regarding the development, implementation, and impact of technology innovations—including whether there is an actual improvement in clinical outcomes—cannot be adequately evaluated and addressed. While securing funding is a challenge for everyone, researchers and innovators in LMIC's often lack training and experience in proposal writing to support their work.

Keywords LMIC · Funding · Funding strategy · Grants · Implementation research · Grant writing · Funding · Research · Technology · Innovation

Learning Objectives

This chapter is designed to provide clinicians and engineers with information on how to develop an idea into a fundable proposal. We will focus on understanding why research is an important strategy in the development and implementation of digital innovations such as mHealth and artificial intelligence (AI) technologies, developing a problem statement and research question, understanding the components of a research proposal, and learning about funding sources and strategies. We use research as a framework for developing a funding proposal because funding opportunities for health care technology development and implementation often are centered around research. Even if you are not planning to seek funding for research,

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L. A. Celi et al. (eds.), *Leveraging Data Science for Global Health*,
https://doi.org/10.1007/978-3-030-47994-7_5

the concepts in this chapter can be adapted to support the development of your idea for other types of funding opportunities. A “toolkit” with worksheets, guidelines, and additional reference materials is included to help you get started on your own funding proposal.

5.1 Background

5.1.1 Introduction

5.1.1.1 The Importance of Research in Digital Health Innovations

Why You Need to do Research in mHealth and Data Science

In order for any technology intervention to achieve an improvement in health, several requirements need to be met. The technology needs to be acceptable, usable, and feasible for the target population; a new technology cannot impact health unless people *actually* use it. This is especially true in LMIC’s, where the culture and environment have a major effect on technology adoption. Research is necessary to determine the innovation’s efficacy and impact—does it result in the desired clinical outcome in a controlled setting and how much of a true benefit is measurable? Finally, implementation research provides critical information about its use and effectiveness on a larger scale in real world situations (Tomlinson et al. 2013)

The number of mobile health apps is growing rapidly, and AI innovations are quickly being incorporated into powerful tools on smart phones. Many of these apps never make it past the pilot stage because they lack proof of usability and acceptability, clinical impact, and value (Roess 2017; Labrique et al. 2013). As a result, there are a plethora of incompletely developed apps of unclear value for clinicians and patients (Kuehn 2015). Research provides evidence for funders, investors and donors who all want to understand the potential impact and risks involved in all stages of technology innovation before making financial investments which are necessary for technology innovations to realize their promise of improving accessibility and quality of care in LMIC’s (Kumar et al. 2013).

The Importance of Implementation Research

Successfully implementing a new process or innovation has many challenges. Understanding the technology, user, and context in which it will be deployed is critically important for success. Research focusing on implementation outcomes can help us understand why and how technology innovations are successful, or unsuccessful, so improvements can be made (Peters et al. 2013). For example, the developer of a smartphone app to help diabetics track blood sugar readings and diet may conduct

Table 5.1 General questions for technology research

- Why is/is not a new innovation an improvement? For whom? In what context?
- What are the barriers and facilitators for technology adoption?
- What new knowledge can we learn from large databases of information?
- How can we successfully implement a new process using a technology innovation?

Table 5.2 General concepts for developing a research proposal

Pay meticulous attention to details
Thoughtful organization
Good leadership and communication
Use a high level of scientific rigor

a qualitative research study using interviews and focus groups to identify facilitators and barriers for using the app. Studying these challenges and gaps is an important opportunity for maximizing the probability of a successful and sustainable innovation.

Pilot studies provide the opportunity for preliminary evaluation and are helpful before scaling up an intervention. They often reveal a myriad of adoption and feasibility issues and unintended consequences. Keeping with the example of a smartphone app for diabetics, a simple mixed methods pilot study looking at adoption might collect quantitative outcomes like the number and characteristics of users who stopped using the app within the first month, and then collecting feedback about why they did or did not continue. This information guides subsequent revisions in the technology and the way it is used, laying the foundation for rigorous research to demonstrate effectiveness of the innovation in a larger population.

5.1.1.2 Develop Your mHealth or Data Science Research Project

Going from an Idea to a Real Project

Ideas are where research and innovation start—but transforming an idea into a useful product requires effort, planning, and collaboration. In most cases, it requires funding as well. In this section, we present some general concepts for developing a research proposal and how it can be used as a framework for writing a funding proposal (Table 5.1). The general concepts for developing a research proposal, summed up in Table 5.2, are easy to understand. Applying these principles from the beginning is necessary for success.

Developing Your Research Question

Formally defining your research question is the foundation for any good research proposal. It clarifies and crystallizes the problem you want to address, and how you intend to address it. Importantly, it determines the study design, outcome measures, and analysis methodology you need to use. A good research question is clear, relevant, achievable, and measurable (Hilsden and Verhoef 2004).

There are three main steps to develop your research question. First, you need to *carefully define the problem* you want to address. You may already have significant knowledge about this issue, but specifically defining the problem you want to address greatly increases your chance of actually solving it. This process can also help identify gaps in your understanding of the problem and identify issues you need to consider in your research strategy. Try to start with a specific, narrowly focused problem, which can then be analyzed using a “Cause and Effect” diagram to understand the contributing factors and how they relate to the problem. After defining the problem, you need to *establish your research objectives*. It is helpful to think about the purpose of your research, such as discovering new knowledge, describing phenomena, explaining phenomena, or testing an intervention. From here you can start to consider possible study designs. The third step is to *determine the actual question you want to ask*, and convey it in a clear and concise manner—one sentence if possible. Methodologists have proposed the use of a structured research question. For example, a structured research question about therapy should contain the following five elements: population, intervention, comparator, outcome, and time-frame. These elements are commonly referred to by the acronym PICOT (Haynes 2006). Using the five PICOT elements prompts the investigator to think about the design of the study and the balance between the research question and the feasibility to answer it (Kanji 2015). Keep in mind that you can keep revising your research question as your understanding of the research objectives deepens.

Plan Your Research

After establishing a research question, there are several issues to be addressed as you plan your funding proposal. If you are planning to do a research study, you will need to specify the study design, research protocol, sample size, and data management and statistical analysis plan. Good research projects require high levels of scientific rigor to deliver high quality, believable data. This process takes time and effort, but it will pay great dividends.

Determining what resources you will need for your project is a necessary step when preparing a funding proposal. One of the most important decisions is determining your research team. Based on your research question and objectives, you will need to bring together a team that has the necessary skills and time to devote to your project. Having the right people in the right roles not only maximizes your success, but shows funders that you have the resources and expertise to accomplish your research objectives. The composition of the study team is of particular interest

Table 5.3 Big picture questions to ask before seeking funding

Who are you?	What do you want to do?	How do you want to do it?
• Individual	• Design and develop	• Research
• Affiliate	• Implement	• Collaboration
• Organization	• Build/equip	• Education
• Business	• Scale up	• Innovation

to granting agencies as they must be confident that the project will be completed if they decide to fund it. You will need to include a detailed description of the roles and expertise of each team member in the application. Seeking advisors and mentors early in the process is helpful; their input can save you time and effort. Time is another important resource to consider at this stage; specifically how much time you have to devote to the project, and what additional staff you may need to complete the project. Other important resource considerations include equipment and supplies, access to research space or facilities, and populations in which to test your idea.

All research studies will require an ethical review process such as an Institutional Review Board (IRB). This can take time, often several months, so understanding what is required for your specific research and location is an important step to consider early in the process. Research or projects involving technology innovation have additional considerations such as access to databases, data sharing agreements, and intellectual property issues.

5.1.1.3 Develop Your Funding Strategy

Define the Big Picture

Before starting your search for funding sources, it is important to define the “big picture”. Developing clarity about “who you are”, “what you want to do”, and “how you want to do it”, is just as important as developing an achievable and focused research question. Table 5.3 summarizes some of the main categories for each of these questions. Nearly all funders have established parameters regarding the types of organizations and projects they will fund, so understanding your organizational structure and project goals is essential evaluating potential funding opportunities.

Funding Sources

There are several types of funding sources available for research and innovation projects. Grants—“award of money that allows you to do very specific things that usually meet very specific guidelines that are spelled out in painstaking details and to which you must respond very clearly in your grant proposal” (Karsh and Fox 2014) are the most commonly sought type of funding source. There are several types of grants: research, innovation, program development, educational and travel. You may want to consider other types of funding sources depending on your answers to the “big

picture” questions. Examples include prizes or awards, crowdsourcing and venture capital investor funds, corporate sponsors, and in-kind service and donations. Even if you will not be doing a research study, this framework is still a valuable approach, as most funders will require specific objectives, a clear methodology, and defined outcome measures.

As you start your search, keep in mind that funders usually have very specific requirements for eligibility. The most common categories are specific health conditions or diseases, geographic regions, technologies, and target populations. There are also eligibility requirements related to you and your team such as career stage, previous experience, presence or absence of preliminary data, organization type, and type of project (e.g. research, training, service delivery). Information on potential funders can be found in several different ways. If you are affiliated with a university or other large organization, check to see if you have access to subscription searchable databases of grants or other lists of funding opportunities. Another option is using one of the free databases of grants on the Internet. A good way to start is simply searching directly on the Internet using key words or going directly to the website of a known funder. Many of the best funding opportunities come through personal contacts so “networking” with colleagues and attending conferences can help you find opportunities not available through databases or websites.

Reviewing Funding Announcements

There are many different parameters to review for each potential funding opportunity. First, look at the basic requirements such as the funder’s area of interest, application deadlines, geographic restrictions, and applicant eligibility requirements. Once you go through these requirements, the next, and most critical step, is to determine *if the objective of your research or innovation aligns with those of the funder*. In addition to reading the funding announcement very carefully, review the funder’s website and previously funded projects to deepen your understanding about their organization and goals. At times, this step can be nuanced, and may require adjusting the emphasis of your research or even reframing your research question or study population to align better with the funder. Even the best written and most compelling application will not be funded if it does not align with the goals of the funder, so it is wise to think through this step carefully and proceed only if there is a definite match between you and the funder.

Writing a grant application is time consuming, so you want to make sure the funding opportunity meets your needs, too. For example, not all grants will cover salary or travel expenses. If these are necessary for you to proceed, you need confirm that these requirements are eligible. Some grants require matching funds, or require specific collaboration arrangements. It is often possible to contact the funder by email or phone before you start the process in order to fully understand the funder’s requirements.

Writing Your Grant

Once you have found a good funding opportunity for your project, you can plan your writing strategy. There are different ways funders request proposals, and are included with the funding announcement, or the “request for proposal” (RFP). This document provides detailed information about eligibility and what the funder is looking to support. It also explains the application process, including deadlines, page limits, and formatting requirements. The content varies widely, but be sure to read and understand everything completely to avoid unnecessary work, or worse yet, having your application rejected due to a technicality. Some funders ask for an initial concept paper. This is a typically a 2, 3 page document with a few questions about your research or project, which the funder uses as a first round screening tool. If they like your idea, you will be invited to submit a full application. You may also be asked to submit a “letter of intent” or LOI, indicating that you plan to submit an application, and is for planning purposes so funders can manage the volume of applications smoothly.

Before you actually start your application, it is a good idea to develop a writing plan so you can complete your application efficiently and on time. Read all the application materials very carefully, creating a list of required documents, and how you will obtain them. It is essential to start early and develop a timeline with due dates, as this endeavor always takes longer than you think. If others will be helping you write the proposal, delegate responsibilities at this early stage. You also need to start preparing your budget at this early stage. If you have never developed a budget before, it is advisable seek help with this part of the application. If you will be applying through an organization, seek out someone who manages grants as they can help you with planning and writing the budget. In addition, it is also advisable to seek for a person who is familiar with the funding agency platform where the application should be uploaded.

It is very helpful to re-read the application instructions again at this time, and make sure you have a plan to address *all* the specific questions they have requested in the RFP. Your writing style should be clear, succinct, and avoid using jargon or technical terms; quality of content matters more than quantity—excessive length or “wordiness” is not helpful. Perhaps the greatest task the researcher or innovator has, is to “sell” the research idea to potential collaborators, co-investigators, administrators, ethics boards, and ultimately funding agencies. It is important to not only convince them that the project *can* be done, but that it *should* be done and why your study team should be the one to do it. A compelling case can be made by identifying knowledge gaps or the new opportunity your innovation will create using examples, and facts or data.

It is also important to think about how you intend to evaluate and sustain your project. Some important concepts to address include a plan for capturing the lessons learned in the project and how you will share them with the funders, other organizations and the community, a plan for continuing the project after the grant period, and how your project will have a broader impact through replication and scaling up in other locations. Finally, leave plenty of time to revise and edit your content. Ideally,

find other investigators or team members to read and critique your application. It can also be helpful to have a reader without direct knowledge of your study area.

5.2 Exercises

5.2.1 Introduction

In this section we describe a series of exercises to guide you through the process of developing your idea into a fundable proposal. Each exercise has worksheets and accompanying documents with more detailed information, templates and checklists (Table 5.4).

5.2.2 Exercise 1: Develop Your Research Question

The research question is the foundation for your entire project. Exercise 1 is a worksheet to guide you through the three main steps to develop your research questions. There are examples of a cause and effect diagram (Ex1.1), a blank template (Ex 1.2), and guidelines on writing a good research question (Ex1.3) (Bordage and Dawson 2003).

Table 5.4 “Toolkit” for developing your funding proposal

Exercise 1	Develop your research question worksheet
	Ex1.1 Cause and effect examples
	Ex1.2 Cause and effect blank template
	Ex1.2 Cause and effect blank template
Exercise 2	Ex2.1 Planning your research
	Ex2.2 Sample timeline
	Ex2.2 Sample timeline
Exercise 3	Funding strategy worksheet
	Ex3.1 Reviewing funding opportunities
	Ex3.2 Finding funding sources
	Ex3.3 Grant writing suggestions

5.2.3 Exercise 2: Research Study Planning Worksheet

Exercise 2 presents the major components of the research study. This includes defining the study population, selecting a research study design, developing a timeline and determining outcome measures. The exercise is accompanied by documents which provide: considerations for planning your research (Ex2.1), a sample timeline (Ex2.2), and an overview of study designs (Ex2.3) (Creswell and Clark 2017). At the completion of the exercise, you should have an initial outline of a fundable grant proposal, and a framework for a research proposal.

5.2.4 Exercise 3: Funding Strategy Worksheet

Exercise 3 is designed to help you develop a funding strategy and search for funding sources. The first part of Exercise 3 guides you through the process of determining what types of funding sources you may want to consider and defining your funding needs for your specific project. The second part of Exercise 3 is a checklist on reviewing funding opportunities, determining if it is a good match, and if your project can meet the requirements of the funding announcement. There are 3 documents to provide additional information: a checklist on reviewing funding announcements (Ex3.1), information regarding finding funding sources including a list of web links to funding sources (Ex3.2), and grant writing suggestions (Ex3.3)

5.3 Uses and Limitations

5.3.1 Various Use Cases

The material in this chapter was originally developed for a workshop for individuals interested in learning more about finding funding for research and technology innovations. It has been revised for use by individuals to develop their own funding proposal, using the worksheets and reference materials provided in the exercises. The original workshop was a half day event with three short presentations introducing the content from the chapter subsections on “The Importance of Research in Mobile Health and Data Science Innovations”, “Developing your mHealth or Data Science Research Project”, and “Develop your Funding Strategy”. The rest of the time was dedicated to working on the exercises in multidisciplinary teams with assistance from the workshop mentors. There is enough content to support a longer event, so participants can present their work to others for feedback and discussion.

5.3.2 *Limitations of Information*

Getting funding is hard. This chapter will help you be organized and have a clear view on how to succeed in getting your project funded. It provides an overview of issues that need consideration when planning and funding a research proposal, so it does not cover many of the important details which often determine success or not. The intent is to help researchers and innovators get started, emphasizing the major elements of a successfully funded project. We also recognize that funding sources and opportunities change over time, and that some of the funding links provided may no longer be available.

5.3.3 *How this Chapter Links with Other Materials in the Book*

In order for any idea or innovation to reach its goal of improved access and quality of health care, it requires significant resources. This chapter aims to provide insight into how researchers and innovators can find and obtain funding so they can transform data science ideas and techniques discussed in the other chapters into usable technologies that can be implemented into the health care delivery system.

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