Evaluating Population, Health, Environment Program Effectiveness: The Need for Stronger, Varied Methods

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Abstract: Population, health, environment (PHE) programs are an increasingly popular strategy to address population growth, adverse health outcomes, and threats to biodiversity through integrated service delivery. Although the approach has existed for nearly 15 years, few studies of its effectiveness have been published in academic journals. This paper provides an overview of PHE and details what is known about PHE program effectiveness in the academic literature, as well as the limits of our knowledge. I argue that academics should develop stronger partnerships with PHE practitioners to strengthen program evaluations, in turn furthering research efforts. Additionally, I call for a broader array of methods for evaluating PHE programs, given the challenges associated with using experimental techniques in open systems.

Population, health, and environment (PHE) is a community of practice that has grown over the past 15 years, focused on developing integrated interventions to tackle challenges associated with population growth, poor health outcomes, and unsustainable resource use in areas where biodiversity is under threat (D'Agnes and Margoluis 2007). PHE is a service delivery model for providing health and conservation activities in an integrated fashion. However, many PHE programs utilize concepts and results from primary research on population and environment connections to inform programming (Carr 2013; Edmond et al. 2009). While there are projects that integrate conservation with another sector, such as education (Dolins et al.

2010), the focus of the following discussion is on projects integrating health and environment, though education and livelihood programming often supplements these activities. Various NGOs define PHE projects differently (The BALANCED Project 2013), but for the purposes of this paper, are initiatives that seek to holistically address concerns around population growth, poor health outcomes, and biodiversity loss in collaboration with local resource users through the provision of family planning, improved health service delivery, and conservation activities.

Understanding how PHE programs function is an important step towards wider adoption of the approach. In particular, many PHE models assume that a *synergy* between population, health, and environment exists—that is, addressing all of these factors together improves human and environmental health outcomes more than if these issues were addressed separately (Oglethorpe et al. 2008; Edmond et al. 2009; Mohan et al. 2011). However, PHE programs are instituted in open systems and typically at a small scale, which makes understanding the nature of this synergy, and in turn, the effectiveness of PHE projects, challenging. As a consequence, few academic articles have been written about the approach. Academics can do more to help improve understanding of PHE, but furthering this knowledge will require using an array of tools to strengthen evaluations, the results of which may provide a basis for future research.

From ICDP to PHE

The PHE model built upon integrated conservation and development programs (ICDPs), which were first implemented in the 1980s with the aim of simultaneously improving human and environmental well-being (Wells and Brandon 1992). ICDP practitioners sought to improve rural economies and the condition of nearby resources by educating communities of the impacts of human activities on environmental quality, by developing monitoring institutions to help communities protect resources, and by promoting and financing alternative livelihood strategies

(Robinson and Redford 2004). A core hypothesis underpinning ICDPs was that external intervention designed to change how local communities manage and use resources was a preferred solution to preventing biodiversity loss as opposed to addressing causes that originated outside of local areas. This idea was premised on the notion that local resource use was the leading driver of biodiversity loss (Hughes and Flintan 2001). However, some scholars feel that most initiatives failed to validate the core hypotheses of ICDP programs because they could not achieve both their conservation and development objectives (Brown 2003; Wells et al. 1999).

Despite these problems with ICDPs, many development practitioners continued to see integration as compelling given the interdependence of many problems facing vulnerable communities. Some practitioners felt that ICDPs were not seen as effective because they were too complicated, involving too many actors, and that better targeted programs could more effectively address health and conservation problems (Pielemeier 2005; Oglethorpe et al. 2008).

Many conservation organizations recognized that without addressing issues of women's health and gender, that environmental goals would not be met (Oglethorpe et al. 2008; Edmond et al. 2009). Early iterations of these newer, more focused interventions were often labeled as population-environment (PE) programs, which typically centered on family planning as their primary health intervention. Family planning use has impacts on health, through reduced maternal mortality (Ahmed et al. 2012), improved child survival (Rutstein 2005), as well as through its wider impact on population dynamics (which in turn impacts conservation objectives; Oglethorpe et al. 2008). Moreover, environmental factors can influence health. For example, ecosystem degradation can worsen nutrition (Golden et al. 2011; Steele et al. 2007), increase the number breeding sites for malaria-carrying mosquitoes (Patz et al. 2004), and exacerbate community vulnerability to natural disasters (Das and Vincent 2009; Marris 2005), all problems

that can, to some degree, be ameliorated with health-related interventions. Health was missing from PE programs despite its clear linkages with both population and environment.

Despite these theoretical justifications, the integration of health into PE programming was largely a result of pragmatic choices. The adoption of health into PE programs was centered largely around "champions"—dedicated individuals and small organizations who have been instrumental in promoting the use of integrated conservation programs more broadly because of their strong beliefs about their effectiveness (Pielemeier et al. 2007; De Souza 2008). Often, it was the actions taken by champions that led to the wider integration of health into PE programs. For instance, as Gaffikin (2008) notes, some practitioners starting PE programs in Madagascar were concerned that family planning would not be widely accepted by rural populations without including it with other health promotion efforts because of the substantial community health needs existing in those communities. Therefore, PE practitioners began to include a broader set of public health interventions to provide a platform for which family planning would be viewed as more acceptable by targeted communities, though funding was not always forthcoming.

Synergies between Population, Health, and Environment

Even though the decisions to integrate health into PE programming were largely not made on theoretical grounds, the theories underlying synergy between population, health, and environment provide important building blocks for developing stronger evaluation and research strategies for testing program effectiveness. Stem and Margoluis (2004) reviewed the existing PHE literature and summarized the theories through which practitioners hypothesized that synergistic change occurs in PHE programs. They discuss over 40 causal chains through which impacts can be generated in one sector by an intervention in another sector. A discussion of these causal chains is provided below, along with empirical supportive examples as appropriate.

From Health/Population to Conservation: These causal chains illustrate the potential for improved health outcomes to lead to improved conservation outcomes. For example, Stem and Margoluis (2004) hypothesize that family planning interventions could reduce fertility, which could in turn have several possible positive impacts, including reducing land clearing, reducing migration to ecologically sensitive areas as resources become scarcer, and reducing burdens on women, who can then take more active roles in conservation activities.

By improving health, PHE programs have been shown to increase working hours (Edmond et al. 2009). While this additional time could be used for activities that promote conservation, Carr (2008) notes that villagers could also use this time to engage in environmentally destructive activities. Other health interventions may involve environmental modifications as part of the project. For example, water and sanitation projects often include infrastructure to maintain long-term water quality, which impacts human and wildlife health.

From Conservation to Health/Population: Forestry and watershed management interventions may improve water quality and quantity, which can directly impact health through improved hygiene and nutrition. Agriculture interventions, such as improved irrigation can improve crop yields, positively affecting nutrition, and may also reduce water runoff, which can diminish the number of breeding sites for mosquitos and other disease vectors. Conservation interventions that reduce biodiversity loss can increase the supply of wild foods and medicines, also improving nutritional health. Environmental education efforts that link conservation with health can increase the willingness of communities to participate in conservation programs (Carr 2008), and also can change reproductive health-related behaviors (Belachew et al. 2013).

Operational Linkages: Integrating population, health, and environment activities may improve program efficiency and effectiveness. For instance, creating a successful conservation

program may build trust among community members and improve cooperation with future initiatives, such as a health program. Cooperation can also be promoted in other ways. For example, recent evidence from Ethiopia suggests that village leaders appreciate the time savings associated with PHE programs. Instead of meeting separately with both conservation and health NGOs if each have programs in the area, leaders in communities with PHE only need to meet with a single person, which has improved receptiveness to program activities (Stelljes 2013).

Current Results of Published PHE Research and Evaluations

While the PHE approach is growing and additional efforts are being made to understand its functioning and effects, academics have an opportunity to provide support that can facilitate stronger evaluations. Given the potential of PHE approaches to improve conservation and health outcomes in some of the poorest, most vulnerable parts of the world, the lack of interest and available funding in this field is unfortunate. Academic journals have published relatively few articles that detail PHE program results. An even smaller set of these articles are designed as academic research—the majority are program evaluations that have been published. Because most of these articles describe studies that lack research methodologies, they provide useful case studies that describe how PHE programs have been successful in specific settings, but they have limited external validity. As far as I am aware, the list below contains all studies published in academic journals on PHE program effectiveness, though there are several other articles not included discussing the planning or implications of PHE programs (but without evaluation results), including Ghiron et al. (2014), De Souza (2014), Torell et al. (2012), and Hunter (2008).

Philippines (IPOPCORM): The Integrating Population and Coastal Resource Management (IPOPCORM) intervention in the Philippines has served as one of the key testbeds for PHE evaluation. Led by PATH Foundation Philippines (PFPI), and set in Palawan in the

southwest of the country, IPOPCORM began in 2001, seeking to reverse the deterioration of fragile coral ecosystems while providing reproductive and other health services to communities in need (D'Agnes et al. 2010). Researchers utilized a quasi-experimental design and gathered baseline data in 2001 on health and sociodemographic indicators, following up in 2004 and 2007, and gathered data on coastal management annually beginning in 2002.

The evaluation showed that between 2001 and 2007, the integrated approach largely outperformed communities where only the health or conservation part of the program was delivered. For example, coral reef condition significantly improved in the integrated site, but not in the sites with nonintegrated interventions. However, despite IPOPCORM being one of the most extensive PHE evaluation efforts to date, the study encountered problems due to a number of outside interferences that hindered the researchers' ability to assess the relative impact of the integrated approach as compared to the nonintegrated sites (discussed further below). While the IPOPCORM evaluation provides evidence of the potential of PHE to improve both human and environmental outcomes (Castro and D'Agnes 2008), it also highlights the challenges of conducting effective demographic and environmental research in open systems.

Nepal (USAID): Starting in 2006, USAID and a group of Nepali NGOs began a pilot PHE project addressing the relationship between fuelwood use for heating, adverse health outcomes due to acute respiratory infections, and population pressure on local forests (Hahn et al. 2011). The project used community education activities that promoted family planning and clean energy, and provided training to local men and women to construct more energy-efficient stoves. In a short project lifespan (30 months), the contraceptive prevalence rate in project communities rose by more than 50%, the number of acute respiratory infections was cut in half, and the proportion of households using improved cookstoves or biogas nearly doubled. These

results suggest that the program is serving its intended purpose. However, the short time span of the evaluation leaves open the question of whether these outcomes will be sustained in the future. Additionally, this evaluation, as well as the other studies discussed below lacked a control site or other comparison group, making it unclear whether their results represent a significant improvement compared to the absence of a program.

Madagascar (Blue Ventures): In 2007, Blue Ventures, a UK-based conservation charity, began a reproductive health project in Velondriake, southwest Madagascar, to complement their existing marine conservation work (Harris et al. 2012). Blue Ventures created a clinic that within two years provided services to three areas of Velondriake, allowing women from even the most remote villages in the region to access services within a day's journey by public transport. The results are positive, with steady increases in the number of services provided and couple years protection, though the sustainability of these gains remains unclear (Mohan and Shellard 2014).

Tanzania (Jane Goodall Institute): In 1997, the Jane Goodall Institute (JGI) added a family planning component to a forest conservation and agricultural development program (TACARE), in Western Tanzania (Mavanza and Grossman 2007). Using a community-based distribution model, JGI expanded access to family planning in villages where many women had an unmet need. In 2005, TACARE personnel surveyed the program area, finding that among persons of reproductive age, 45% were using a modern method of family planning and nine in ten women were aware of at least one modern method.

PHE Research vs. PHE Evaluation

In order to understand effectiveness, PHE practitioners and their partners have focused on conducting program evaluations. Evaluation is the process of measuring outcomes with an aim to provide immediate knowledge to program practitioners, which can be used to refine program

operations (Levin-Rozalis 2003). Evaluations are designed to assess whether the program is functioning as intended, and if not, to document how the program is failing short.

Academics have an opportunity to further the knowledge gained by the evaluations through research. Grounded in theory, research is designed to test hypotheses and generate results that are applicable to contexts wider than the area being studied. While evaluation and research are distinct approaches to gathering knowledge, the two approaches can complement each other. Evaluators often borrow research tools in order to strengthen their evaluations. For example, realist evaluation methods utilize theory to refine hypotheses about program mechanisms (Pawson and Tilley 1997), and impact evaluations are designed to measure the performance of a particular program, but with tools that enable the researcher to make stronger inferences about causality, often with the result of increasing external validity (Pattanayak 2009).

Many PHE programs have been evaluated (e.g. Carr 2008; Gaffikin and Kalema-Zikusoka 2010; Pollnac and Dacanay 2011; Belachew et al. 2013), and these evaluations have largely succeeded in their objective—to provide timely and accurate information to practitioners and funders about program outcomes. However, many evaluations have not, or could not, utilize rigorous research methodologies. The lack of these methods reduces the internal and external validity of the evaluations, and ultimately makes them less informative for scholars seeking to conduct research about PHE programs. This may in part explain why little research has been conducted about PHE linkages. The challenges faced in using research tools should be considered by scholars considering research on PHE programs. These challenges may be surmountable with sufficient time and financing, strong partnerships between researchers, practitioners, and other stakeholders, as well as a focus on first improving evaluations, which can then provide support for causal hypotheses that can be tested with more directed research.

Researchers can obtain valuable insights on future work by understanding some of the challenges that PHE evaluations have faced thus far. These include:

Duration: PHE projects operate in complex human and natural systems, and project impacts are likely to be felt at different periods in time. Some impacts, such as increases in contraceptive use, have occurred over short time periods (Gaffikin and Kalema-Zikusoka 2010). However, PHE projects are designed to ameliorate the consequences of decisions made about family size and future livelihoods, and their outcomes are only likely to be clear in a generation. Most PHE evaluations are not set up to capture these long-term impacts (De Souza 2008). With more time, however, projects may appear to be more effective. Although many ICDP projects were considered ineffective due to their short time frame, projects that were designed and evaluated for longer time periods have been shown to be more successful (Mulder et al. 2007; Baral et al. 2007). Moreover, it can take many years in natural systems from the beginning of an intervention to witness the full potential for change. For example, studies of marine reserves show that on average, the longer a protected area regime has been intact, the more effectively it preserves fish stocks (Claudet et al. 2008; McClanahan et al. 2006). Designing long-term projects, and by extension, long-term evaluations, can address this issue. Academic researchers, who are not bound by the objective of informing stakeholders and assessing whether a project is meeting its objectives, can also help to facilitate long-term studies by following up when a project has ended as practitioners may have moved on.

Controls: In order to quantitatively measure changes over time, controls—sites not receiving the intervention—need to be incorporated into the evaluation design (Pattanayak 2009). Without understanding what would have occurred in the absence of an intervention, it is impossible to know whether it represents an improvement or not. Comparison sites have been

used in some PHE evaluations (e.g. Kleinau et al. 2005; Belachew et al. 2013). However, using controls as a way to generate rigorous counterfactuals presents challenges to PHE practitioners. As with many development interventions, PHE program sites are typically not chosen randomly. Sites may be selected because of their proximity to or impacts on natural resources of concern (Carr 2008; D'Agnes et al. 2010), current population size (Carr 2008), or because of their proximity to existing program sites (Harris et al. 2012). Control sites should be selected based on the same criteria, with an understanding that starting conditions in the program and control sites should be as similar as possible on variables that are predicted to influence program outcomes (Ferraro and Pattanayak 2006). Yet doing this is not always possible in PHE settings due to preexisting relationships between implementing organizations and specific communities before initiating an integrated project, as well as the potential for spillover effects from program sites.

If a program were implemented in a large number of sites, the impact of confounders could be nullified through randomization. However, PHE projects are generally not designed on a large enough scale. While randomization of sites has been a challenge in the past, the goal of a randomized control trial (RCT) for PHE programs is one worth striving for, though not to the exclusion of other evaluation methods. Academics knowledgeable in developing RCTs would benefit from partnering with practitioners on exploring the possibility for such a study.

Funding priorities and constraints: The success of PHE interventions rests on a high level of integration between program components. However, funding for PHE programs comes largely from donors who operate with sector-specific funding models. Most of the key governmental and nongovernmental funding partners that PHE providers rely upon keep their population and health grantmaking distinct from their conservation programs. An integrated intervention like PHE does not fit well into this structure, which places PHE programs at a

disadvantage when applying for funds (Stelljes 2013). Instead, PHE must rely on a hodgepodge of funding sources, not only resulting in shorter-term funding, but also potentially skewing program (and thus evaluation) priorities in order to meet the needs of particular donors.

For example, because most USAID PHE funds come from the Population and Reproductive Health budget, they are generally required to be used for family planning, even though there are situations where using such funds for health or environment purposes would be more appropriate (Carr 2008). In USAID's BALANCED project, these restrictions have hindered its capacity to develop integrated interventions—instead, funding restrictions have sometimes led to programs that emphasize family planning at the expense of health and environment, rather than treating them as co-equal priorities (Lauro 2011). Evaluations of such programs may be able to capture the effects of the intervention, but have less to say about the nature of integration, and how integration affected outcomes because of their lopsided design. Even though funding continues to be largely siloed, encouraging donors to develop interdepartmental grantmaking teams that have experts in population, health, and environment could provide more sustainable and flexible funding for PHE programs and their evaluations.

Case Study: IPOPCORM and Limitations of PHE Research

The IPOPCORM study was designed to address many of the challenges to PHE evaluation, including nonuse of controls, lack of integration, and short time frames. Data were collected between 2001 and 2007—considerably longer than for other PHE interventions to date, and with secure funding for the program's duration. Moreover, the study was designed to test the effect of integration versus nonintegration. IPOPCORM contained an intervention site with coastal resource management (CRM) and reproductive health (RH) services, a CRM-only site, an RH-only site, and a site with no programming. These sites were carefully selected to match on a

series of socioeconomic, health, and ecological metrics (D'Agnes et al. 2010). While the selection process for these sites was based on substantial evidence, PATH Foundation Philippines (PFPI) was not able to prevent outside confounders from impacting their study. Outside NGO involvement in the non-intervention site, as well as adverse environmental problems in the RH-only and CRM-only sites due to poor institutional controls hindered PFPI's ability to draw accurate conclusions about the impact of IPOPCORM (Pielemier et al. 2007).

Alternative Learning Strategies

As illustrated by the lack of literature on PHE, especially research, academics have done relatively little to shape debate about PHE. This is unfortunate for the academic community, as a rich area of exploration with the potential to affect how family planning services and conservation programming are delivered is being neglected. And it is unfortunate for the PHE community, as programs could benefit from the theoretical and technical expertise of academics. A stronger partnership would be beneficial for both sides.

In order to facilitate this, it would be advantageous for practitioners to adopt research tools when feasible. Such efforts will in turn require the collaboration of donors to provide sufficient and flexible funding for more rigorous evaluations. Academics would also benefit from collaborating with practitioners. However, it is important that such a collaboration include a range of research methodologies—as illustrated by IPOPCORM, RCTs and similar methods that rely heavily on control sites may be poor candidates for PHE given the high barriers to eliminating confounders in open systems. A greater willingness to explore other methods may lead to a richer understanding of the relationships between population, health, and environment than can be gained from an experiment alone. This knowledge can then provide a platform for future research activities. Several research techniques that might be more appropriate for PHE

are briefly discussed below, but the list should be considered a suggested starting point for conversation, not a comprehensive menu.

Matching methods (quantitative): A counterfactual is needed in order to determine whether an intervention actually changed outcomes, as observed changes may have occurred even in the absence of a program. Matching methods can be used to balance control sites with intervention sites based on observable covariates (D'Agostino 1998). Matching methods can be used in instances when control sites have been selected and monitored by evaluators prior to the evaluation. They can also be used if control sites do not exist, as a technique for constructing controls *ex-post* using secondary data. These methods are designed to control for the nonrandom assignment of program sites (Ferraro et al. 2011). Such techniques have been successfully used in a number of studies examining the effect of protected areas on poverty (Andam et al. 2010; Canavire-Bacarreza and Hanauer 2013; Miranda et al. 2014), and could potentially be adopted for evaluating PHE interventions, if data from other sources on social and environmental variables can be found. While some high-quality environmental data, such as on forest cover (Hansen et al. 2013), are freely available, finding sufficiently high-resolution socioeconomic data may prove too difficult in many settings where PHE programs are conducted, which may make *ex-post* matching less feasible.

Realist evaluation (mixed methods): Combining qualitative and quantitative techniques may also prove useful for PHE research. For example, realist evaluation methods have been recently used to analyze the Blue Ventures PHE program in Madagascar. Realist evaluations utilize a theory-based approach to help evaluators develop an understanding of the mechanisms within an intervention which caused a particular change (Mark et al. 1998). Theories about program function are tested using qualitative and quantitative techniques, and either

substantiated or modified based on evidence yielded. Realist evaluation is best considered as an iterative process, whereby learning to refine theoretical development is constantly taking place as the program evolves. Mixed methods such as realist evaluation are designed to complement more heavily quantitative approaches by providing context that can explain experimental results. As Pawson and Tilley (1997) note, experiments enable practitioners to determine what factor or set of factors affected an outcome in a particular set of conditions. But they tell us very little about how those outcomes came about, which can only be determined through the use of other methods.

Qualitative methods: There is a growing recognition within the conservation community that qualitative methods are increasingly important tools, as human contexts are embedded within ecosystems, which often cannot be measured with quantitative methods alone (Stem et al. 2005). In particular, case studies can be used to identify exceptional examples that counter existing theories, which in turn stimulates further theoretical refinement (Flyvbjerg 2006). Semi-structured interviews can allow researchers to ask a standard set of questions while also allowing space for respondents to describe their personal perceptions and experiences with the program. Such interviews can show progression over time as a project is implemented. In addition to strengthening the quality of evaluations, the emphasis on narrative in many qualitative techniques can provide a vehicle through which to transmit research findings to non-academicians. Stories can provide deep insight into personal experiences, highlighting social and power dynamics, as well as potential problems with an intervention (Carr 2010). Research methods that emphasize storytelling may provide evidence that is better understood by donors and the general public, which can in turn facilitate policy change (Leslie et al. 2013).

The use of appropriate evaluation techniques could greatly advance PHE. Even though PHE is not a widely used approach today (although it is growing), a critical mass of programs may not be needed in order to demonstrate its effectiveness. A small number of well-designed evaluations using a variety of techniques could provide much more compelling evidence than a larger number of poorly designed studies (Ferraro and Pattanayak 2006).

Lessons Learned

The first 15 years of PHE initiatives have demonstrated that the approach has much to offer family planning, health, and conservation practitioners. However, there is more work to do to help ensure that the integrated principles behind PHE programs become a larger part of development strategies. Without strengthening the theory behind PHE, as well as broadening the use of evaluation methodologies to fully capture knowledge about how PHE interventions create change, PHE risks being cast aside in the development and conservation communities as another ineffective approach because of the lack of supporting evidence. The PHE community would benefit from partnerships with the academic community to increase the use of research tools in program evaluations. Improved collaboration between practitioners and academics will help to ensure that PHE is valued within the academic community and that future knowledge about the approach is developed through rigorous evaluation and research techniques.

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