



Perspectives

Beyond broken pumps and promises: Rethinking intent and impact in environmental health



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ARTICLE INFO

Article history:

Received 11 December 2016

Accepted 12 December 2016

Available online 19 December 2016

Keywords:

Global development

Measurement and evaluation

Poverty reduction

ABSTRACT

Global environmental health efforts are motivated by a sense of common responsibility. These programs take forms small and large, from community churches to the World Bank. The methods likewise take varying, and sometimes competing forms, from watershed restoration to road building to community engagement, with funding provided by charities, bilateral aid, loans, microfinance and big business. Once these projects are installed, typically the implementers are their own evaluators. Under the best of circumstances, sometimes funding is available to run a randomized controlled trial to rigorously evaluate if the projects are improving the intended environmental, economic, health or other metrics. But, usually sooner rather than later, the funding runs out for that particular project, and everyone moves on. This has resulted in sad statistics. For example, half of the water pumps installed in some African countries are broken a few years after they're installed. In a recent volume, *Broken Pumps and Promises – Incentivizing Impact in Environmental Health* [1] my co-authors and I review alternatives. Instead of pushing money toward projects based on promises, pay interventions for successfully demonstrating impact that meets this intent. We propose moving from intent to impact via a combination of aligned standards, metrics and evidence.

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1. Introduction: the intent to impact gap

The United Nations Sustainable Development Goals (SDGs) were announced with fanfare in September 2015. Replacing the retired Millennium Development Goals (MDGs), the 17 SDGs promise to deliver an ambitious range of impacts globally, including “End poverty in all its forms everywhere,” “Ensure access to water and sanitation for all,” “Ensure access to affordable, reliable sustainable and modern energy for all”, and “Revitalize the global partnership for sustainable development” [2].

What is less apparent is how success will be measured. At release, the United Nations provided no objective standards or statistical indicators. These standards will no doubt be informed by the favorable interpretation of the progress made with the MDGs. In some cases, the United Nations claimed that the MDG goal targets were met. For example, claiming that MDG 7, a goal to reduce by half of the number of people without access to clean drinking water, was met in 2012 [3]. Unfortunately, it has become apparent that the standards and metrics used are in many cases insufficient to actually meet these goals. As a result, the doubling-down with SDGs may equally fall short if measurement standards are not directly aligned with the impact actually intended.

Only a month after the SDGs were announced, the United States Government Accountability Office (GAO) released a report examining the United States Agency for International Development (USAID) efforts in water and sanitation. The title was straightforward – “USAID has Increased Strategic Focus but Should Improve Monitoring” [4]. The report commended USAID’s water and sanitation efforts, but highlighted that, even by USAID’s own metrics, they were likely overstating impact.

USAID’s recommended standard and custom indicators include “Number of people gaining access to an improved drinking water source”, and “Number of people gaining access to an improved sanitation facility”. These indicators are intended to be collected annually for programs implemented in the previous year and have no meaningful consideration of monitoring over a period of years, measurement of water quality or sanitation level, or health impact. And yet, even with these demonstrably low quality indicators, USAID failed in many cases to collect data, and, in the view of the GAO, may have overstated their impact in claiming that millions have been provided access to safe water and sanitation [4].

Rather than an indictment of USAID or the United Nations, these examples instead highlight the status quo in delivering well-intentioned environmental health interventions. The finite and fickle flow of funds begets incentivizing new projects, and not sustained delivery of services.

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Fig. 1. The status-quo in many environmental health interventions includes linear flow of funding that does not result in continuous or reliable feedback on impact for beneficiary communities.

1.1. The perils of business as usual

In contrast to piped water supplies, sanitation disposal or electrical grids in many countries, service provisioning in emerging economies can take the form of household water filters, community hand-driven water pumps, improved wood, charcoal or kerosene cookstoves, and pit latrines. Access to these improved drinking water, sanitation systems and clean burning stoves could benefit the billions who suffer from diarrheal disease and pneumonia, two of the leading causes of death for children under five globally [5]. Billions of dollars are spent annually by governments, donors, non-profits and private sector institutions on technology interventions designed to provide these environmental services and address these public health issues.

The resilience of environmental service provisioning globally is dependent upon credible and continuous indicators of reliability, leveraged by funding agencies to incentivize performance among service providers. In many countries, these service providers are usually utilities providing access to clean water, safe sanitation, and reliable energy. However, in rural areas of developing countries, there remains a significant gap between the intent of service providers and the impacts measured over time.

This status-quo generally calls for finite funding and timelines of typically a few years to deploy, maintain and monitor such interventions. Impact is nominally evaluated by implementers directly. In some cases, funding may be available to employ health epidemiologists or development economists to run randomized controlled trials to rigorously evaluate if the projects are improving environmental, health or other targets. Yet, even when a positive impact is measured, the majority of these environmental service interventions are supported by implementers for only a few years. As a consequence, there is increasing evidence that much of the services provided in developing countries have failed to continue to positively deliver services.

The overstatement of the impact of water and sanitation services can be tied to two factors. Firstly, the measurement methods used to evaluate access are imprecise and are not aligned with the impact intended of clean water and sanitation access. Secondly, implementers responsible for delivering these services are often incentivized to construct infrastructure and have little incentive or resource to provide on-going operation and maintenance services. This status quo is simplified in the following figure (Fig. 1).

Driving along a rural dirt road in many developing countries you see frequent evidence of this generous intent of global humanitarian aid agencies. Most tangible are hand driven water pumps that dot the landscape. These pumps are the concrete and steel outputs of a global intent to provide more clean water to more people.

Thousands are installed every year, funded and implemented by organizations large and small. But, sadly, in many cases a flip of a coin may be your best judge of if the next water pump you pass will be surrounded by people, often women and children, filling their jerry cans, or if you'll see a decrepit artifact of wasted resource.

In rural sub-Saharan Africa, where hand pumps are a common technology, 10%–67% of improved water sources are non-functional at any one time, and many never get repaired [7]. While the proximate failures may be a leaky seal, a broken riser or a missing handle, these are only symptoms of the ultimate failure in how we fund, incentivize and monitor these efforts.

Presently, the impact of interventions may not always be aligned the intent originally sought. Improved regulations, standards and metrics that closely match intent, programs can be directly evaluated for compliance with those metrics and funders may incentivize and reward implementers for demonstrating impact. Monitoring must move toward surveillance systems to improve operational performance and sustainability of services [6].

1.2. Paying for performance

One widely-promoted solution to the challenges of sustained service delivery is through enabling greater accountability and transparency. Many funders are increasing their requirements for project monitoring and reporting and have encouraged more systematic evaluation and communication of activities and performance. These funders want evidence that their investees are doing the promised work and delivering the agreed upon outputs. But meeting these demands for accountability doesn't guarantee that the desired social changes have been achieved.

To ensure that these investments are having an impact, there has been an ongoing push toward providing hard evidence. The "gold standard" for reliable evidence comes from randomized control trials (RCTs). In this approach, measurements are taken before any action is taken, and groups are randomly assigned either to receive or not receive a funded intervention. At the end of the intervention, the organization or some external auditor measures whether the group that received the intervention is better off than the group that did not.

Although trials can be valuable, they are only useful for a fraction of investments, because they require very careful control of the intervention and they don't allow for any course corrections during the delivery of the program. And evidence about one intervention can rarely be generalized to another, because local conditions and populations vary so widely. This has left the sector with insufficient guidance on how to more efficiently and effectively address the needs of beneficiaries and to create the desired impacts.

At its core, pay for performance is the payment of money or other resources contingent on achievement of a performance goal. The increased recent interest in this approach results from the belief that funding can be designed to increase an organization's social performance through impacts such as improved quality of services, higher number of beneficiaries positively affected, or increased efficiency of service provision.

Donors have always cared about performance, and it has been common practice performance in one time period to funding in the next. However, like most ongoing funding, this performance-based funding has typically linked funding to inputs and activities rather than outcomes [8].

1.3. The opportunity of emergent technologies, methods, and data

Emergent technologies, methods, and data sharing platforms are increasingly aligned with program incentives and monitoring. Improved, frequent or continuous monitoring of water and sanitation interventions may allow more cost-effective impact. In many

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