What Have We Learned from 20 Years of Stated Preference Research in Less-Developed Countries?

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Abstract

Over the past two decades, hundreds of stated preference studies have been conducted in less-developed countries. This article examines what has been learned on the methodological front from stated preference research, and it summarizes the empirical evidence from stated preference studies about household preferences in less-developed countries. The main conclusion is that households' willingness to pay for a wide range of goods and services offered to respondents in stated preference scenarios is low, in both relative and absolute terms and in comparison to the costs of service provision. This article discusses why this finding is important for development professionals. The article also identifies what is missing from the literature on stated preference studies in less-developed countries.

1. INTRODUCTION

Over the past two decades, hundreds of stated preference (SP) studies have been conducted in less-developed countries. In three earlier articles (Whittington 1998, 2002, 2004), I reported on the body of work from this research and policy enterprise and offered suggestions on how the quality and implementation of many of these surveys could be improved. In this article, I pursue two main objectives. The first is to reflect on what we have learned on the methodological front from this SP work in less-developed countries. The second is to summarize what we have learned about household preferences in less-developed countries from the empirical findings of these SP studies. I also comment on what is still missing from the literature and what we would still like to learn.

This is an interpretative essay; it is not an exhaustive survey of the literature. No attempt has been made to conduct a quantitative summary of the literature such as a systematic meta-analysis of SP studies in less-developed countries. The majority of SP applications now carried out in less-developed countries never make it to the refereed journals. This is so for two reasons. First, the majority are done to support ongoing policy work and were never intended for distribution to a wide, academic audience. Second, most environmental and health economics journals have increasingly stringent publication standards for SP articles. Straightforward, professional applications of the methods may be fine for policy work, but a simple reporting of empirical findings is of little interest to most editors. Many well-executed studies thus never reach a wide audience.

I follow developments in the SP field in a number of ways. First, I assist the environmental economics networks in Southeast Asia (EEPSEA), Latin America (LACEEP), South Asia (SANDEE), Africa (CEEPA), and the Middle East (MENA). In this capacity, I have the privilege of meeting and assisting environmental economists and policy analysts who are conducting SP studies on a variety of different topics around the world. Second, I see new work in my capacity as a reviewer of manuscripts for peer-reviewed journals. Third, my students and I continue to conduct SP studies in less-developed countries and to study the literature for new ideas and applications. In the next section of this article, I look back 20 years and recall some of the reasons why economists were originally so skeptical about conducting SP surveys in less-developed countries. I discuss some of the things that have changed to make this task more tractable. In the third section, I discuss three major things that I believe environmental and health economists have learned, from a methodological perspective, from the body of research on SPs in less-developed countries. The fourth section offers an interpretation of a common thread in the empirical findings from SP studies in less-developed countries: households' low willingness to pay (WTP) for a wide range of goods and services offered to respondents in SP scenarios. The fifth section discusses what is missing from the literature, and in the sixth section I offer some concluding observations.

2. BACKGROUND: WHY DID WE THINK STATED PREFERENCE SURVEYS WERE GOING TO BE HARD?

Writing in 1925, John Maynard Keynes foreshadowed the debate in economics over the contingent valuation (CV) method, warning us that the task of measuring WTP for nonmarket goods was going to be hard. He argued that it was not good to know exactly what everything costs, that it was right to weigh concrete things against each other, but not to weigh concrete things against abstract money, "the ultimate object of which is vaguely

conceived or not conceived at all. . . . The test of money measurement constantly tends to widen the area where we weigh concrete goods against abstract money. Our imaginations are too weak for the choice, abstract money outweighs them" (quoted in Skidelsky 1994, pp. 240–42).

In 1931, shortly after Keynes wrote about the love of money, the young Soviet psychologist A.R. Luria traveled from Moscow to Uzbekistan to study the cognitive abilities of peasants who had not been exposed to much of the modern world as it then existed. He recorded verbatim conversations that he and his research team had with poor Muslim farmers, in which he tried to assess their analytical reasoning (Luria 1976). The transcripts of these conversations (of which a sample is presented in the Appendix) illustrate the extreme difficulties Luria had while trying to communicate his Western analytical concepts to illiterate Uzbek peasants.

Fifty years later, in the 1980s, some environmental and resource economists still believed that cross-cultural communication between Western economists and illiterate respondents in developing countries would be next to impossible. It was then widely believed that it would be a waste of time to attempt SP research in such circumstances, even though it was clear to applied economists that better information on environmental values and behavior would be valuable for the design and implementation of development projects if it could somehow be obtained. The cost-benefit texts available at the time (e.g., Dasgupta et al. 1972) did not address the issue of measuring nonmarket benefits in developing countries. Economists instead relied on ad hoc assumptions and occasionally on benefit transfer techniques to estimate household demand for goods and services.

In part, the skepticism about the use of SP methods in less-developed countries was due to an understandable caution about undertaking new and untested research activities in what to most Western economists seemed strange, perhaps even dangerous environments. This skepticism also derived from criticism by the economics profession of SP methods in general: If these methods were a bad idea in the United States and Europe, they must be a doubly bad idea in developing countries. Anthropologists reinforced this skepticism with further warnings about the difficulties of cross-cultural communication, also pointing out the danger that respondents might tell interviewers what they thought researchers would want to hear.

In retrospect, this consensus view about the challenges to having meaningful conversations with poor households in developing countries was overblown. Social scientists in every discipline now conduct a wide variety of open-ended and structured interviews, focus groups, and participatory meetings with poor respondents in developing countries to gather information on their knowledge, attitudes, perceptions, beliefs, and values. These data collection efforts are not always easy, but they are certainly possible. In fact, in most respects, it is now far easier to interview respondents in developing countries than it is in industrialized countries.

Additionally, several things have changed since the days when researchers like Luria faced seemingly insurmountable barriers. First, since the 1930s, important aspects of modernization have permeated large portions of the populations of developing countries. In most urban areas, even poor households have electricity, are exposed to radio and television, and increasingly have access to mobile phones and the Internet. These households follow global news, adopt new technologies, and know about Western lifestyles. Throughout many developing countries, a wide variety of consumer goods are available, especially to urban middle-class households.

Second, literacy rates have increased greatly since the 1930s. Many households in developing countries now have members who can read and access information from a variety of sources. Most of the issues that SP researchers want to discuss with respondents in developing countries are no longer entirely new or exotic, even in remote and impoverished areas; to varying degrees, respondents have already thought about them.

Third, in many developing countries, substantial numbers of households have now been through the demographic transition to smaller families and longer lives. These posttransition households share many of the values and concerns of households in industrialized countries and often look at the world in similar ways. The psychological, cultural, and social distance between households in industrialized countries and households in developing countries that have been through the demographic transition is much less than that experienced by Luria in Uzbekistan in the 1930s.

Fourth, the majority of the SP studies now conducted in developing countries are undertaken by researchers who are from those countries. This is a new generation of researchers who were trained mostly in graduate programs in environmental or health economics in the United States and Europe and who have returned to carry out research in their home countries. They understand their own cultural norms and language and have the potential to conduct much more culturally sensitive, carefully executed SP studies compared with researchers who come from industrialized countries.

3. WHAT HAVE WE LEARNED ON THE METHODOLOGICAL FRONT?

3.1. Nonmonetary Numeraires

One of economists' early worries about the applicability of SP methods in developing countries was whether it would be possible to pose valuation questions in subsistence economies where cash was rare.[1] Experience over the past 20 years has shown that this has not been a major hurdle for two reasons. First, the cash economy has spread to almost everywhere around the globe. There are few places these days where people are unfamiliar with cash and do not use cash for at least some of their transactions. Second, where cash is rare, SP researchers have successfully managed to use nonmonetary numeraires. An early, seminal paper by Shyamsundar & Kramer (1996) adopted rice as a numeraire to estimate the willingness of poor households in Madagascar to accept compensation for not collecting nontimber forest products from lands that were under consideration for a new national park.

Kohlin (2001) used respondents' willingness to spend time (labor) rather than money on the management of forest plots in Orissa, India. In a CV survey in Bangladesh, Brouwer et al. (2009) first asked respondents whether they would pay anything in monetary terms for a flood protection program. Sixty percent of respondents said no. In a follow-up survey, the research team asked these respondents who had said that they would not pay anything whether they would be willing to contribute in kind, either with household labor or with a

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[1]There are also situations in which people may object to thinking about a monetary trade-off for religious or ethical reasons, and in such cases, a nonmonetary numeraire may be more appropriate. For example, some people may feel that it is ethically inappropriate to trade species preservation for money compensation. In this case, a respondent may reject the hypothetical deal structure suggested by a SP researcher, not because of the implied preference for the good or service but because the trade-off was made in monetary terms. In such cases, another good or service may serve better as a numeraire. Of course, concerns about the ability of respondents to make trade-offs and lexicographic preferences are not limited to SP studies conducted in less-developed countries.

portion of their harvest, to the flood protection program. Forty percent of these out-of-the-market respondents then said that they would contribute in kind. The researchers thus concluded that the use of a nonmonetary numeraire was feasible and would substantially reduce the number of zero bids.

3.2. New Techniques for Dealing with Hypothetical Bias

The main criticism that economists have leveled at the CV method has been that such WTP estimates are inflated because respondents do not face an actual budget constraint (hypothetical bias) and because they are prone to say yes too easily, perhaps just to please the interviewer (enumerator bias). In practice, it is often difficult to distinguish between these two pitfalls.

It is by no means clear that WTP estimates based on data from SP surveys are always inflated. In their meta-analysis of studies comparing SP and revealed preference WTP, Carson et al. (1996) concluded that there is no statistically significant difference between SP and revealed preference estimates—but almost all these studies are from industrialized countries, and the relevance for developing countries is unclear. Their finding is supported by comparisons of what respondents tell researchers (and pollsters) before elections and the results from actual referenda (Johnston 2006), but this evidence is likewise from industrialized countries.

There are two situations in which SP results often do differ from actual behavior. The first has occurred in SP studies that ask for voluntary contributions. The second arises with comparisons of actual behavior versus SPs in laboratory experiments in which the SP questions are purely hypothetical. The latter is not a problem for SP surveys in developing countries that are conducted in the field.

In my experience, many times in developing countries, one encounters a tendency for some respondents in in-person interviews to say yes too easily to the choice task(s) presented to them in the SP scenario (Whittington 1998, Whittington et al. 2000). As critics of SP surveys have suggested, the two main reasons for this yea-saying are probably the social interaction between the respondent and the enumerator and the fact that respondents do not actually have to pay the bid amount offered. However, SP researchers have developed a number of ways to reduce this yea-saying tendency, including cheap-talk scripts (Cummings & Taylor 1999, List 2001, Lusk 2003, Carlsson et al. 2005, Murphy et al. 2005, Carlsson & Martinsson 2006), ballot boxes to simulate voting behavior (Carson et al. 1994, Krosnick et al. 2002, Harrison 2006), recalibration of SP results with data from real experiments (Blackburn et al. 1994), time-to-think (TTT) experiments (Whittington et al. 1992), and drop-off protocols (Subade 2007). The last two methods were first developed and field tested in developing countries.

In a TTT protocol, the in-person CV interview is split into two parts, which are conducted on different days. At the first meeting, the enumerator completes the first component of the interview and may go through the CV scenario. The respondent is typically (but not necessarily) presented with the choice task (valuation question) but is not asked to answer the question immediately. The interviewer asks the respondent to think about this choice and to be ready to give a reply at a second session, in which the remainder of the interview will be completed. The hypothesis is that allowing the respondent more time (usually overnight) to reflect on the choice may (*a*) eliminate an overprompt (knee-jerk) yes answer to please the enumerator, (*b*) allow the respondent to

discuss the choice with other household members, and (*c*) permit the respondent to consider more carefully the household's budget constraint(s).

In a series of three recent CV studies conducted in India, Bangladesh, and Mozambique (Islam et al. 2008, Lucas et al. 2008, and Whittington et al. 2009a, respectively) and one choice experiment (CE) in Vietnam (Cook et al. 2007), survey respondents were randomly assigned to receive TTT or no-time-to-think (NTTT) in-person interview protocols. All four surveys were designed to estimate private demand for new-generation typhoid and/or cholera vaccines. The three CV surveys used very similar survey instruments. In all four studies, WTP estimates for respondents who received the TTT treatment were substantially lower than results from NTTT respondents. Moreover, the magnitude of the reduction was similar for the three CV studies (∼30%). The reduction was even larger in the CE (∼50%).

Subade (2007) developed a second approach for reducing hypothetical bias while conducting a household survey in the Philippines. Under the research design, respondents were randomly assigned to in-person or drop-off interview protocols, and then the results were compared. In both protocols, the interviewer made the first contact with the respondent in an in-person encounter, introducing herself and explaining the purpose of the survey. Some respondents then completed the CV questionnaire as the interview proceeded. To the others, the interviewer explained that she would like to leave the survey instrument with the respondent to complete and would return to pick it up later. If the respondent agreed, the interviewer made an appointment to retrieve the completed questionnaire and to answer any questions that might have arisen while the respondent was filling in the questionnaire. When WTP estimates from the two groups of respondents were compared, those from respondents who had received the drop-off protocol were approximately 50% lower than the estimates from respondents who had completed their protocols during in-person interviews.

This drop-off protocol method requires that respondents be literate and thus is not applicable in some rural areas and urban slums where respondents may be unable to complete a self-administered questionnaire. But the protocol has now been implemented successfully in numerous other studies in Southeast Asia (e.g., Labao et al. 2008, Nabangchang et al. 2008). Drop-off questionnaires may not entirely eliminate the threat of enumerator bias because the respondent still has limited interaction with the enumerator during the introductory phase of the protocol. The drop-off protocol also introduces a potential problem common to other self-administered questionnaires: A respondent may jump ahead in the survey instrument to see what questions are coming, which may affect replies to questions throughout the survey instrument. Nevertheless, experience to date suggests that the drop-off protocol is a promising approach to reduce yea-saying and can be implemented successfully in large cities in developing countries, where the majority of the population is literate.

In practice, the TTT and drop-off protocols are similar in that neither asks the respondent to answer the valuation questions immediately; that is, both allow the respondent an opportunity to sleep on it before giving the answers. In fact, the results of the drop-off and the TTT protocols appear similar; both substantially reduce WTP estimates compared with results from in-person control groups. The drop-off protocol has the advantage that it is cheaper and easier to implement. The TTT protocol can be used in situations in which a significant portion of respondents may be illiterate. A ballot box approach or cheap-talk script can be easily combined with a drop-off or TTT protocol. But to the best of my knowledge, the additive effect of these approaches to reducing hypothetical and enumerator bias has not yet been tested in either an industrialized country or a developing country.

3.3. Hypothetical Baselines

Another issue that has become more apparent to SP researchers as a result of applications in developing countries is the challenges posed by presenting respondents with hypothetical baseline conditions, as well as hypothetical management plans and/or goods and services.[2] A hypothetical baseline refers to the practice of telling respondents to value a hypothetical management plan, good, or service not from the individual's or household's status quo conditions but rather from some alternative, hypothetical situation or state of the world. The respondent's status quo state of the world will have a number of attributes, including infrastructure endowment, health status, and location, that a SP researcher may choose to change to construct a hypothetical baseline.

For example, a respondent might be asked to pretend or to assume that she lives in a location different from where she actually lives. She might then be asked whether she would vote for the hypothetical management plan if she lived in the hypothetical location (Whittington & Adamowicz 2010). In other words, the CV or CE scenario describes two hypotheticals: (a) a hypothetical status quo and (b) a hypothetical management plan, good, or service.

The need for a hypothetical baseline became especially apparent when SP researchers working in less-developed countries attempted to interview tourists about their willingness to pay increased entrance fees to national parks, or surcharges on visa fees or airport exit fees, to support conservation efforts (Hearne & Salinas 2002, Alpizar & Carlsson 2003, Tuan & Navrud 2007, Edwards 2009). What, precisely, might an SP researcher ask a tourist who was about to leave a national park? One possibility would be to move the respondent back in time, asking whether she would have come to the national park if the entrance fee had been a higher amount. Alternatively, moving forward in time, the respondent might be asked whether a return visit would be contemplated if the entrance fee were a higher amount.

Such contingent behavior questions, in which both the baseline condition and the proposed fee are hypothetical, are problematic from several perspectives. First, they are cognitively more difficult for respondents. Second, the subtleties of the question may be lost on enumerators, who may thus find it difficult to administer the valuation question consistently from one respondent to the next. Third, hypothetical baselines may raise challenging ethical issues, especially if the hypothetical baseline is one that may be interpreted as potentially harmful to the respondent or that inadvertently contributes to the spread of false information that may influence an individual's or community's actions in real conditions (Whittington 2004).

4. WHAT HAVE WE LEARNED ABOUT THE PREFERENCES OF PEOPLE IN DEVELOPING COUNTRIES?

Over the past 20 years, researchers using SP techniques have measured households' WTP for a wide variety of public and private goods in developing countries, many of special interest to policy advocates in industrialized countries as well (e.g., national parks, species conservation, various public health interventions). These SP researchers have often been paid for their work by mission-oriented professionals working in international donor organizations who hoped either implicitly or explicitly that demand for improvements in

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[2]In a developed country context, DeShazo et al. (2010) discussed the issue of choice set misspecification from the omission of perceived substitutes among real-world alternatives, an issue closely related to hypothetical baselines.

their sector would be high and that thus the benefits of the policy interventions under investigation would be large. Economists skeptical of the use of SP methods therefore fully expected that researchers working in developing countries would return with inflated estimates of benefits. They thought that (*a*) respondents would simply tell researchers that they would pay for the hypothetical goods and services offered, but these respondents would not pay when confronted with a real budget constraint, and that (*b*) there was a built-in bias to provide benefit estimates that would satisfy policy advocates. But in general this was not what happened. Economists expected respondents in developing countries to say yes too easily, but respondents seemed to have little trouble telling researchers no. In sector after sector, SP researchers found low WTP for the good or service that was the focus of their study. WTP was low in absolute terms and as a percentage of income. Also, WTP estimates were low relative to the cost of service provision. This conclusion is supported below with examples of SP studies from eight different policy areas: (*a*) improved water infrastructure, (*b*) sanitation and sewerage, (*c*) household water treatment, (*d*) ecosystem services and watershed protection, (*e*) solid waste management and collection, (*f*) marine turtle conservation, (*g*) vaccines against cholera and typhoid infection, and (*h*) the preservation of cultural heritage assets.

4.1. Improved Water Services: Public Taps and Private Connections

Starting in the late 1980s, the World Bank and the U.S. Agency for International Development (USAID) funded a series of CV studies designed to estimate households' WTP for improved water services, both from public taps and from private water connections (Briscoe at al. 1990; Whittington et al. 1990, 1991, 1992, 1998, 2002; Altaf et al. 1993; Griffin et al. 1995; Davis et al. 2001; Davis 2004; Davis & Whittington 2004). Households switching from contaminated existing sources to public taps and private connections could anticipate receiving both health and nonhealth benefits. These studies were conducted in Latin America, Africa, Asia, and Eastern Europe. **Table 1** summarizes the results of eight of these studies.

As shown in **Table 1**, there is considerable heterogeneity in WTP for improved services across different communities. In many places, WTP (especially for public taps) was modest. In contrast, in Lugazi, Uganda (a small market town), and in Kathmandu, Nepal (a large metropolitan area), researchers recorded substantial household WTP for piped water connections. However, demand for improved services was rarely found to be sufficient to recover the costs of service provision; capital subsidies were still needed, especially for lower levels of infrastructure such as public taps and hand pumps (Whittington et al. 2009b).

4.2. Sanitation, Sewerage, and Wastewater Treatment

As in the CV estimates of household WTP for improved piped water services, there is a great deal of heterogeneity in estimates of demand for improved sanitation, sewerage, and wastewater treatment. Studies from middle-income countries in Latin America report a very wide range of demand and WTP for sewer connections and wastewater treatment (McConnell & Ducci 1989, Russell et al. 2001). McConnell & Ducci (1989) reported estimates ranging from less than US$1 per month to US$15 per month (1989 dollars), although they admitted they were suspicious about the higher estimates.

Outside of Latin America, the only evidence of significant WTP for sewer connections and wastewater treatment comes from Cairo, Egypt, where Hoehn & Krieger

Table 1 Average household willingness to pay (WTP) for water services: a summary of eight contingent valuation studies

Authors	Study location and date	Monthly WTP (US$)		
		Public tap (unconnected households)	New private connection	Improved service
Whittington et al. (1990a)	Rural Haiti, 1986	1.1	1.4	
Whittington et al. (1988)	Rural Tanzania, 1987	0.32		
Briscoe et al. (1990)	Rural Brazil, 1988		4	
Altaf et al. (1993)	Rural Pakistan, 1989		1.5	
Whittington et al. (1993)	Kumasi, Ghana, 1989		1.5	
Griffin et al. (1995)	Rural India		1.38	
Whittington et al. (1998)	Lugazi, Uganda	3.7	8.63	
Whittington et al. (2002)	Kathmandu, Nepal	3.19	11.67	14.35

(2000) and Hoehn (2000) reported mean household WTP for a sewer connection of US$7–8 per month (1995 dollars). Elsewhere, there is no evidence that poor households will pay much for improved sanitation. In an early study in Kumasi, Ghana, Whittington et al. (1993) found an appalling urban sanitation situation in which many people were waiting in long lines to use a system of dilapidated, filthy public latrines. Many households were spending approximately US$1 per month to use these public latrines, and they said they were willing to pay approximately 50% more for on-site, hygienic, ventilated pit latrines. But demand for sewer connections was not much higher than WTP for improved on-site sanitation and was far less than the costs of such services.

Similarly, in the Philippines, among urban households in Davao City in the province of Mindanao, Choe et al. (1996) found demand for sewer connections and municipal wastewater treatment to be very low, at least an order of magnitude less than the costs of such services. They reported that almost half (47%) of respondents refused to pay the lowest bid (US$1 per month) offered in a referendum elicitation procedure for a management plan to clean up the water pollution in the rivers and bay and to make the urban beaches safe for recreational use. At the same low bid, 37% of respondents (in a different split sample) rejected a management plan that would have provided households in their neighborhood a connection to a sewer system and a municipal wastewater treatment facility to clean up the water pollution in the rivers and bay and to make the waters safe for recreational uses. Even though household incomes in Davao were much higher than in Kumasi, average household WTP for sanitation improvements was only US$1–2 per month. Choe et al. concluded,

> People are aware of environmental problems [caused by poor urban sanitation], but water pollution control is simply not a high priority for residents of Davao. People do feel that they have lost valuable recreational opportunities as a result of water pollution, and many are concerned about possible food

contamination. But these are not major problems in their lives compared to other pressing concerns. . . . Because households' willingness to pay for water quality improvements in Davao is much lower than the costs of providing such improvements, and because other environmental problems appear to deserve higher priority, the appropriate strategy in this case appears to be to wait until incomes are higher and willingness to pay has risen before embarking on a large investment program to control water pollution.

In a third study of household demand for improved sanitation services, Whittington et al. (2000) investigated demand for neighborhood sanitation improvements in Semarang, Indonesia, using both the CV method and participatory community meetings. Even though household incomes were higher in Semerang than in Kumasi and Davao, demand was still low in most neighborhoods studied. A large majority of households without piped water services said that they would vote for their neighborhood not to participate in the management plans offered in the CV scenarios. The authors concluded,

The results of both the household interviews and the community meetings suggest that willingness to pay for a connection to a sewer system is low. Many households questioned whether the neighborhood deal proposed [in the CV scenario] was a good idea even at very low prices. Among those households interested in having their neighborhood install new water and sewer lines, a diversity of opinion exists about whether to use an engineering contractor or a self-help approach. On the other hand, some households were enthusiastic about neighborhood sanitation improvements, and many survey respondents and community meeting participants were keenly interested in learning more about the sewerage and wastewater treatment technologies introduced. Overall, household demand for improved sanitation and sewers appears highly uncertain; people are simply not yet of one mind regarding the need for new sewers in their neighborhood.

4.3. In-House Drinking Water Quality

A third example concerns household WTP for treatment of domestic water supplies to remove contaminants that pose health risks. The distinction between these studies and those described above that focused on improved water services (public taps and private connections) and improved sanitation services is that here SP researchers presented households with scenarios that would deliver only health benefits from improved water quality, not the nonhealth benefits associated with greater accessibility and quantity of water (e.g., time savings, lifestyle benefits) or cleaner neighborhoods and recreational benefits from reduced water pollution.

Ahmad et al. (2005) interviewed 2,700 households living in parts of Bangladesh where groundwater supplies were threatened with arsenic contamination. They asked respondents to suppose that a treatment system that would remove arsenic from their drinking water was available. These researchers told respondents that it would cost their households a specified amount of money per month to remove the arsenic. They found average household WTP of only US$0.10–0.20 per month (0.2–0.3% of average household income) to remove arsenic. The authors concluded that "the [WTP] estimates indicate that rural people in arsenic-affected area of Bangladesh place a low value on arsenic-free

drinking water. . . . Costly arsenic reduction technologies. . .may find little social acceptance, unless heavily subsidized."

4.4. Paying for Environmental Services: Watershed Protection

Payments for environmental services (PES) schemes are a popular policy instrument for promoting watershed protection, especially in Latin America. Most PES schemes involve downstream water users (usually households receiving water from a municipal piped system) paying upstream landholders to undertake activities to protect a watershed (Pagiola 2005). Upstream landholders (landowners or possibly tenants) may be paid to stop deforestation, undertake afforestation, reduce soil erosion on agricultural lands, or cease slash-and-burn agriculture. The potential benefits to downstream water users include improvements in the quality, quantity, and reliability of water supplies; reduced risk of severe droughts; and perhaps the bequest value of preserving natural areas for future generations.

The price to be paid for environmental services is a critical aspect of any PES scheme and is bracketed by the maximum amount that users of environmental services (buyers) would be willing to pay for improvements in those services and by the minimum amount that providers of those services (sellers) would be willing to accept. Dozens of CV studies have been conducted to assist PES designers in estimating either or both of these values (Whittington & Pagiola 2010). These studies vary widely in quality; most are unpublished and difficult to access.

However, a few of these PES studies have appeared in refereed journals (e.g., Pattanayak & Kramer 2001, Johnson & Baltodano 2004, Calderon et al. 2006). Pattanayak & Kramer (2001) reported the results of a 1996 survey of 500 downstream farmers in the Manggarai district of Flores, Indonesia, and asked them about their WTP to control illegal cutting of forests in parks upstream. Downstream farmers' mean WTP was estimated to be US$0.23 per month.

Johnson & Baltodano (2004) reported the results from interviews conducted in 1998 of 153 municipal water users in five communities in the Rio Calico watershed (San Dionisio, Nicaragua) about their willingness to pay upstream landowners to adopt practices that would improve the quality, quantity, and reliability of the municipal water supply. They reported a mean WTP of US$0.42 per month.

In the largest and arguably the most skillfully executed of these studies, Calderon et al. (2006) interviewed respondents in 2,232 households in 13 communities of greater Manila, Philippines, and asked their willingness to pay upstream landowners to prevent deforestation and maintain forest cover. Respondents were told that these payments would improve the reliability and quality of the water provided by the municipal utility as well as protect the ecology of the upstream watershed. From the respondents' replies, the researchers estimated a mean household WTP of US$0.53 per month. In all three PES studies discussed here, the reported mean WTP was modest. None of the authors reported problems of choking off demand with high bid values or with respondents' yea-saying.

4.5. Solid Water Management and Collection

In one of the early applications of the CV method in a developing country, Altaf & DeShazo (1996) interviewed respondents in 968 households in Gurranwala, a dynamic secondary city in the Punjab, Pakistan, about their preferences for improved solid waste management

services. Despite a seriously dysfunctional existing municipal system that left the majority of the solid waste generated in the city accumulating in neighborhoods, resulting in serious dissatisfaction with the municipal services among the population, 29% of respondents had no trouble saying that they were not willing to pay anything to improve the situation. For the 71% of respondents who were willing to pay a positive amount for improved services, the mean WTP was US$0.57 (in 1990 dollars), just 0.3% of average monthly income.

Naz & Naz (2006) conducted a CE with 604 respondents to estimate households' demand for different attributes of improved solid waste management services in the municipality of Tuba in Benguet Province, Philippines. The researchers wanted to determine whether user fees could be implemented to finance solid waste management in such communities. They found that most households chose the lowest-price option in their choice set. Respondents were willing to pay US$0.30 per month (in 2005 dollars) to increase the frequency of solid waste collection from once a week to twice a week. Implicit prices for other attributes of solid waste collection services (e.g., type of waste collector, degree of waste segregation) were just a few U.S. cents per month. Naz & Naz suggested a monthly household collection fee of just US$0.38 (0.2% of average household income) for a base level of solid waste services that would generate some revenues and would still be acceptable to the majority of households. These researchers concluded that the municipality could not recover the cost of services with this user fee and that it would need to secure additional outside funding to continue to provide solid waste management services.

4.6. Vaccines

In a series of coordinated SP studies conducted for the International Vaccine Institute, researchers estimated household demand for new-generation cholera and typhoid vaccines in selected locations in South Asia (Islam et al. 2008, Whittington et al. 2009a), Southeast Asia (Canh et al. 2006, Cook et al. 2007), and Africa (Lucas et al. 2008). The results from two neighborhoods in Kolkata, India ($N = 835$ households), suggest that household demand for these vaccines was sensitive to the price of the vaccine suggested to respondents. In the poorest neighborhood, only 20% of respondents said they were sure they would purchase a typhoid vaccine for themselves if the price were US$1.10. In the middle-class neighborhood, the percentage was only 37%.

Beira, Mozambique, is one of Africa's cholera hot spots, with cholera incidence an order of magnitude higher than in Southeast Asia. Cholera outbreaks are regular occurrences in Beira, and the disease is well-known to almost everyone. Nevertheless, the median per-capita WTP for a two-dose vaccination regime to protect against cholera was only US$1.25, much less than the full cost of provision.

4.7. Marine Turtle Conservation

Nabangchang et al. (2008) interviewed respondents in China, the Philippines, Vietnam, and Thailand to determine their WTP for a regional marine turtle conservation program in Southeast Asia. Human activities in Southeast Asia present a variety of threats to marine turtles, and several species are now endangered. Because marine turtles are migratory and their habitat is shared among a number of Southeast Asian countries, the research team presented respondents with a CV scenario that described a cooperative regional program

to save marine turtles. From focus groups and pretest interviews, the researchers determined that a regional program would be both credible and appealing to respondents.

Nabangchang et al.'s (2008) results suggest that respondents knew that marine turtles are endangered and that respondents placed a high priority on saving marine turtles compared with other endangered species. Yet as in SP surveys conducted for other sectors, the researchers found that respondents had little trouble saying no to the bid levels offered. Only the lowest monthly surcharge mentioned to their respondents (US$0.02) would pass a referendum in all five cities in the study (Davao, Bangkok, Ho Chi Minh City, Hanoi, and Beijing). Mean WTP estimates were low (**Table 2**). The authors stated in conclusion that for each city surveyed, "we found that respondents were willing to make only small payments. . . . This suggests that many people place a low priority on marine turtle conservation compared to other public policy issues. . . . Until Asia develops higher per-capita incomes and trustworthy payment vehicles, the international community will play an important role in financing conservation in the region."

4.8. Cultural Heritage Preservation

Seenprachawong (2005) conducted the first SP study of household preferences for cultural heritage preservation in Thailand. He interviewed respondents in 540 households in Bangkok and used both CV and CE methods to estimate their WTP to preserve historic Buddhist temples that were in need of major repairs. The research design included the use of a cheap-talk script and secret ballot to reduce hypothetical and enumerator bias, as well as a scope test to check the sensitivity of respondents' answers to the number of historic temples to be preserved. He tested both income tax surcharges and voluntary donations as payment vehicles.

Results revealed that 30% of Seenprachawong's (2005) respondents would not pay anything for the preservation of historic temples—even in a Buddhist country, where merit in the next lifetime is earned by charity and good works and where the commodity under investigation was the preservation of important Buddhist shrines. Average willingness to make a one-time payment to a trust fund to preserve 10 historic temples varied from US$5 to US$9, depending on the payment vehicle and the estimation technique. The proposed one-time payment was approximately 0.2% of average annual income of respondents in the sample.

Table 2 Household willingness to pay (WTP) for marine turtle conservation program in Southeast Asia (2006 US$)[a]

	Respondent average income (US$/month)	Mean WTP (US$/month)	WTP as percentage of monthly income
Bangkok, Thailand	592	1.16	0.20%
Beijing, China	562	1.41	0.30%
Hanoi and Ho Chi Minh City, Vietnam	212	0.83	0.40%
Davao, Philippines	165	0.17	0.10%

[a]From Nabangchang et al. (2008).

In another study of the value of cultural heritage preservation from Southeast Asia, Tuan & Navrud (2007) interviewed foreign visitors and local residents in Vietnam about their preferences for preserving and upgrading the My Son world cultural heritage site in the central area of the country. My Son is a large complex of religious temples dating from the fourth to the thirteenth centuries. Although the complex is in a state of disrepair and urgently needs conservation and restoration, in 2005 the site received a total of 117,000 visitors (both foreign and domestic), and the visitation growth rate has been increasing rapidly. The researchers asked local residents both CV and CE questions. The CV valuation question asked Vietnamese respondents whether they would pay a one-time mandatory tax to fund a preservation plan for the My Son temple complex. The CE questions sought to determine the attributes of the preservation plan that respondents cared most about. The authors report that 28% of Vietnamese respondents who received the lowest bid, a one-time payment of US$0.33, refused to pay it. The Vietnamese respondents' average (one-time) WTP for the preservation plan for the My Son temple complex was approximately US$2, or approximately 0.3% of respondents' average annual income.

4.9. Should We Have Been Surprised?

I reemphasize here that the results from this body of SP research showing low WTP for a wide range of goods and services in developing countries are not what most economists expected. Concerned that respondents, swayed by enumerators and not facing an actual budget constraint, would tend to reply yes too easily in CV surveys (which they still may have done!), many economists expected WTP estimates from less-developed countries to be inflated. From this perspective, the low WTP estimates reported from SP studies in less-developed countries, such as those described above, should be even lower.

SP researchers have often failed to see their empirical results for what they are, that is, an indication that the hypothetical good or service that was the focus of the SP study was simply not a priority for many of the respondents interviewed. Perhaps in an effort to spin their results to please their sponsors, SP researchers have often characterized low WTP estimates as good news—and at least as being larger than what one might have expected. Positive WTP estimates are often interpreted to mean that user charges are feasible and that at least some revenue collection may be possible.

In retrospect, perhaps it should not have been a surprise that poor households in developing countries often have much more pressing needs than the hypothetical goods and services offered by SP researchers. In *A Farewell to Alms*, Clark (2007) reminded us that poor laborers in England in 1800 spent 75% of their income on food. Clothing and bedding took another 10%, and housing 6%. Less than 10% of income was left for everything else (most of the remainder went to heating, lighting, and soap). Clark pointed out that a food basket purchased with the daily wage of a laborer in Malawi in 2001 amounted to only 40% of the food basket purchased by the English laborer in 1800. Poor households such as those in Malawi are living at a subsistence level and must spend almost all their money on calories to survive.

In the SP studies conducted in many developing countries, poor households seem to have done their best to convey this simple message to the researchers. If households have any extra resources, their priorities are often on education and infrastructure investments that will enable them to increase their incomes.

5. WHAT WE HAVE NOT LEARNED?

5.1. Problems with Payment Vehicles

The choice of an appropriate payment vehicle has often proved difficult in applications of SP methods in developing countries because governments often have in place only a limited number of tax instruments and because compliance is low. Income, sales, and property taxes are rarely feasible payment vehicles in developing countries. For example, even if income taxes are enacted, they are often collected only on higher-income wage earners in the formal sector. Early applications of SP methods in the water supply and sanitation sector and in the management of protected areas and national parks did not face this problem of the lack of good payment vehicles. Studies designed to estimate demand for improved water services could logically ask respondents to pay for service improvements as increases in household water bills. Studies of the management of protected areas and national parks, and studies of tourists' visits to national parks and protected areas, could ask respondents to consider increases in park entrance fees or other types of surcharges (Naido & Adamowicz 2005, Parsons & Thur 2008).

The seriousness of this problem of the lack of good payment vehicles for financing public goods did not become apparent until SP researchers moved into other sectors, such as species conservation and urban air quality management. SP methods have employed three main strategies to deal with the problem of finding a suitable payment vehicle, none entirely satisfactory. First, researchers have reverted to the notion of using surcharges on water or electricity bills; in many situations, these are the only credible revenue collection mechanisms in operation. Surcharges on utility bills have the added advantage that respondents' payments can credibly be framed as both mandatory and periodic. Payment vehicles that require one-time payments are especially problematic in developing countries, where respondents typically have high personal rates of time preference and prefer not to make large upfront payments (Poulos & Whittington 2000, Botelho et al. 2006).

Sometimes surcharges on utility bills may be viable payment vehicles for nature conservation and national park programs. For example, in their study of regional marine turtle protection management plans in Southeast Asia, Nabangchang et al. (2008) used surcharges on household water bills as payment vehicles for financing contributions to a conservation trust fund. The linkage between marine turtles and water bills may seem plausible to respondents, as marine turtles swim in the ocean, and the water may be polluted by urban wastewater discharges. Labao et al. (2008) used monthly surcharges on electricity bills in a CV scenario to fund a Philippines conservation program for eagles. Here the linkage between conservation and electricity bills seems more tenuous, but the researchers seem to have used it successfully in their study. Surcharges on utility bills may seem an odd way to finance cultural heritage or species preservation activities, but state income tax surcharges have similarly been used in the United States to support wildlife management activities.

A second payment approach commonly used in developing countries has been to ask respondents for a voluntary donation to help the community or society pay for a public good. This question typically makes more sense to respondents than a payment vehicle based on taxes that they do not pay; SP researchers in developing countries often find it to be the best payment vehicle option. But donation payments are not incentive compatible, and they invite free-rider problems (Carson & Groves 2007). The evidence from industrialized countries indicates that SP questions that ask respondents for donations elicit

unreliable answers, and there is little evidence to suggest that these problems may be less serious in a developing country context.

A third payment approach has been simply to present respondents with increased prices for the goods or services in question. Researchers have sometimes failed to appreciate the added complexity that this approach poses for respondents and for themselves. A proposed price surcharge on a private good necessitates that the researcher elicit some indication of how much less of the good in question the respondent will be inclined to buy. Sometimes the researcher gets a lucky break, and the private good or service is simply an either/or decision: For example, the respondent can either buy or not buy a vaccine for self-protection. But even for vaccine purchases, there may be a quantity response to a price increase if the head of household is asked how many vaccines would be purchased for household members at an offered price (Whittington et al. 2008, Prabhu 2010).

SP researchers interested in tourism have posed price increases to respondents in the form of increased entrance fees to parks or increased airport taxes for entry to a country (Edwards 2009). Here again, for local tourists, an increase in the entrance fee to a national or urban park may also result in a quantity response because the number of trips (or visits) may be reduced over some specified time period. However, for foreign visitors, the decision to visit a country may be an all-or-nothing choice. For example, a foreign visitor may want to visit only the Galápagos Islands, the Taj Mahal, or the Pyramids once in a lifetime. If the price is too high, the traveler may decide not to come at all. In this case, the decision is similar to the either/or decision an individual makes about buying, or not buying, a vaccine.

5.2. Few Studies of the Behavior of Firms or Producers

Thus far, there have been relatively few instances in which SP methods have been used to study the behavior of actors engaged in supply-side or production activities by either households or firms. Although interviews with firm owners and managers are typically more challenging and difficult to conduct than interviews with households, the few studies that have been conducted illustrate that this is a research area with considerable potential.

Davis et al. (2001) interviewed 360 owners and managers of micro and small enterprises (MSEs) in two small market towns in Uganda. The researchers exploited a natural experiment in which one town (Wobulenzi) had a new water supply installed and another nearby town (Lugazi) did not. They asked respondents in both communities about their WTP both for piped water connections and for water from public taps. They found that improved water services were less important to MSEs than anticipated from results of studies of households in similar East African market towns and that MSEs were not willing to pay as much for piped water connections as households were. In Wobulenzi, only 30% of MSEs said that they were willing to pay US$5 per month for a piped water connection (1999 dollars). Moreover, the owners of MSEs did not have a strong preference for piped connections over public taps. The researchers concluded that the economic benefits of improved water supplies to MSEs in these two small market towns would be small and that water infrastructure financing strategies should not be based on the erroneous assumption that high demand from MSEs can be exploited to cross-subsidize households.

In a series of three papers, Scarpa and his coauthors described CEs used to estimate the economic value of genetic resources of livestock, as applied to indigenous cattle breeds in Kenya (2003b), hairless pigs in the Yucatán (2003a), and pigs in Vietnam (Roessler et al.

2008). For example, in 2000 they interviewed 310 respondents (cattle producers and traders) in seven livestock markets in southern Kenya to collect data on 2,500 hypothetical choice tasks. Contrary to their hypothesis, they concluded that the attributes characterizing Maasai zebu cattle were not positively valued by respondents and that economic incentives to conserve the genetic resources of this indigenous breed were lacking.

5.3. Few Tests of the Accuracy and Reliability of the Results of Stated Preference Studies

I am persuaded by Smith's (2004, p. 30) argument in "Fifty Years of Contingent Valuation" that there is no simple test that will settle the debate on the reliability and accuracy of CV methods:

> The majority of research on the reliability of CV seems to rest on the presumption that there exists a crucial experiment (or set of experiments) that, once conducted, will allow us to decide in favor of, or against the method. I believe this is a strategy that can never succeed. Just as there is no single experiment that discredits the method, there is none that unambiguously supports it. In most of science the accumulated evidence of repeated and verifiable experiments testing (and failing to reject) some hypothesis corresponding to what might be described as a stationary theoretical principle ultimately changes the beliefs of the scientific community. Accumulated evidence provides the basis for revisions in what are taken to be the principles governing the behavior that is observed. This strategy will not work with CV because the economic values to be measured (and even their relationship to observable characteristics of the background context) are unlikely to appear to be stationary.

Still, it is surprising that the SP work in developing countries has not included more comparisons of real and hypothetical behavior or comparisons of revealed and hypothetical behavior. Such experiments are comparatively much cheaper to carry out in developing countries and are still of substantial interest to the SP community.

The one seminal paper (Griffin et al. 1995) comparing real and hypothetical behavior in a developing country reported research carried out in Kerala, India. Griffin et al. (1995) used the CV method to estimate demand for piped water connections in villages without piped water distribution systems but for which investments in piped water distribution systems were planned. Five years later, after the piped water systems had been installed in these villages, the researchers returned to see if the sample households had done ex post what they had said they would do ex ante when they were queried in the hypothetical CV survey. The researchers concluded that the hypothetical responses collected in the CV survey predicted accurately what individual households actually did once the piped distribution system was built.

There have been at least three comparisons of WTP estimates obtained from the travel cost method and CV surveys. One must be careful in the interpretation of any comparison of such estimates. Travel cost studies measure user values; CV studies may measure user and nonuser and/or altruistic values (and there are other reasons why travel cost and CV estimates may differ). The theoretical expectation is that travel cost estimates should be less than CV estimates, but it is not clear a priori how large the difference should be. The implicit assumption in such comparisons is that nonuser values and altruistic motivations

are small and that the travel cost and CV estimates should be close, but this is rarely tested. Another difficulty in comparing travel cost and CV estimates is that the former are heavily dependent on a household's value of time. This is typically assumed. If the opportunity cost of time is estimated from the data, it is not household specific but a sample mean.

In the study in Davao, Philippines, mentioned above, Choe et al. (1996) collected both travel cost and CV data and used both data sets to estimate household WTP for water quality improvements that would make the urban beaches safe for recreational uses. They compared the mean WTP estimates for recreational benefits to be gained from improved surface water quality and found them to be close: US$1.44–2.04 per month for the travel cost method and US$1.48–2.04 per month for the CV method. The travel cost estimates were based on the assumption that the value of travel time is equal to one-half the household hourly wage rate. A lower assumed value of time would result in lower WTP estimates from the travel cost method. From a policy perspective, both the travel cost and CV estimates gave an identical message: Household demand for surface water quality improvements was very low, and the benefits were far less than the costs of any possible management plan to clean up water resources.

In the vaccine demand study conducted in Beira, Mozambique, cited above, Jeuland et al. (2010) exploited an unusual natural experiment that enabled them to collect both SP and travel cost data to estimate household WTP for a two-dose cholera vaccine regime (i.e., an individual must be vaccinated on one day and come back several days later for the second dose). In January 2004, more than 41,000 residents from various locations in Beira received two doses of oral cholera vaccine free of charge. Approximately 30,000 people arrived at the clinics from outside the target zone, and the authorities in charge of the vaccine trial decided to allow them to be vaccinated. This ex post decision to change the research protocol resulted in long queues, an average waiting time of 85 min per dose, and considerable heterogeneity in the distance that individuals traveled to obtain a vaccine.

The research team estimated the opportunity cost of travel time to be in the range of US$0.05–0.14 per hour (20–50% of the household hourly wage). The travel cost estimate of the sample mean WTP was US$0.85 for a two-dose vaccine regime, compared with approximately US$1.25 from the CV study. The CV estimate was thus approximately 50% higher than the travel cost estimate, even though the authors employed a TTT treatment to reduce hypothetical bias. But as with the water quality study in Davao (Choe et al. 1996), the basic policy message from the travel cost and CV estimates was essentially the same: The majority of the population of Beira was not willing to pay the full costs of vaccination.

Kremer et al. (2009) estimated the willingness of households in an area of rural Kenya to pay for the protection of natural springs that provided domestic water supplies, using the travel cost method and two SP methods: CV and contingent ranking. They found that the travel cost method yielded WTP estimates in the range of US$0.25–0.96 per household per month (the range arises from variation in the estimate of the value of time spent collecting water, from 10% to 25% of the local agricultural wage), whereas the contingent ranking method yielded WTP estimates of US$0.41–1.67 per household per month, approximately two-thirds higher. Their CV estimate of mean WTP was US$1.47 per household per month. The authors concluded that "stated preference approaches generate much higher valuations than revealed preference estimates, by a factor of two, with contingent valuation yielding especially imprecise estimates, casting doubt on their reliability in this setting." However, a number of features of their CV study should be noted.

First, the valuation question in the scenario in the CV component of the study created an unusual management plan for the respondent to consider. Households that did not use protected springs were not asked how much they would pay to have a nearby spring improved. Rather, only households who already used a protected spring were asked,

> Now that you have seen the protected spring, suppose that somehow the spring had been split so that there was free access to an unprotected spring and restricted access to a protected spring, both at the same site. Would you be willing to pay ____ Ksh for one year's access to the protected spring, assuming everyone would have to pay this amount too?

In this CV scenario, respondents are instructed to imagine an extremely odd situation at the spring, a situation that would in fact never exist. They were given no reason as to why this odd setup of splitting a natural spring into a protected part and an unprotected part might occur. No payment vehicle is mentioned, nor is there any institution or plan for collecting or managing money at the protected part of the spring.

Second, the research team did not employ any of the currently available methods (described above) to reduce hypothetical bias. Third, for their application of the travel cost method, the researchers relied on self-reported travel times to nearby water sources. In a poor rural area where people, especially children, may not wear watches, such data are problematic. In summary, just as Smith (2004) argued, it is difficult to conclude that the results of this single comparison of travel cost and SP methods in one location discredit SP methods generally.

6. CONCLUDING REMARKS

In May 2008, eight distinguished economists, including five Nobel Laureates, met in Copenhagen under the auspices of the Copenhagen Consensus, directed by Bjørn Lomborg of the Copenhagen Business School, to reflect upon priorities for aid to less-developed countries. A few dozen leading economists working in various sectors (e.g., trade, health, education, and water and sanitation) presented their analyses and recommendations to the Nobel panel for investments in their own sector specialties. The Nobel panel then prioritized those recommendations on the basis of the cost-benefit analyses presented by these sector specialists and the panel members' own judgment.

The panel's main recommendation was that new funds for development aid should be heavily focused on health interventions (Lomborg 2009). Five of the panel's top six recommendations are health related: micronutrient supplements for children (vitamin A and zinc), micronutrient fortification (iron supplementation and salt iodization), expanded immunization coverage for children, biofortification, and deworming and nutrition programs at schools. Thirteen of the top 20 recommendations were for health-related interventions (including heart attack management, tuberculosis case finding and treatment, HIV prevention, and improved surgical capacity at district hospitals).

This conclusion that improved health is of central importance in the development process is consistent with the views of the World Health Organization, the Gates Foundation, and many other donors, as well as many people in industrialized countries. Improved public health is of course desirable in its own right, on humanitarian and moral grounds, but many health professionals also argue that improved health frees up more labor and makes labor more productive, thus increasing economic growth. There are other important

linkages as well. For example, improved health enhances education and thus indirectly increases human capital.

The Gates Foundation (**http://www.gatesfoundation.org/about/pages/bill-melinda-gates-letter.aspx**) tells the following story about how improved public health will set in motion a virtuous cycle that will pull people out of poverty:

> This is a unique moment in history: scientific and technological advances are making it possible to solve big, complicated problems like never before. If these advances are focused on the problems of the people with the most urgent needs and the fewest champions, then within this century billions of people will grow up healthier, get a better education, and gain the power to lift themselves out of poverty.

Development professionals and donors who believe that global public health initiatives should have first claim on development aid dollars confront a puzzle: If public health interventions are such fantastically attractive economic investments for poor people in developing countries, why has the diffusion of interventions such as impregnated bednets, point-of-use water treatment technologies, and vaccines been so slow, whereas other technological innovations like mobile phones have spread like wildfire?

The empirical results from two decades of SP research in developing countries provide part of the answer to this question. The body of work produced by SP researchers working in less-developed countries suggests that the poorest people on our planet, whom Collier (2007) has termed the bottom billion, have development priorities that are strikingly different from those of the international development community and many people in industrialized countries.

A few years ago, the World Bank commissioned a survey of government officials in developing countries and asked them about their development priorities (Briscoe & Malik 2006). Health interventions were at the bottom of these officials' lists. Their top priorities were better infrastructure (e.g., roads, power, dams) and improved education. Similarly, SP researchers have discovered that improved health services are not the top priorities of many households in developing countries (e.g., Cropper et al. 2004, Poulos et al. 2006, Mahmud 2007).

The results from SP research in developing countries should remind us of the risks associated with becoming policy advocates for specific sectors. In the development business, professionals in every sector tell stories about how investments in their sector have higher economic returns (and more positive externalities) than projects in other sectors and how investments in their sector will set in motion a self-reinforcing cycle of economic growth. The conclusion inevitably is that aid dollars should be reallocated to their sector. Not all these poverty-trap stories told by sector professionals are true. If they were, it would be an easy task to help poor households climb out of poverty, because it would not matter in which sector development professionals decided to invest first. All investments would launch households onto the virtuous cycle out of the poverty trap.

In his book *Business Cycles* (1939), Joseph Schumpeter noted that "one essential peculiarity of the working of the capitalist system is that it imposes sequences and rules of timing. . . . [I]t is not sufficient to be right [about investment opportunities] in the abstract; one must be right at given dates." The same is true for aid investments in developing countries. The search to determine the best sector, with the highest economic rates of return, that trumps investments in other sectors at all times is a fool's errand. There

are good and bad investment projects in every sector, and the attractiveness of a specific development investment depends on local circumstances that vary widely in time and place.

In 1993, the drug kingpin Pablo Escobar was killed by police in the large, sprawling slum of Santo Domingo Savio in Medellin, Colombia. For more than a decade, Escobar and drug traffickers had effectively turned this slum of 170,000 people, which covers an entire mountainside, into a war zone, dividing the city of Medellin along class lines. In the years following Escobar's death, Sergio Fajardo, the city's mayor (2003–2007), consulted with the poor residents of Santo Domingo Savio about their development priorities and what investments were needed to heal the wounds from years of conflict and violence.

The city government of Medellin and the people of Santo Domingo Savio decided on a two-pronged infrastructure investment strategy. First, they built a magnificent public library, designed by the renowned Colombian architect Giancarlo Mazzanti. Today the Parque Biblioteca España is located on the top of the mountain above the slum where Pablo Escobar was killed. Second, the government and people chose a modern cable car system that now links the new library to the city's mass transit system. The poor are no longer isolated in Santo Domingo Savio, nor do they have to climb the steep streets of their community on foot to reach their homes. Residents of other parts of Medellin are drawn to the new public library. The people of Santo Domingo Savio are now more integrated into the economic and social life of the city, and Parque Biblioteca España provides an important venue where the children of Santo Domingo Savio can pursue new educational opportunities and participate in the life of the city.

There are at least two lessons here. First, the attractiveness of the investment in the library and cable car system depended crucially on timing and sequencing. One should not draw the conclusion that libraries and cable car systems are everywhere and are always the most attractive development projects. Rather, this plan made sense in this particular time and place in Medellin. Second, when the timing and sequencing of investments matter, mission-oriented development professionals working in specific sectors are not likely to be of much help in identifying the most attractive investments. Here SP researchers can play an important supporting role. To avoid investment mistakes, it can be important to find out what people in a community like Santo Domingo Savio do not want, as well as what they do want.

In the rapidly growing middle-income economies and in industrialized countries, people have been through the demographic transition to long life and few children, and they now place a high value on mortality-risk reductions and public health interventions. But the empirical evidence from SP research in less-developed countries suggests that the poorest people are willing to pay much less, in both absolute and relative terms, for preventive health measures and mortality-risk reductions.[3] If development professionals and donors assume that the bottom billion see the world the way development professionals do and place a relatively high value on mortality-risk reductions relative to their income, then there is a strong economic case for many health interventions in less-developed countries. This is what the Nobel panel in Copenhagen implicitly assumed in its recommendations.

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[3]This suggests that the common practice in cost-benefit analysis of transferring estimates of the value of a statistical life (VSL) from developed to developing countries using simple adjustments for income elasticity of VSL is misguided. Evans & Smith (2010) showed that much of the conventional wisdom about VSL income elasticity is incorrect.

But the SP research from developing countries has reminded us of the simple truth that the bottom billion continue to cope with a wide range of problems that many of our own ancestors faced before the Industrial Revolution but that citizens of the industrialized world have largely forgotten. It should thus not be surprising that rich and poor citizens of the world have different perspectives on the nature of development and economic growth. The bottom billion must confront the risks of famine, natural disasters, civil war, and land disenfranchisement—not just the risk of disease and poor health. Survival requires complex coping strategies that depend greatly on local circumstances and carefully chosen timing and sequencing of very limited expenditures. Producing better health outcomes for the bottom billion involves not only vaccination programs and micronutrients but also better housing and education, more nutritious food supplies, and the higher incomes needed to obtain them.

The bottom billion of the world's population seem to understand the Malthusian trap in which they find themselves better than many development professionals from rich countries. As Clark argued (2007), in a Malthusian economy, improved health leads not to economic growth but to increased population and lower average incomes—precisely the situation found in much of Sub-Saharan Africa today. The poor of course want better health, but their first priority is the means to escape a Malthusian economy and get on a path to higher incomes. And with higher incomes they can purchase better health care, housing, and food. Health interventions that reduce mortality risk may not make economic sense on the basis of people's preferences, but health interventions that reduce morbidity may if they significantly improve labor productivity and avoid unanticipated income losses due to illness. The citizens of countries that are currently experiencing very rapid economic growth, such as China, Brazil, India, and Vietnam, now expect longer and more comfortable lives and can pay for the entire package of health interventions on the Copenhagen Consensus list of priorities.[4]

The work of SP researchers in developing countries suggests that a massive shift of development aid to public health interventions is misguided. Nor is increased aid for public health interventions what governments or people in less-developed countries actually want.

DISCLOSURE STATEMENT

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[4]These same arguments are likely to apply to suggestions by industrialized countries and donors about what developing countries "need" to do to respond to climate change. Decision makers in developing countries likely see conventional energy sources—both fossil fuel and hydropower generation—as a clearer, safer path to income growth compared with renewable energy alternatives.

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APPENDIX: CONVERSATION BETWEEN A RESEARCHER AND UZBEK PEASANTS (1931) (FROM LURIA 1976)

A researcher presents three peasants with a group of four objects: a hammer, a saw, a log, and a hatchet.

Researcher: Which of these things could you call by one word?
Peasant 1: How's that? If you call all of them a "hammer," that won't be right either.
Researcher: But one fellow picked three things—the hammer, saw, and hatchet—and said they were alike.
Peasant 1: A saw, a hammer, and a hatchet all have to work together. But the log has to be here too!
Researcher: Why do you think he picked these three things but not the log?
Peasant 1: Probably because he's got a lot of firewood, but if we'll be left without firewood, we won't be able to do anything.
Researcher: True, but a hammer, a saw, and a hatchet are all tools.
Peasant 1: Yes, but even if we have tools, we still need wood—otherwise, we can't build anything.
Peasant 1: They all fit! The saw has to saw the log, the hammer has to hammer it, and the hatchet has to chop it. And if you want to chop the log up really good, you need the hammer. You can't take any of these things away. There isn't any you don't need.
Peasant 1: It's the hammer that doesn't fit. You can always work with a saw, but a hammer doesn't always suit the job; there's only a little you can do with it.
Peasant 2: You can't throw out the hammer because when you saw a log, you have to drive a wedge into it.
Researcher: Yet one fellow threw out the log. He said the hammer, saw, and hatchet were all alike in some way, but the log is different.
Peasant 3: If he wants planks, he won't need the log.
Researcher: But that other fellow said that the saw, the hammer, and the hatchet are all alike in some way, while the log isn't.
Peasant 1: So what if they are not alike? They all work together and chop the log. Here everything works right; here everything is just fine.
Researcher: Look, you can use one word—tools—for these three, but not for the log.
Peasant 1: What sense does that make to use one word for them all if they are not going to work together?
Researcher: What word could you use for these things?
Peasant 1: The words people use: saw, hammer, and hatchet. You can't use one word for them all!
Researcher: Could you call them tools?
Peasant 1: Yes you could, except a log isn't a tool. Still, the way we look at it, the log has to be here. Otherwise, what good are the others?

Peasant 2: If we are getting firewood for the stove, we could get rid of the hammer, but if it's planks we're fixing, we can do without the hatchet.

Researcher: If you had to put these in some kind of order, could you take the log out of the group?

Peasant 1: No. If you get rid of the log, what good would the others be?

Researcher: But these three things are tools, right?

Peasant 1: Yes, they're tools.

Researcher: What about the log?

Peasant 1: It belongs there too. You can make all sorts of things out of it—handles, doors, even handles of tools are made of wood!

Peasant 2: We say it's a tool because everything's made out of wood, so it belongs with the others.

Researcher: Suppose I put a dog here instead of a log?

Peasant 1: The dog wouldn't fit; it goes with the rifle.

Researcher: Then these three things are alike in some way?

Peasant 2: If it was a mad dog, you could beat it with the hatchet and the hammer, and it would die.

Researcher: Still, aren't these three things alike in some way?

Peasant 2: No, what's missing is a man, a worker. Without him, there's nothing alike about these things.

Peasant 3: You've got to have the wood there! There's nothing alike about these things unless the log's here. If you keep the log, they're all needed, but if you don't, what good are they?

Researcher: Yet you can use one word—tools—for these, isn't that so?

Peasants 1–3: Yes, of course.

Researcher: And you can't use that word for a log.

Peasants 1–3: No.

Researcher: That means these three have some likeness?

Peasants 1–3: Yes.

Researcher: If I asked you to pick the three things you could call by one word, which would you pick?

Peasant 1: I don't understand.

Peasant 2: All four of them.

Peasant 3: If we don't pick the log, we wouldn't have any need of the other three.

Researcher: But one fellow told me that a log isn't a tool. After all, it can't chop, it can't saw.

Peasant 3: No, whoever told you that must have been crazy. To make a tool, you need a log. Part of the log goes into making the handle of a saw, so the power of the log goes into cutting. The log can't cut by itself, but together with the hatchet it can.

Researcher: But I couldn't call a piece of wood a tool, could I?

Peasant 1: Yes, you could. Handles are made out of it.

Peasant 2: Take this mulberry tree—you can make handles of tools out of it.

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