

Impact Assessment of HIV Educational Interventions Using Item Response Theory

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Introduction

The most critical challenge that philanthropy has faced over the last several years is showing that the financial gifts given have made a significant impact, and this has become even more critical with the present economic crisis. In fact, a recent New York Times article calls the ability to measure impact as “philanthropy’s largest problem.”¹ Within the various programs falling under the umbrella of philanthropy, ones that focus on behavioral change are among the most difficult on which to assess impact. This is due to a combination of the lack of measurement tools as well as the historic focus on self reporting from beneficiaries and implementing agencies.

Behavioral change programs usually focus on educating the beneficiaries on the “best” or most healthy way to act. Examples of behavioral change programs include topics ranging from nutrition to sexual behavior and from sanitation to character building. But the question looming over all of these interventions is: what difference do they make? How does one know if a beneficiary washes their hands in the bathroom after being taught good sanitation behaviors? How do you know if a man’s sexual behavior was modified after attending an educational seminar?

While the direct outcomes of behavioral change programs are notoriously difficult to measure, *indirect* outcomes of these educational interventions can be measured and are often equally important. For example, what is it that the education does to change someone’s behavior? It provides people with knowledge that in turn influences their attitude or belief on the subject. This change in belief then leads to the changed behavior, which is the desired goal. A person first understands the various diseases that can be spread by not washing their hands, and then they are impressed upon by this belief to change their behaviors. Over time, as they remain disease free, the belief and commitment to the new behaviors are reinforced.

Both knowledge and beliefs are considered latent or hidden traits. It is often assumed that these latent traits cannot be measured with any quantitative rigor. There is, however, a whole field of study within the human sciences that analyzes questionnaires to make them suitable instruments for measurement using a methodology called Item Response Theory (IRT).² IRT is an accepted and frequently used methodology within the fields of psychology, pain management, business and education that is uniquely suited to measure the change within these hidden traits. It is set apart from other methodologies in its ability to create a calibrated scale by determining which questions are most difficult to endorse and which questions are easier to endorse. Perhaps the most well known use of IRT is in the Graduate Record Exam (GRE), required by the majority of graduate schools for entrance, which measures the latent traits of knowledge and aptitude.

¹ <http://www.nytimes.com/2008/03/09/magazine/09metrics-t.html?pagewanted=4&ei=5070&en=379bdd350fcaa1a0&ex=1205726400&emc=eta1>

² Item Response Theory applies mathematical models to data from questionnaires and tests as a basis for measuring abilities, attitudes, or other variables.

Specific Aims

While there are many potential applications to behavioral change in philanthropy, we propose applying the IRT methodology to the HIV/AIDS sector due to the large amount of money spent there annually. In 2007, HIV/AIDS prevention educational programs reached 57.5 million people at the cost of nearly \$345 million through PEPFAR.³ From 2004-2007, just under \$1 billion was spent on HIV prevention education programs reaching nearly 200 million people internationally. The true impact of these programs on beneficiaries will never be known in spite of the massive amount of money spent. This is because there is currently no way within the PEPFAR program or other similar programs to measure impact of individual educational interventions. Therefore, there is no method for quantitatively determining best educational practices and no way to inform future policy from efforts of the past.

This research aims to create a series of questions using the IRT methodology that can be utilized to measure impact of HIV prevention education programs on the knowledge and beliefs of beneficiaries. The questionnaires will be specific to each culture since cultural norms and beliefs influence behavior and therefore impact the efficacy of the scale.

Current Applications

Questionnaires have been created and utilized by PEPFAR projects in both Ethiopia (N=900) and Cote D'Ivoire (N=600). Figure 1 illustrates the item map for the questionnaire used in Ethiopia. The -3 to 3 are log-odds units on an interval-level scale of measurement. Negative values means that the questions or items are easily endorsable, and high values mean the items are more difficult to endorse.

Figure 1. The item map created by IRT analysis from the Ethiopia data



The figure illustrates that some questions overlap or are close in the level of their difficulty, as represented by thick lines or ticks, and can therefore be dropped. The figure also illustrates gaps in the scale between -1 and -2 as well as above +1 and below -2.

Future Work

The next phase of the research involves taking the information and lessons learned from the applications in Ethiopia and Cote D'Ivoire, and applying them to the context of Kenya. The first phase of the Kenyan questionnaire development has occurred with the collection and analysis of data from 300 participants. A revised questionnaire is being developed with data collection occurring in early 2011.

The goal of this research is to create an innovative tool that quantitatively assesses the impact of educational interventions. Our hope is that this a tool to quantitatively determine the educational best practices will substantially influence how practitioners and policy makers allocate resources. A detailed technical proposal outlining this research can be obtained by upon request.

³ <http://www.pepfar.gov/documents/organization/100029.pdf>