Higher levels of health and education in developing countries could considerably improve wellbeing and promote economic growth. My research aims to understand the barriers that households and governments face in accumulating or fostering accumulation of these two forms of human capital, and how these barriers can be overcome. I study these issues through extensive fieldwork, namely field experiments embedded in longitudinal data collection efforts, which I use to perform empirical tests of microeconomic theory and to quantify the effects of potential policies.

Health is the primary focus of my research to date. My work covers the role of information and education in health behavior, and the role of subsidies in increasing adoption of health technologies. My work on subsidies is arguably my most distinctive contribution. I study both demand and supply factors, including how to target subsidized products to households most likely to use them; the long-run impacts of temporary subsidies on willingness to pay; and public providers’ incentives to deliver subsidies to their targeted beneficiaries.

My work on education, joint with Esther Duflo and Michael Kremer for the most part, covers three areas: understanding the demand; understanding the production function; and quantifying the returns, including health outcomes.

I have also been studying household savings behavior, since household savings affects the ability of people in developing countries to invest in human capital. This work, joint with Jonathan Robinson, aims to understand the type of financial products that can help poor households to save lump sums and to invest them in human capital, particularly health.

1. Health
The bulk of my health research concerns the immediate and long-run effects of subsidies to promote household adoption of health technologies such as bednets to prevent malaria infection or water filters to prevent water-borne diseases. The effectiveness of such subsidies is a prominent aspect of the debate on the efficiency of foreign aid, ongoing in both the academic and policymaking circles. There are two controversies, one centering on whether subsidies increase not only ownership of these products but also their usage, and the other on whether subsidies create a dependency effect.

Proponents argue that subsidies can rapidly increase take-up, and critics counter that even if subsidies do encourage take-up, the households may not use the products appropriately. This could happen for two reasons. First, because subsidies lower prices thereby lowering the screening or selection effect of prices, the marginal households that acquire the subsidized product may simply have less desire to use it. Second, because subsidies may reduce the likelihood of the “sunk cost” fallacy effect where individuals who have paid a high price for a product feel compelled to use it. In “Free Distribution or Cost-Sharing?” (Quarterly Journal of Economics 2010), Jessica Cohen and I designed a two-stage randomized experiment to estimate the distinct roles of the screening and sunk cost effects in the use of bednets in rural Kenya. We find no evidence of either effect: how much households used their bednet is independent of the price they paid for it.

Even if households do, as we find, use the highly subsidized products, it is still possible that they might be unwilling to pay a higher price for those products once the subsidies are withdrawn, which would reduce long-term demand and potential public health gains. This could happen if households take the subsidized prices as reference points, or anchors, thereby reducing their subsequent willingness to pay for the product. But a subsidy could also increase subsequent willingness to pay if it enables households to update positively on the returns to using the product. In “Short-Run Subsidies and Long-Run Adoption…” (R&R at Econometrica), I study the relative importance of these effects. I find that the overall effect of subsidies on own adoption in the long run is positive. Using a simple structural model, I estimate a large, positive learning effect, and a small and insignificant anchoring effect.

A major finding of both studies was that demand is highly sensitive to price. That there is also a learning effect suggests that information could possibly reduce this sensitivity and increase adoption at
higher prices. Some of my earlier work indeed suggests that actionable information is sometimes enough to increase adoption of health-promoting behavior: In “Do Teenagers Respond...” (AEJ Applied 2011), my job market paper, I had found that informing adolescent girls of the relative risk of HIV infection associated with potential sexual partners—that older men pose a higher risk than adolescent boys—could have large impacts on subsequent choice of partner. In “What matters...” (American Economic Review Papers & Proceedings 2009), I extend this line of inquiry to adoption of health technologies, testing the effects of information and other interventions from the marketing literature on price sensitivity to bednet demand. None of the tested interventions—emphasizing the health and financial benefits of investing in a bednet, verbal commitment to purchase a bednet, and targeting a specific gender—had a significant effect on level or slope of the demand function for bednets.

Together, these studies suggest that, at least in allocating anti-malarial bednets, higher prices deter adoption without bringing about the selection effect posited by economic theory. But bednets are a preventative product, and there is ample reason to suppose that households will be more sensitive to their prices than they would be to the prices of medicines they need right away to resolve a crisis. In “Price Subsidies, Diagnostic Tests, and Targeting...” (R&R at American Economic Review), Jessica Cohen, Simone Schaner, and I use experimental data from Kenya to examine the targeting effects of prices on the allocation of malaria treatment. The product in question is the latest class of antimalarial drugs, the only class that is still effective in Africa, where the malaria parasite is now mostly resistant to other therapies. An international subsidy currently under consideration would make these antimalarials available very cheaply over-the-counter, but here again there is a trade-off between demand and appropriate use. Since underuse can be fatal, absent access to reliable diagnosis presumptive use is privately optimal, especially when the treatment is cheap. This results in overuse, which has large negative externalities on public health in that it wastes scarce resources and contributes to drug resistance of the malaria parasite, ultimately making treatment of malaria harder. Our study shows that over the subsidy range considered by the international community, price is a useful tool for selection: somewhat higher prices reduce overtreatment among adults, while leaving access among children unchanged. Thus lower drug subsidies can help improve targeting, but jointly subsidizing access to formal diagnosis appears important.

Overall, my research suggests a number of contexts in which some subsidization may be warranted. The question then becomes implementation. A first and obvious difficulty is budget constraints. When returns are heterogeneous and there is a cap on the number of subsidy recipients, the eligibility rule used to select recipients can affect the overall benefit arising from the subsidy program. In “Inferring Welfare Maximizing Treatment Assignment...” (J. of Econometrics 2012), Debopam Bhattacharya and I set-up an econometric framework to consider the problem of allocating a fixed amount of treatment resources to a target population with the aim of maximizing the mean population outcome, as well as the problem of estimating the minimum cost of achieving a given mean outcome in the population by efficient targeting of the treatment.

A second difficulty in the implementation of public health subsidies stems from the potential inefficiencies arising from the behavior of health providers, such as absenteeism and corruption. I am exploring these issues in ongoing, NIH-funded work, with Rebecca Dizon-Ross and Jonathan Robinson. The work aims to estimate the health and financial costs of petty corruption (including shirking and mis-targeting) in the delivery of targeted health subsidies, and how the costs vary with the governance structure. A key challenge is measurement. By its very nature petty corruption is clandestine and so cannot be easily elicited. To overcome this challenge, we devised innovative measurement strategies and are applying them to representative samples of health centers in rural Ghana, Kenya and Uganda.

In addition to these major lines of inquiry, I am also conducting work on the health impacts of political and civil conflict. In “The (Hidden) Costs of Political Instability...” (Journal of Development Economics 2012), Jonathan Robinson and I study the impacts of the civil unrest that followed the 2007 Presidential Elections in Kenya. We extend this line of work in ongoing work on the health impacts of the 2010/2011 crisis in Cote d’Ivoire.
2. **Education: Demand, Quality and Returns**

Private investments in education remain low in many developing countries, even after the introduction of Free Primary Education. Understanding why the demand for schooling sometimes remains low is therefore an important question. Some of my work suggests that financial constraints remain a barrier in a number of contexts. With Esther Duflo and Michael Kremer, we have shown that education subsidies such as free uniforms reduce dropout rates among upper primary school students in Kenya (this is shown in the paper “Education, HIV, and Early Fertility” (R&R at *American Economic Review*); and in ongoing work we find that bursaries considerably increase secondary school enrollment in Ghana. But financial constraints appear not to be the only barrier. In a recent working paper with data from Morocco (“Turning a Shove into a Nudge?...”), co-authors and I find that in an environment with almost no direct costs of education and low rates of child labor, small cash transfers that were not conditional on school participation but clearly labeled as meant to support education had a large impact on school participation--not through an income effect but instead through an endorsement effect: receiving the transfers increased perceived returns to schooling. This suggests that parents’ belief (or lack thereof) that education is a worthwhile investment remains a key determinant of the demand for education.

Even when they have reached universal primary school enrolment, developing countries routinely score near the bottom on international tests. Limited resources are an obvious culprit, but previous research found limited to no effect of additional resources on learning. In the working paper “School Governance, Teacher Incentives and Pupil-Teacher Ratios” with Duflo and Kremer, we argue that this may be due to the fact that, in the absence of reforms to increase teacher motivation, increases in resources are at risk of being crowded out by a reduction in teacher effort. We also show that inexpensive reforms in teacher management seem to improve the productivity of additional resources in terms of educational outcomes. In “Peer Effects, Teacher Incentives, and the Impact of Tracking” (*American Economic Review 2011*), we show that an even cheaper reform, tracking students by initial preparedness, a highly debated policy among both academics and policymakers in both developed and developing countries, can also have large positive learning effects in the Kenyan context. The paper presents and tests with experimental data a model in which peer quality affects students both directly and indirectly by influencing teacher behavior, in particular teacher effort and choice of target teaching level. In the model, the impact of tracking depends on teachers’ incentives: in a context in which teachers have convex payoffs in student test scores (as is the case in Kenya and in most developing countries), tracking can lead teachers to refocus attention closer to the median student. Students at all levels of the initial distribution may then benefit from tracking – which is what we find empirically.

As more developing countries adopt these reforms, the impact of increased education levels is likely to be felt in many domains. To study this, Duflo, Kremer and I have been building two panel datasets – one covering over 10,000 youths as they age from 13 to 20 in Kenya, and one involving over 2,000 youths as they age from 16 to 26 in Ghana. The now complete Kenya dataset, combined with randomized variation in access to an education subsidy and sex education, enabled us to study the (complex) relationship between education, fertility and health risk (in particular, HIV risk) in the paper “Education, HIV, and Early Fertility” mentioned at the top of this page. In Ghana, the youths in our ongoing study (we are about half-way) participated in a lottery for a secondary school bursary and a third of them won it. Five years later, the secondary school completion rate among lottery winners is over 50 percentage points higher than that of lottery losers. With NIH funding, we are currently collecting rich follow-up survey data which will allow us to study the relationships between education and health, fertility, labor market participation, beliefs, preferences, and a number of other outcomes.

3. **Financial access and Household Savings Behavior**

The vast majority of households in the developing world live in rural areas, far from financial institutions, as these tend to be concentrated in more urban areas where potential clients are richer and have more regular income streams, and where population density reduces per-client costs. While much attention has been paid to the impacts of credit constraints, much less work has considered the impact of the lack of
banking access on household savings behavior. With Jonathan Robinson, I study the intra- and interpersonal barriers to savings and the types of financial products that can increase households’ investments in health, education and other high-return investments. Our experimental work to date suggests that lack of access to formal saving services or products can be an important impediment to households’ ability to save and invest.

In *Savings Constraints and Microenterprise Development* (*AEJ: Applied 2013*) we subsidized the opening fee for savings accounts in a village bank that pays no interest but charges hefty withdrawal fees. We found substantial demand for such accounts, as well as large impacts on savings for those using the accounts, suggesting that for these individuals the returns on savings at home must be even lower than the returns on the account. To understand why cash kept outside a bank account depreciates quickly, in the paper “Why Don’t the Poor Save More? Evidence from Health Savings Experiments” (*American Economic Review* 2013) we randomly introduced a variety of saving technologies across individuals. The variation in the features of the technologies offered enabled us to back out the relative importance of various barriers to savings. The main barrier appears to be that keeping track of petty cash and limiting transfers to others is difficult when one does not have a safe and designated place to save money for specific goals. Investments in lumpy health products significantly increased among individuals who got access to a simple lockable box in which they could save towards these investments.

Together these studies suggest that simply expanding access to even the most basic financial products could potentially have large development impacts. But this will depend on the quality of financial services in very rural areas. If people do not trust banks or banking agents, because their services are unreliable or fee schedules keep changing, then expanding such services is unlikely to affect household savings. Robinson and I are currently involved in a number of “replication” studies with larger and more representative samples in multiple countries to try to understand the extent to which the private sector can reliably offer the types of products the poor need.

**Teaching and Advising**

*Graduate level* -- I have taught a Ph.D. course in economic development in both my years at Stanford, with instructor evaluation scores of 4.60/5 the first year and 4.80/5 the second year, above the mean of 4.31/5 for economic courses. This course was similar to a course I had previously taught for three years at UCLA. My ratings at UCLA were consistently in the 8.75 to 9 out of 10 range, well above the UCLA mean (varying from 7 to 7.5 across years) for economic courses.

*Undergraduate level* -- I taught an undergraduate course in economic development in the Spring 2013. This was an elective course restricted to economics majors (or masters and PhD students outside of economics). I had a total of 34 enrolled students (5 of them graduate students). This was my first time teaching this course and I put a lot of effort into preparing it. The investment paid off as I got an instructor rating of 4.76/5. I also had the experience of teaching intermediate microeconomics at the undergraduate level for two years in my first job at Dartmouth College.

Besides teaching, I am committed to giving interested students at both the undergraduate and graduate level the opportunity to get first-hand experience with empirical research in development. I am taking nine undergraduate students to Uganda for two weeks in September. I have given numerous graduate students the opportunity and resources to collect their own data or to use one or more of my datasets.