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Comment

Amitabh Chandra and Heidi Williams

Morbidity and mortality from preventable diseases represent substantial global health burdens. For example, the World Health Organization (WHO) estimated that in 2002 there were over 1.5 million deaths globally from diseases for which vaccination is part of most national immunization schedules (that is, diseases such as measles and tetanus).[1] On one hand, it is admirable that despite the many challenges facing health systems in most low-income countries, approximately three-quarters of the world's children receive a standard package of childhood vaccines; on the other hand, these vaccine-preventable deaths represent some of the tremendous costs of *not* expanding immunization to remaining groups of children. The morbidity costs of these diseases—both in terms of direct health costs and other costs, such as lost work productivity—would only add to the already large burdens of these vaccine-preventable diseases.

In this innovative chapter, Banerjee, Duflo, and Glennerster evaluate a novel program designed to address iron deficiency anemia—another preventable disease. Iron deficiency is thought to be the most prevalent nutrient deficiency globally, and to generate large costs in terms of poor health and lost work productivity. Traditional public health mechanisms to target anemia include pill-form iron supplements and food fortification (such as for flour and salt), neither of which reaches very isolated populations such as those in the tribal district of Udaipur, which is the focus of this study. For example, most households in this district consume their own grain, which makes centralized food fortification interventions infeasible. In this chapter, Banerjee, Duflo, and Glennerster report results from a randomized evaluation of a novel community-level fortification program that aimed to deliver iron supplementation to this population through giving households the choice to have free ferrous sulphate added to their flour at the point of milling. The basic findings of the evaluation are that the program was effective at reducing anemia and fatigue when take up of the program was sufficiently high, but did not lead to other health improvements or increases in labor supply. Moreover, willingness to pay for the program appeared to be low, and take up decreased over time from 60 percent to 20 percent.

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1. See http://www.who.int/immunization_monitoring/burden/estimates_burden/en/index.html.

A natural question is, given the observed improvements in health and low private costs of the program, why did take up drop off? The authors focus on a "low demand" interpretation of their results—arguing that, absent jobs and other opportunities, incremental improvements in health may not be valued and that it is only in the presence of large-scale "structural" interventions that aid will be effective. We certainly agree that this is a reasonable conjecture consistent with the results of the study. Although not extensively discussed in the chapter, this argument is related to poverty-trap-style models in which it is necessary for countries or individuals to get over a certain threshold before being able to "take off" economically; at a microeconomic level, the case for poverty traps typically involves nonconvexities in returns to investments, such as health and human capital investments. An alternative hypothesis would be that poverty is due as much to poor government policies as to poverty traps, and that small interventions that fill holes not currently being filled by government policies (such as increasing access to clean water, or increasing access to childhood vaccines, or decreasing iron deficiency) could in fact have high returns. This latter view is more in line with the authors' extensive previous work evaluating small-scale development interventions in low-income countries, but it does raise the puzzle of why this potentially cost-effective intervention was not as effective as we may have expected ex ante.

In this discussion we offer several thoughts (some more speculative than others) on potential explanations for the observed results of the program.

Demand-Side Explanations

Our first point is to argue that demand for health and health care may operate differently from demand for health inputs. Health is produced from a variety of factors—biological processes such as aging, predetermined factors such as genes, health care inputs given in an acute setting (such as rescue angioplasty or admission to a neonatal intensive care unit), and health inputs (ranging from medicines for chronic diseases to diet and exercise). The distinction between health care inputs given in an acute setting and other health inputs may seem artificial, but we argue this distinction is conceptually useful. Whereas the effects of rapid acting interventions are often quite clear to consumers, the effects of health inputs can be more difficult to quantify. The benefits of health inputs may be realized with a (potentially long) time lag, whereas any financial costs or short-term side effects are likely to be realized immediately, introducing two potential issues: first, hyperbolic consumers may overvalue short-term costs relative to long-term benefits; and second, particularly in environments where there are high levels of communicable diseases and frequent health shocks, it may be difficult for consumers (however rational) to separate the gains from health inputs from other determinants of health. Both issues are likely relevant in explaining

why patients all over the world struggle with compliance to medicines for chronic diseases.

These issues are likely to be exacerbated if the health inputs cause side effects that are experienced immediately. According to the U.S. Centers for Disease Control (CDC), iron supplementation can sometimes cause side effects such as nausea, vomiting, constipation, and diarrhea; Murray et al. (1978) and Gera and Sachdev (2002) discuss potential side effects for children. In theory, such short-term side effects could have been overvalued by consumers relative to longer-term health benefits of the supplementation. However, in the case of the Banerjee, Duflo, and Glennerster experiment, the authors took care to monitor potential side effects for adults in their study, and received few reports of side effects.[2] While possible that individuals may not have reported side effects that are common for other reasons in this population, presumably surveyed individuals should have been aware of any side effects that would have affected compliance behavior. Thus, although appearing not to be relevant in the case of this study, this type of issue could be important in other contexts.

One way to address the challenge that consumers may overvalue short-term costs relative to long-term benefits would be to try to inform consumers of the benefits of health inputs in the short term, through providing patients with information on quantifiable health indicators for the duration of the intervention. In the United States, many medical treatments are set up such that patients get direct feedback on at least some effects of the treatments. Consider cholesterol-lowering statins as one example—consumers have their cholesterol level measured before initiation of statin therapy, and frequently continue to monitor their (hopefully, declining) cholesterol level after statin therapy is initiated. A natural question is whether observing changes in health metrics (here, cholesterol level) makes people believe that statins are more effective than they would believe in the absence of seeing such data—and indeed, whether seeing such data affects compliance behavior. Even if reductions in an individual's cholesterol level are an imperfect proxy for long-term health impacts, if such metrics have strong benefits in terms of improving compliance behavior it may be very worthwhile to invest in technologies to monitor such health metrics for a broader set of conditions. In the case of anemia, consumers could be shown data on their hemoglobin level and one could measure potential impacts on take up behavior.

Finally, key to understanding take up in this context may be to understand the etiology of anemia. Specifically, recent work in medicine (Calis et al. 2008) suggests that iron deficiency is inversely associated with bacteremia (bacteria in the blood), consistent with the idea that iron deficiency

2. The exceptions were a few reports that roti—a flat bread—sometimes became black when fired, although realistically the probability of such blackening may not increase when fortified flour is used.

protects against opportunistic bacteria by creating an unfavorable environment for their growth. This may be one reason why Murray et al. (1978) and Sazawal et al. (2006) noted worsening health outcomes after iron supplementation in areas with prevalent anemia. While speculative, this suggests that if Banerjee and colleagues had monitored side effects among children as well as among adults, adverse effects may have been detected.

Supply-Side Explanations

One interpretation of the experimental results is that the chakkis (local millers) did not seem to have sufficient incentives to participate in the program, which in turn made them switch out of the "fortification default," which in turn produced lower take up. This suggests either changing the incentives facing chakkis, or placing incentives on consumers in a way that somehow circumvents the chakkis.

On the first point, one natural "next step" would be to try a chakki payment scheme that gives chakkis a small mark-up for each unit sold. Obviously one would not want the chakkis to have an incentive to pressure households into purchasing the fortified grain, but it seems that at the moment the marginal payment to the chakki is not covering their marginal cost, hence the problems with them wanting to switch consumers out of the "fortification default."

On the second point, assuming that villagers pay chakkis a small amount for grain milling, it might be possible to give a small price subsidy on fortified units to make those units more attractive to consumers relative to nonfortified units (similar to the suggestion in the chapter's conclusions of giving small price subsidies for fortified salt), or even to put in a negative price subsidy for fortified units.

Optimism

There are three reasons why we are optimistic about the intervention studied in this chapter. First, the intervention is cheap, and consequently, even very small improvements in health or fatigue would make it cost-effective. This interpretation makes the simple point that interventions that cost (for example) ten dollars per person only have to generate 10/100,000 of a quality-adjusted life year in order to be considered cost-effective at conventional thresholds. To put that number into perspective, if an intervention only operates on the dimension of reducing mortality, then a ten dollar intervention only has to generate an additional hour of survival to be deemed cost-effective. It is also possible that this intervention generated improvements in health too small to be measured by the survey metrics, but commensurate with the low costs of the program.

Second, Banerjee, Duflo, and Glennerster report an intent-to-treat analysis. This is the relevant parameter for determining the overall cost-

effectiveness of a public policy. However, if this is a treatment whose benefits exhibit wide variation across the population (perhaps because of how side-effects are valued), an equally interesting parameter is the treatment-on-the-treated, or the improvement in health for those who chose to continue in the program. To obtain this parameter it is necessary to scale the reported estimates by the take up rates (because take up rates are less than 100 percent, this will increase the measured effect of the program). Assuming that take up was at 50 percent in the villages of Kotra and Kherwara, this would double the estimates for these villages. These are large effects and suggest that there is more work to be done in precisely understanding the role of supply and demand explanations in affecting program take up.

Finally, the presence of externalities suggests that the study may not have fully captured the benefits of reducing anemia. Banerjee, Duflo, and Glennerster are more circumspect about drawing such conclusions and write ". . . there are no obvious externalities to iron deficiency anemia, so one could argue that individuals should be left alone to deal with this problem." Yet there may be two types of "externalities": first, there may be within-person "internalities" where hyperbolic consumers may not take actions today that would have future benefits (even if the actions today are zero cost), and that there are externalities on future "selves"; and second, if parents make decisions about fortification for their children but do not fully internalize benefits realized by the children (for example, in the form of increased birth weight for yet-unborn children of pregnant women), parental decisions may have externalities on their children.

The authors discuss potential concerns over curtailment of freedom from only offering fortified salt, but there are a number of precedents suggesting we take similar actions in other situations—iodizing salt, fluoridating water, putting vitamin D in milk, and so forth. Presumably such policies were justified based on a desire to reduce public expenditures on treatments (which could be less relevant in countries without large public insurance programs such as Medicare and Medicaid), or based on the existence of relatively large fixed costs that need to be absorbed, or based on more paternalistic motivations that connect to our point about discounting future benefits. Understanding the rationale for these precedents will help us think about whether we should be designing centralized policies for improving certain dimensions of health versus policies that allow patients to select their treatment.

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