Health Behavior in Developing Countries

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Abstract

The disease burden in low-income countries is extremely high. Malaria, respiratory infections, diarrhea, AIDS, and other diseases are estimated to kill more than 15 million people each year, most of them children. Yet the great majority of these diseases can be prevented or treated. This article reviews microeconomic studies of health-seeking behavior in low-income countries. Factors examined include information, peers, liquidity constraints, and nonrational preferences, such as present bias. I then discuss the implications for policy, including the scope for mandates, subsidies, and incentives.

Keywords: Adoption, Prevention, Market Failures, Subsidy, Incentive.

JEL Codes: D10; I10; O12.

1 Introduction

Developing countries face multiple health challenges. Besides the diseases common to all countries, such as diabetes and cancer, they face an additional disease burden related to their geography and poverty, including tropical diseases, such as malaria, dengue fever, and schistosomiasis; waterborne diseases, due to unclean drinking water; respiratory diseases, due to indoor air pollution from cooking and heating with solid fuels; and, finally, HIV/AIDS, which has been most prevalent in Africa, where it is thought to have originated.

Overall, the disease burden in developing countries has two main features: It affects people at much younger ages than the disease burden in developed countries, and its main channels of morbidity and mortality are infectious and parasitic diseases, which generate important public health externalities. The implication of these two features is that, in the absence of any proactive health behavior to prevent or treat these diseases, the likelihood of a child in a poor country living to the age of 5 and of an adult living to the age of 50 is significantly lower than in a rich country.

The good news is that the great majority of these diseases are preventable and treatable. Both clinical trials and social experiments have identified a series of preventive and remedial practices and products that are highly effective at reducing the burden of these diseases. For example, sleeping under a bed net prevents malaria, treating drinking water prevents waterborne diseases, taking deworming pills gets rid of intestinal worms, and using condoms prevents HIV. The bad news is that take-up of these strategies is often slow. For example, by 2008, more than 20 years after insecticide-treated nets (ITNs) were developed, only 3 in 10 African households owned at least one such net (World Health Org. 2009).

Understanding the barriers to the adoption of these products / behaviors is a critical issue in development economics. This article provides a selective review of the recent microeconomic evidence on this issue. It starts by providing some stylized facts on households' health behavior in low-income countries, before laying out a simple model of health investments. I then discuss the evidence on the role of information, financial market imperfections, and time-inconsistent preferences. I then discuss the policy implications.

2 Two Stylized Facts

2.1 High Levels of Curative Health Expenditures

The first stylized fact is that households in low-income countries spend a significant portion of their resources on remedial health care. Banerjee et al. (2009) find that out-of-pocket health expenditure represents about 10% of total household expenditure among slum dwellers in Hyderabad, India. Using detailed diaries kept by rural households in western Kenya, Dupas & Robinson (2009) find that health expenditure represents 8% of total household expenditure. To give some perspective, in the United States, out-of-pocket health expenditure, excluding insurance premiums, is typically considered unaffordable if it is more than 5% of family income (Shen & McFeeters 2006, Cunningham 2009).

Using data from 11 low- to middle-income Asian countries, van Doorslaer et al. (2006) show that out-of-pocket health expenditure exacerbates the prevalence and depth of poverty. They estimate that the poverty rate in these countries, based on the threshold of US$1 per day that is used by the World Bank, would increase by 2.7 percentage points (or 78 million people) if household resources were assessed after accounting for health expenditures. Xu et al. (2003), defining health expenditure as catastrophic when out-of-pocket health expenditure exceeds 40% of income net of subsistence expenses, estimate that the proportion of households with catastrophic health expenditure in a given year is over 10% in Vietnam and Brazil, but it is only 0.01% in France, 0.09% in Canada, and 0.55% in the United States. In addition to the almost universal lack of health insurance and the high cost of treatment relative to household income, there are two other reasons why health expenditures are relatively high in low-income countries. First, presumably because letting an illness go untreated can cause extreme and immediate suffering, households appear to be relatively price inelastic vis-à-vis medical treatment. In a recent randomized study in Kenya, Cohen et al. (2011) show that increasing the price of an antimalarial treatment course for young children by 250%, from US$0.30 to $1.5, does not reduce the share of households buying the treatment (about 32%). Although, as expected, demand falls at much higher prices (only 4% of households buy the treatment at US$3), price elasticity appears remarkably low over a range of moderate prices. These findings are similar to those of earlier cross-sectional studies estimating the price elasticity of the demand for health care (Akin et al. 1998, Sahn et al. 2003; see Griffin 1989 for a review of earlier evidence).

Second, delayed access to appropriate medical care, in particular because of limited access to proper diagnosis, introduces costly inefficiencies. In their study discussed above, conducted with around 2,000 households in rural western Kenya, Cohen et al. (2011) observe that the typical first response of households to manifestations of malaria is to self-diagnose and buy over-the-counter medication, bypassing the formal health care system altogether. But a substantial fraction of those that self-treat do not in fact have malaria. Using rapid malaria diagnostic tests, the researchers found that only 37% of people over age 15 for whom a malaria medicine had been purchased tested positive for malaria. The rest of the patients probably had another febrile illness, such as bacterial pneumonia, and needed a completely different treatment course. Because of the misdiagnosis, these patients might never get the proper treatment, or if they do, they will get it late and in any case will have wasted resources on inappropriate and ineffective treatment.

Just encouraging households to seek diagnosis and care at public facilities instead of drugstores might not solve this problem, however. In an observational study among 10 hospitals in northeast Tanzania, only 46% of more than 4,000 people receiving inpatient care for severe malaria actually had malaria parasites in their blood (Reyburn et al. 2004). In Rajasthan, India, Banerjee et al. (2004) find that only 3% of patients at public health facilities have at least one diagnostic test performed on them, but 38% nevertheless get prescribed an injection or a drip. Such low-quality medical care is common throughout the developing world. Using data on medical care quality collected through both vignettes and direct observations in India, Indonesia, Tanzania, and Paraguay, Das et al. (2008) show not only that the competence of doctors in low-income countries is low, but also that the quality of care patients receive is even lower than would be expected given their doctor´s competence, especially among the poor. For example, they find that in Delhi, a doctor spends on average only 3.8 min with a patient and performs less than one examination procedure. In Tanzania, doctors complete only 24% of the essential checklist when faced with a patient with malaria and only 38% when the patient is a child with diarrhea (Leonard & Masatu 2007).

2.2 Low Levels of Preventive Health Expenditures

The second stylized fact is that households in low-income countries invest little in preventive health care. For example, malaria and diarrhea account for 18% and 16% of under-5 mortality in Sub-Saharan Africa, respectively (UNICEF 2007). Yet both can be prevented:

ITNs have been shown to reduce the incidence of malaria by 50% and mortality by 20% (Morel et al. 2005). Point-of-use chlorination of drinking water reduces the incidence of endemic diarrhea by 37% (Clasen et al. 2007). Yet bed-net coverage and point-of-use water chlorination were both estimated to be under 10% in Sub-Saharan Africa by the early 2000s (Miller et al. 2007, Stockman et al. 2007). Another example is immunization, which is a highly cost-effective method for improving child survival. It is estimated that every year, at least 27 million children worldwide do not receive the basic package of immunizations, and between 2 and 3 million people die from vaccine-preventable diseases (Banerjee et al. 2010).[1]

What are the barriers to the adoption of bed nets, water-treatment products, immunization, and other preventative technologies and behaviors? Most households mention financial constraints as the main reason for not acquiring health products (Guyatt et al. 2002). Indeed, demand for these products appears quite price elastic. In Kenya, Kremer & Miguel (2007) find that take-up of deworming medication is close to 80% when the drugs are provided through schools for free and that it drops to 20% when the price is raised to US$0.30. Also in Kenya, Cohen & Dupas (2010) find that pregnant women universally take up an antimalarial bed net when it is given for free during a prenatal visit, but only 40% buy one at the still highly subsidized price of US$0.60. In Zambia, Ashraf et al. (2010a) find that take-up of a water-treatment product drops from 80% to 50% when the price increases from US$0.10 to $0.25. These findings are surprising, given that for most diseases, the individual benefits of preventing the disease would appear to greatly outweigh the costs (assuming a reasonable discount factor). Lucas (2010) estimates that the cost of an ITN is much lower than the life-long increase in earnings associated with the cognitive and educational gains generated by a reduced burden of malaria in childhood. In this context, it is puzzling that households are not buying a bed net for every one of their children.

In some contexts, the problem is the supply: Delivery of preventive care, which is mostly through the public sector, is often poor. Returning to the immunization example, a study by Banerjee et al. (2010) in Udaipur, India, finds that public facilities that are supposed to provide free immunization have very high absenteeism: 45% of the health staff in charge of immunizations are absent from work on any given day, being neither at the

[1] These might be underestimates. Lim et al. (2008) show that actual immunization coverage is systematically lower than that suggested by countries' official reports or WHO and UNICEF estimates.

health center nor on their rounds in surrounding villages. To make matters worse, there is no predictable pattern to their absence. Because a full immunization course requires at least five visits to a public health facility, unreliable service makes it hard for families to fully immunize their children. Unreliability may also deter them from attempting any visit to the facility in the first place. In this context, Banerjee et al. (2010) show that increasing the reliability of the supply—by holding well-advertised immunization camps with consistent hours of operation—can have a large impact on immunization rates. They find that, whereas 49% of children have at least one immunization when the supply is unreliable, offering a reliable immunization camp boosts this rate to 78%. Full immunization rates increase from 6% to 18% when reliable immunization camps are held. Although this corresponds to a 200% increase in full immunization, the overall rate is still very low: More than 80% of households still do not fully immunize their children, even when immunization is offered for free and reliably.

The two stylized facts discussed in this section raise many questions: Why do households buy medicines they do not need? Why do households not buy preventive health products, the private returns of which far outweigh their costs? These behaviors are inconsistent with the neoclassical model of economic behavior, in which fully informed households weigh benefits and costs when deciding on investments. In what ways does the situation in low-income countries depart from the neoclassical model? Do people lack basic information or the skills to process this information? Do they lack financial markets? Or are they simply not rational? The next section provides a simple economic model of health investments that considers preventive and remedial investments separately and highlights the key factors that are likely to be important in a developing-country context. I then review the empirical evidence on each of the identified factors.

Because the existing literature is skewed toward understanding preventive health behavior, the majority of the evidence presented will help explain the second stylized fact (too little preventive spending). I have less to say about the first stylized fact, although the two stylized facts are obviously not independent from each other. It is precisely because of the low levels of investments in preventative health that health shocks are common and require important outlays of cash for treatment.

3 A very simple model of health investments

Let us consider that households maximize an intertemporal utility function such as:

$$\sum_{t=1}^{T} E_t(\frac{1}{1+\sigma})^t U_t + B(A_{T+1})$$

where σ is the discount rate, B is a bequest function, A is assets, and U_t is given by:

$$U_t = U(H_t, C_t, L_t)$$

with H denoting the stock of health of the household, C the consumption of other goods, and L leisure.

The health stock is a commodity that households value in itself, but one over which they have a certain degree of control: For example, they decide whether to immunize their children, whether to seek care and from which providers, and whether to invest in the prescribed treatment. We consider that households make two types of health investments: preventive and remedial. Preventive investments reduce the risk of a bad health shock (the risk of illness). Remedial investments restore the health stock when there is an illness, meaning that if the household does not make a remedial investment, the health stock remains permanently diminished after the bad shock. Formally, a household's health stock over time evolves as follows:

$$H_t = H_{t-1} + \pi_t \min(remedy_t - shock_t, 0)$$

where π_t is the probability of an illness shock at period t; $shock_t$ is the severity of the shock; and $remedy_t$ measures the adequacy of the response to the shock, that is, how much of the health stock is restored by the remedial investment made.

The probability of an illness shock, π, is endogenous: It depends on the preventative investments made by the household up to time $t-1$, denoted $prevent_{t-1}$. It also depends on a random variable ε_t, which is independently and identically distributed for all t and captures the fact that the health stock is subject to randomly varying threats outside the household's control; for example, the likelihood of malaria or cholera in a given season will depend on the intensity of rainfall. Formally,

$$\pi_t = \pi(prevent_t, \varepsilon_t)$$

Altogether, this means that the health stock will depend, first, on how much the household previously invested in preventing health shocks and, second, on the adequacy

of responses to those health shocks that did occur. If the response to a shock is inadequate, ($remedy_t < shock_t$), then the health stock carried forward to the next period is reduced.

Finally, households have the following budget constraint:

$$p_c C_t + p_p prevent_t + p_r remedy_t = w(\bar{T} - L_t) + rA_t + W_t$$

where the p's denote prices, w the wage, $\bar{T}$ the total time endowment, and W the unearned income (for example, net transfers from relatives). Some of the health investments could be time investments, such as traveling to a health center and waiting, in which case the price is the opportunity cost of time.

At each period, after having observed whether a bad health shock has occurred and the unearned income, the household chooses the level of investment in preventative care, the level of consumption, the level of leisure, and the level of investment in remedial care if there was a bad shock. In this setup, health only enters as a direct input into the utility function. Of course this is a gross simplification. In a richer model, the stock of health would affect productivity, and thereby the wage rate. But this simple model already helps highlight a series of key factors in households´ health investment decisions.

First, investment decisions will be affected by the household´s level of information. How much households invest in prevention will depend on their beliefs about the function $shock_t$, that is, by how much they believe the risk of bad shocks would be reduced through prevention. Remedial investments will depend on their beliefs regarding shockt, that is, on their beliefs about the type of sickness they face and the adequacy of accessible remedial care. Given this, households could underinvest or overinvest in both preventative and remedial care in the presence of imperfect information.

Second, investment decisions will depend on households´ access to financial markets. If they lack access to credit, their choice set would reduced by the constraint $A_t \geq 0$ for all t. And if they lack access to a safe saving technology, they would face an interest rate $r < 0$.

Finally, the model highlights that preventative and remedial investments enter into utility in quite different ways. The level of preventive health investments chosen in a given period does not directly enter the utility in that period; it only enters into future utility levels. In contrast, investments in remedial health (in the presence of a bad health shock) directly affect current utility. This implies that preventive health investments should decrease faster with the discount rate than curative investments.

Although this model can be applied to any setting, this review focuses on health investments in developing countries. This means that we will be considering an environment in which market imperfections are common. In particular, imperfect information is likely to be prevalent because of the low penetration of public health communication media, low education levels, and low access to health services. Financial markets are also likely to be underdeveloped, with the majority of households lacking access to credit or even simple banking services.

4 The Role of Information

The first possible explanation for why households in developing countries often underinvest in preventative health care is that there is a lack of information on illness prevention or on the effectiveness and cost-effectiveness of preventative behaviors. Likewise, the fact that they buy drugs they do not need might come from lack of information on the source of their illnesses and how to cure them.

A series of recent studies suggests that lack of information could indeed be an important factor. Below, I review eight of these studies, conducted in a variety of contexts and for a variety of health issues, all showing that providing information can have substantial impacts on health behavior. Not all information will influence behavior, however: I review four studies that clearly show that the impact of the information depends on what information is provided and to whom. Finally, although information can make a difference, it is often not sufficient to achieve optimal health behavior, suggesting that there are other important determinants of health behavior.

4.1 Information Matters ...

Four recent studies suggest that households are responsive to information on health risks. In a randomized field experiment in Bangladesh, Madajewicz et al. (2007) show that informing households that their well water has an unsafe concentration of arsenic increased the likelihood that they switched to a safer well: 60% of households informed that they were using unsafe wells changed wells, compared with only 8% of households in control areas changing wells within the same time period.

In an experiment in India, Jalan & Somanathan (2008) show that informing households that their drinking water is contaminated with fecal bacteria can affect their adoption of

purification techniques. About 1,000 households were surveyed and had their drinking water tested for the presence of fecal bacteria (before any at-home water purification was done). Of these, 60% had contaminated, or dirty, water. Half the sampled households were randomly selected to receive the test result as well as information about the cost and likely efficacy of point-of-use water purification methods being used locally at the time. At follow-up, eight weeks later, households that had not been purifying and that had been informed that their water was dirty were 11 percentage points more likely to have changed their water-purification or water-storage behavior than households that had not been informed of the test result.

In an experiment in Kenya, Dupas (2011) finds that adolescent girls change their sexual behavior in response to information on the relative risk of contracting HIV by type of partners. In most of Sub-Saharan Africa, adult men are more likely to have HIV than adolescent boys, which means that adolescent girls in sexual relationships with adult men face an increased risk of HIV. But because most information campaigns do not disaggregate HIV risk by age and gender, adolescent girls are mostly not aware this risk discrepancy. The Relative Risk Information Campaign provided information on HIV infection rates disaggregated by age and gender to adolescents in 71 randomly selected primary schools. The information campaign reduced the incidence of childbearing by 28%, from 5.4% of girls to 3.9% within a year, suggesting that fewer girls were engaging in unsafe sex. More importantly, it reduced unsafe cross-generational sex; the rate of childbearing with men at least five years older decreased by 61%, with no offsetting increase in childbearing with adolescent partners.

Cohen et al. (2011) show that information also affects remedial health behavior. Nearly 70% of Kenyan households in their study self-diagnose malaria when a member comes down with a fever. As a result, a significant portion of patients for whom malaria treatment is bought from a pharmacy do not in fact have malaria: 47% of patients aged at least 5 years test negative, as do 63% of patients over 15 years. The question becomes, would increased access to diagnostic tools reduce the likelihood of overtreatment? In the study, access to diagnostic testing was randomized by distributing vouchers for a free rapid diagnostic test (RDT) to a random subset of households. Among households that came to a drugstore to purchase medicine for a patient who, when tested, proved not to have malaria, those that learned of the malaria status through the RDT were 40 percentage points less likely to buy malaria medicine than those who did not know the status at

the time of the purchase decision, suggesting that households are responsive to reliable diagnostic information.

The four studies above suggest that individuals respond to information about the quality of their environment and the risks they face. There is also evidence that information campaigns about specific prevention techniques can also make a difference in household behavior. A famous example is that of diarrheal death prevention in Egypt in the early 1980s. In 1977, dehydration due to diarrheal disease was identified as the cause of half, if not more, of all infant deaths in the country. In the early 1980s, Egypt established the National Control of Diarrheal Disease Project to promote the use of oral rehydration therapy (ORT), a glucose electrolyte solution that does not stop the diarrhea but prevents dehydration. The program distributed ORT kits, along with information about the appropriate treatment of children with diarrhea. The program reached mothers through mass media, including television, and through health workers trained on how to teach mothers to treat diarrhea and use the ORT kits. Within 5 years, awareness and use of ORT had increased dramatically, and between 1982 and 1987 infant diarrheal deaths decreased by 82% (Levine et al. 2004).

Another example is provided by Cairncross et al. (2005), who report on the long-term impact of a campaign to promote good hygiene practices among households.[2] The campaign was conducted in 10 local councils (panchayats) in Kerala, India, between 1988 and 2000. In 2002, rates of reported systematic handwashing with soap in those panchayats were over 55% among women and girls and over 40% among men and boys, compared with only 7% among women and girls and 3% among men and boys in a nearby panchayat where no hygiene promotion took place. The authors of the study conclude that the hygiene promotion campaign caused a change in behavior and that this behavior change was sustained over time. This finding agrees with the result of an older study by Wilson & Chandler (1993), who found that 79% of mothers in a village in Lombok, Indonesia, continued to wash their hands with soap two years after a four-month intervention to promote the practice had taken place.

Information on malaria prevention can also be effective. A critical tool in the fight against malaria is the use of ITNs, but their use remains limited in many areas with

[2]Handwashing with soap at critical times (after defecation, prior to preparing food) has been shown to be very effective at preventing diarrhea, as well as skin and respiratory infections (see for example Luby et al. (2004) and Luby et al. (2005) for results of a randomized controlled trial in Pakistan).

malaria. To test whether lack of knowledge of malaria transmission and prevention is a barrier to ITN adoption, Rhee et al. (2005) conducted a randomized controlled trial in Mali in 2003. Households received net-impregnation services either with or without education. The education focused on signs and symptoms of malaria, its transmission and prevention, and the benefits of ITN use, including how, when, and where to impregnate nets. They find that 49% of households that had received the educational component impregnated their nets, compared with 35% of households that did not.

Overall, these studies suggest that households in developing countries often lack information on the returns to investing in preventative behavior (be it information on risks, i.e., on the costs of not investing in prevention, or information on prevention techniques, i.e., on the effectiveness of investing in prevention) and that their health behavior is quite responsive to information. But information, or rather the source of information, has to be credible for it to make a difference. Information campaigns carried out by governments with a bad track record might be doomed to fail. For example, although Egypt was extremely successful at increasing the adoption of ORT, in India few children with diarrhea were treated with ORT in the early 1990s, despite 10 years of vigorous ORT campaigning by the Indian government (Rao et al. 1998). One could hypothesize that the lack of success of the Indian government´s ORT campaign was related to the forced sterilization effort carried out by the government during the state of emergency between 1975 and 1977, and the subsequent distrust, among the population, of any government initiative related to family issues.

4.2 ... But It Depends on the Type of Information Provided, and to Whom

Information can make a difference, but not all information matters. Although Dupas (2011) shows that Kenyan teenagers are responsive to information on the relative riskiness of potential partners, she also demonstrates that the behavioral choices of teenagers are not responsive to pure risk-avoidance information. A year prior to the relative-risk information campaign described in the paper, half the schools in her sample had been randomly selected to receive teacher training on the national HIV/AIDS curriculum, which focuses on average risk and encourages abstinence until marriage, but does not discuss risk-reduction strategies, such as condom use or selection of safer partners. The results

suggest that the teacher training on the national HIV/AIDS curriculum had no effect on the likelihood that teenage girls started childbearing within a year, suggesting no reduction in risky behavior. A longer follow-up presented in Duflo et al. (2011) shows that the teacher training on the abstinence-only HIV/AIDS curriculum in fact had the (potentially perverse) effect of increasing rates of teen marriage among girls. Overall, these results suggest that providing comprehensive risk information and prevention messages, rather than focusing on encouraging just one type of preventative behavior (abstinence), is necessary to affect behavior.

Comprehensive information might not be sufficient to affect behavior, however. Kremer & Miguel (2007) show that a randomized health-education campaign aimed at reducing intestinal worm infections among children in Kenya had absolutely no effect on children´s behavior. Health-education efforts in their experiment consisted of classroom lectures taught by trained teachers as well as experienced NGO staff members. The education focused on encouraging preventative behaviors such as washing hands, wearing shoes, and avoiding infected fresh water. One year later, data on pupil cleanliness and shoe wearing (as observed by the research team) as well as self-reported data on exposure to fresh water showed absolutely no effect of the education campaign. A possible explanation is that the information campaign was targeted at children, rather than their parents.

The effectiveness of information might also depend on the gender of the person receiving the information and, specifically, on whether the information is targeted to the female or the male head of the household. Indeed, the unitary model of the household has been rejected by a number of studies that have shown that mothers or grandmothers spend a higher share of their income to improve child health, nutrition, and development than fathers or grandfathers do (Thomas 1990, 1992, Duflo 2003, Qian 2008). This suggests that women and men may value child health differently and therefore might respond differently to information on the health returns of various behaviors. The evidence on this is quite scarce, however. Dupas (2009) randomly varied who in the household was targeted by a promotion campaign for antimalarial bed nets in western Kenya. Households received a voucher for a bed net at a randomly chosen price. The gender of the household head that received the voucher, as well as a marketing message, was randomized: Either the female head alone, or the male head, or both heads were targeted. Women were not more likely to purchase the bed net, and they did not appear to be less price elastic than men. However,

handing out the voucher in the presence of both household heads increased take-up by about 7 percentage points (20%) compared with targeting either of them alone. Overall, this study does not find systematic gender differences in willingness to invest in bed nets. But it suggests that, at least for some households, both heads might need to be convinced of the effectiveness of a product before the household invests in it.

Conversely, if the returns to a behavior or technology are quite different for the husband and the wife, informing both of them might deter adoption. A good example is that of contraception. Despite the introduction of modern methods of birth control, rates of births reported by women as unwanted remain high in low-income countries. To estimate the role of spousal discordance in fertility preferences in explaining this suboptimal adoption of contraceptives by women, Ashraf et al. (2010b) conducted a field experiment with a family planning clinic in Lusaka, Zambia. Over 830 married women received a voucher guaranteeing free and immediate access to a range of modern and relatively concealable contraceptives, such as injectables and implants, through a private appointment with a family planning nurse. Women were randomly selected to receive the voucher either in private or in the presence of their husbands, giving the former greater facility to conceal take-up of contraception from their husbands as the husbands did not receive information about concealable forms of contraception. The study results suggest that intrahousehold discordance over family planning plays a significant role in contraceptive use and fertility outcomes. When women were given greater opportunity to hide birth control (i.e., the private treatment), they were 23% more likely to visit a family planning nurse and 38% more likely to adopt a concealable form of contraception, leading to a 57% reduction in unwanted births. All in all, this suggests that the impact of information on health behavior can depend on the degree of intrahousehold concordance in preferences.

4.3 Complementarities Between Education and Information

Although a number of studies demonstrate that household health behavior is responsive to information, lack of information cannot by itself explain all the discrepancy between actual and optimal behaviors. For example, as mentioned above, informing households seeking to buy a malaria medicine that they are actually malaria negative reduces the odds that they buy a malaria medicine from 100% to 60%, but not to 0%. This is despite the fact that the test used has a risk of false negative of less than 5%. So why are there not more people reacting to the test result? Not all households even demand diagnostic testing

itself. Cohen et al. (2011) show that getting access to a free RDT at the local drugstore increases the likelihood that households suspecting malaria seek a formal diagnostic test (from the shop or from the local clinic) from 18% to 40%. Once again, although large, this increase does not reach 100%. Why are there not more people suspecting malaria seeking free diagnosis when they know it is available.

It is possible that people simply need more time to adapt to new information or to the availability of new technologies. The malaria test study cited above looks at the very short run after a new diagnostic tool is introduced. It is possible that adoption of this tool would increase over time, as more information about it spreads. But another possible explanation for why 40% of households do not seek diagnostic testing, and why 40% of those that do get tested seem to ignore the results, could be that they lack the education needed to assess the scientific soundness of diagnostic testing. Indeed, without education, it might be difficult for households to process information even if it is easily accessible. Schultz (1975) argues that schooling enhances information acquisition and learning. As a result, when facing technologies that have a large potential for misuse or information that requires complex processing, individuals with lower education levels might be at a disadvantage (Rosenzweig 1995).

There is evidence that education matters for health behavior through this cognitive-ability channel for developed countries. For example, Rosenzweig & Schultz (1989) show that all women in the United States have a comparable success rate with passive (thus easy) contraception methods such as the pill, but women with a higher education level are much more successful at using the rhythm method, which requires some active computation. Using data from the United States and the United Kingdom, Cutler & Lleras-Muney (2010) show that about 20% of the health-education gradient is statistically accounted for by general cognitive ability.

Although growing, the evidence on this health-cognition gradient is more limited for developing countries. Using data from Brazil, Thomas et al. (1991) find that almost all the impact of maternal education on child health (as measured by child height) can be explained by indicators of access to information, such as reading the newspaper, watching television, and listening to the radio. De Walque (2007) investigates how different education groups responded to the "ABC" HIV prevention information campaign in Uganda and finds that the response to the information was faster and more pronounced among the educated. Cohen et al. (2011) also find heterogeneous effects of access to RDTs by

education level in Kenya. But in that study, the more educated appear more skeptical of the new information: Households with literate female heads are less likely to comply with the malaria test result. This could be because educated households are more likely to have learned to be skeptical of test results and want to experiment with RDTs before trusting the new diagnostic tool, that is, before they abandon the tried and tested, as well as recommended and established, practice of presumptive treatment. Indeed, previously available diagnostic tools (microscopy lab tests performed at health facilities) have a high rate of false negatives, and most health practitioners in Kenya recommend presumptive treatment with a malaria medicine even in the presence of a negative microscopy test result.

4.4 Social Learning

When learning about the effectiveness or quality of a product or service requires inference over a large-enough number of data points, households might learn not only from their own experimentation, but also from that of others (their neighbors or peers). For example, Adelman et al. (2009), using cross-sectional data from rural Tanzania, find evidence that households learn about the quality of care available at multiple facilities from their neighbors´ illness experience.

Such social learning in health has received more limited attention so far than social learning in other domains, in particular agriculture (for a review of the literature on the role of social learning in technology adoption in low-income countries, see Foster & Rosenzweig 2010 in this series). However, the theoretical insights discussed in the agriculture literature also apply to health: Although acquiring information through others can only speed up the learning process compared with learning only by oneself, learning externalities can also lead to a free-riding problem, especially if the individual cost of information acquisition is high. Say, for example, that a new malaria drug is introduced, and you want to know if it is more or less effective than the status-quo drug. The cost of learning might be high if the new drug is less effective than the old drug—you will suffer from malaria more than if you had not tried to experiment with the new drug. You might thus prefer to let your neighbors do the experimenting and learn from observing them. But if everyone takes this attitude, then no one will experiment with the new drug, and adoption might stall even for drugs that turn out to be more effective than the status quo. In such a context, subsidizing adoption/experimentation for a subset of the population

might be necessary to achieve the social optimum.

A number of recent studies have exploited randomized subsidization to test for the presence of social learning in the adoption of health technologies in low-income settings. Kremer & Miguel (2007) use data from a school-based deworming program in Kenya and find that households were less likely to invest in deworming if they had a higher number of social contacts who benefitted from free deworming in the past. Their negative effect is consistent with a model of social learning in which people start with a prior that overestimates the private returns to adoption. Although deworming has large social returns (due to the health externality), it has low private returns due to high usage costs in the way of nontrivial side effects. People who learned about these low private returns from those who received the subsidy rationally chose not to invest in deworming as a result. Dupas (2010) finds evidence of similar social learning effects but in a context in which people underestimate the returns to adoption, and therefore social learning leads to increased adoption. Exploiting household-level randomization in the subsidy level people received for antimalarial bed nets, she finds that higher exposure to early adopters (those who received a full subsidy) leads to higher willingness to pay and higher adoption. Oster & Thornton (2009) study the adoption of a personal hygiene product (menstrual cups) among adolescent girls in Nepal. Menstrual cups were given to a random subset of girls within a school as well as their mothers. Looking at the adoption (self-reported usage) among those who received it for free, they find that having a greater number of friends who also received the product for free (controlling for total number of friends) significantly increases the likelihood of self-reported adoption. The authors provide evidence that the peer effects operated through learning (learning how to use the product) rather than through norms (making one to want using the product).

Overall, the evidence reviewed in this section suggests that rural communities in poor countries often lack basic information on the health returns to specific behaviors or products. Although simply providing information about health benefits is sometimes sufficient to change behavior, it is not always enough. In particular, when the healthy behavior comes at a cost (e.g., when it requires a costly tool or technology), people often need to experiment, or see others experiment, to become convinced about the health returns of that behavior or technology. The next section discusses the extent to which financial market imperfections lead to suboptimal levels of experimentation with health technologies.

5 The Role of Financial Markets

A number of preventative health behaviors require substantial and lumpy financial investments by households. For example, ITNs, discussed above, cost around US$7 at market price, which represent a large sum for households living on less than US$1 a day per person. Likewise, water filters cost US$15 to $20. It is clear that for many households, quickly outlaying that kind of cash will be impossible, unless they can borrow. In this context, it is likely that, even with full information, poor households´ demand for these types of preventive health tools will remain low unless they can access credit or have access to a safe saving technology.

5.1 Credit Constraints

To evaluate the possibility of using consumer loan contracts to increase ITN ownership, Tarozzi et al. (2011) carried out a large study in five districts of the eastern Indian state of Orissa, where endemic malaria represents one of the most serious public health concerns. The researchers worked in collaboration with the microlender Bharat Integrated Social Welfare Agency (BISWA). In a random sample of 47 villages, existing BISWA clients were given detailed information about malaria and the effectiveness of ITNs, after which they were given the option to purchase unsubsidized ITNs in cash or on a one-year credit contract. People had two days to think about the offer. If nets were purchased on credit, a yearly interest of 20% was charged. The authors report that only 2% of households purchased a bed net in cash, whereas 52% purchased at least one net on credit. Repayment rates were high, with 65% of those who bought the net on credit having repaid the loan within a year. Overall, the change in the number of bednets owned by households between baseline and follow-up was 150% larger in those villages than in the 47 control villages where bednets could not be purchased on credit. This large difference could mean two things. First, some who purchased on credit possibly did not have enough liquid savings on hand to purchase the net(s) but knew they would have enough income over the year to pay for it (with interest). Or they had cash on hand available, but the ability to pay for the net over a one-year period was much more attractive than paying in cash because it implied only a low immediate cost. In particular, for people exhibiting present-bias preferences, outlaying a large sum today to buy a bed net would bring much lower utility than acquiring the product immediately by committing one´s future self to making small

payments at regular intervals in the future. We return to this issue in Section 6.

Devoto et al. (2011) find similar results when studying the demand for home connections to the drinking-water network in Morocco. In 2008, poor households living in the inner city of Tangiers became eligible to purchase a home connection to the water system on credit from the local water utility company, Amendis. The price of a home connection was a function of the work required to install a pipe from the network to the home entrance, and it was typically at least US$500, a relatively important lump sum that many households with no access to formal credit cannot pay upfront. Among eligible households, a random subset was sampled for a personalized information campaign about the new Amendis credit program, along with assistance in preparing the application. The authors find that 69% of households that received the information bought a connection, compared with only 10% of households in the control group, who typically did not know about the credit program until a year later. The repayment rate among those who took on the credit was high: After two years, only 15% of households had arrears of more than 20% on their monthly repayments. Again, these results suggest that credit constraints are an important barrier to households´ investments in lumpy, potentially health-enhancing products.

Interestingly, both the Orissa and Tangiers experiments relaxed the credit constraint for a specific product only. For this reason, it is possible that they overestimate the demand for ITNs and home connections that we would observe if households´ liquidity constraints were relaxed. In other words, if households just accessed a consumer loan at the same rate as the BISWA (Amendis) targeted loans, would they have bought an ITN (a home connection)? Or would they have bought a TV? Or a goat? A number of recent studies estimate the impact of expanding access to credit on households´ welfare, but none of them looked specifically at the impact on preventative health investments. Banerjee et al. (2009) look at the impact of expanded access to credit on curative health expenditures in Hyderabad (urban India) and find no effect. But they do not report anything on investments in durable health products, such as water filters or improved cooking stoves. Likewise, Karlan & Zinman (2010), reporting on the impact of expanding access to households in Manila (urban Philippines), show no change in the likelihood that households see a doctor when there is an illness but did not collect data on preventive health investments.

One question that naturally arises is, if people underinvest in preventive health because

of liquidity constraints, why is their demand for remedial health insensitive to changes in credit access? And how can households afford to deal with very high (and lumpy) health bills in the presence of an illness if they cannot afford lumpy preventive tools? A likely answer is that households are part of solidarity networks of neighbors or relatives, networks with members who insure each other against health shocks. There is evidence that households in developing countries are somewhat insured against idiosyncratic shocks, particularly health shocks, through such networks. Using data from rural India, Townsend (1994) shows that, controlling for village consumption, episodes of sickness among a given household do not affect consumption for that household. Robinson & Yeh (2011a), looking at women who supply transactional sex in western Kenya, show that transfers from regular clients (partners) increase by 37%–42% when a woman is sick.

Although networks appear to be an important source of cash when a health emergency occurs, they are often not enough. Gertler & Gruber (2002) argue that Indonesian families are unable to adequately smooth consumption over large, unexpected, major illness episodes. Fafchamps & Lund (2003) find that gifts and loans from relatives and friends are enough to cover the expenses associated with funerals, but not those associated with health shocks. As a result, for households without formal insurance or access to credit, although periods of poor health may not immediately lower consumption, the coping mechanisms used by households might be extremely costly in the long term: Households might decrease investments in productive assets such as draft animals (Rosenzweig & Wolpin 1993) or even jeopardize their long-run health. For example, Robinson & Yeh (2011b) show that women who engage in transactional sex in western Kenya substantially increase their supply of risky, better-compensated sex to cope with unexpected health shocks, particularly the illness of another household member. The authors conclude that these increases in risky sex are likely to have dreadful health consequences for these women and their clients over time, given the high prevalence of HIV/AIDS in the region.

5.2 Barriers to Saving

Even if they cannot borrow to invest in preventive health products, households should be able to save toward acquiring these products, even if over a very long time. So why do they choose not to?

To start with, households spend so much money dealing with actual health shocks that this might curtail their ability to save toward investments in the very products or

behavior that would help prevent such shocks in the future, creating a sort of vicious cycle or health poverty trap. A related example is provided by Case & Menendez (2009), who examine the effects of funeral spending on household functioning in South Africa. They show that large outlays of money at the time of a funeral are common, as dictated by social norms. But such outlays leave households vulnerable to future hardship: The more a household spends on a funeral, the lower its future spending per person, the lower its investments in children schooling, and the poorer its future adult health. Although this problem could be somewhat solved by a change in social norms that would bring some limits to the size of funerals, reducing the outlays for curative health expenditures is not always an option—unless households invest in useless medicines and care, the option to reduce curative costs to increase savings toward preventive investments is not really there, or if it is, it is a stark trade-off.

People may also be prevented from saving adequately for health, and from saving in general, by the lack of access to a safe saving technology. The great majority of poor people in low-income countries do not own a bank account. If people face an important risk of expropriation when they save cash at home, they might have difficulty accumulating the amount of cash necessary to acquire relatively expensive, indivisible products such as a bed net or a water filter. The source of expropriation risk can simply be a risk of theft. Another more subtle, but likely more common, source of expropriation risk could be the strong pressure to share cash on hand with friends and relatives, which has been documented by Platteau (2000). These two sources of expropriation, by making the rate of returns to savings negative, not only make it harder for people to save enough to invest in expensive health products, but also create disincentives to personal savings. How important are they in explaining the low levels of investments in lumpy preventative health tools? In a randomized experiment in western Kenya, Dupas & Robinson (2011) estimate the extent to which a saving device that simply protects one´s savings from others (a simple safe box made out of metal) can increase preventative health investments among rural households. They observe a very large demand for the device and show that those who got access to the device were able to invest more in preventative health products in the following 12 months than those in the control group. The study also finds that some individuals face strong-enough claims on their savings that a simple safe box is not enough for them to invest in health as much as they would like. Such individuals benefit from saving devices that enable them to earmark their savings for personal health

investments. Overall, Dupas & Robinson (2011) estimate that 66% of the individuals in their study sample would invest more in health if they had access to a better saving technology.

Another potential barrier to savings is that individuals might be present biased: Even though they would like to save in the long run, they might be subject to temptations on a daily basis that prevent them from accumulating as much as they would like. I discuss this issue in the next section, which reviews the extent to which self-control problems arising from time-inconsistent preferences affect health behavior.

6 The Role of Time Preferences

Under the standard model of economic behavior, individuals discount the future at a constant rate. These preferences imply that when individuals plan a future course of action, such as adopting a healthy behavior at a later date, they are guaranteed that when this future date will arrive, their preferences will not have changed. But what if preferences change as the date of action nears? For example, what if the discount rate over long time horizons is lower than the discount rate over shorter time horizons (Laibson 1997)? This is the present bias briefly evoked above: Even though people would like to save or adopt healthy behaviors in the long run, they might not be willing to sacrifice consumption or pleasure today. The presence of such present biasness has been well established among the general population in the United States, and commitment devices such as automatic transfers into 401(k) accounts have been shown critical in increasing saving rates for retirement (Madrian & Shea 2001). Similar evidence has started to emerge for less developed countries (Ashraf et al. 2006).

Such time inconsistency might explain procrastination in the adoption of preventative health behavior, as the returns to such behavior are typically far in the future. In contrast, in the midst of a health shock, when suffering is immediate and the risk of death imminent, procrastination is extremely unlikely. Thus time-inconsistent preferences could explain why we observe, at the same time, high expenditures on remedial care and low take-up of preventive tools and behaviors.

There is evidence that such present bias explains the low adoption of preventive behaviors in rich countries. For example, DellaVigna & Malmendier (2006) document how health club members end up exercising much less often than they intended to when they

first enrolled in the health club. To what extent is time inconsistency also a factor behind the low take-up of preventive behaviors in low-income countries? In this section, we present two types of recent evidence on this issue. The first type of evidence concerns the demand for and impact of products that enable individuals to commit to healthy behaviors (for a review of the evidence on the demand for and effectiveness of commitment devices in general, see Bryan et al. 2010 in this series). The second type of evidence concerns the impacts of small incentives (nudges).

6.1 Committing to Healthy Behaviors

Above we discuss the bed-net experiment in Orissa, India, in which clients of a microfinance institution were given the option to purchase bed nets on credit, resulting in take-up of around 52% (Tarozzi et al. 2011). The researchers added a twist, however: Because the nets sold needed to be retreated with insecticide every 6 months to maintain full efficacy, participants could either purchase the nets alone or with two prepaid retreatments at 6 months and 12 months after the sale. In other words, people in the experiment were offered two different purchasing contracts for the bed net: one exclusive of retreatment and another, more expensive, inclusive of future retreatment costs. If participants did not purchase the contract with retreatment, they were given the opportunity to purchase the retreatment with cash after 6 and 12 months. As such, the retreatment contract was a commitment contract: Those who chose it were bound to invest in retreatment in the future. There was relatively high demand for this contract: Of the clients that purchased nets, 53% preferred the commitment contract. Six months after the original offer, the research team returned to each village to retreat the nets of those with retreatment contracts, and offered the opportunity to buy retreatment in cash to those who had not purchase the retreatment contract. Only 30% of participants without the retreatment contract purchased the retreatment with cash on the spot. In other words, retreatment rates were much lower in the absence of a commitment contract. Although these results are not experimental (households chose which contract to take on), they suggest that compliance with health-protecting guidelines (such as retreatment of nets) may be enhanced by the introduction of contracts that require prepayment of compliance costs.

Gine et al. (2010) tackle the issue of smoking in the Philippines. Although smoking is common behavior, nearly 46% of surveyed smokers in Manila report having tried to stop smoking within the past year. Survey responses suggest that their lack of success

may result from time inconsistent preferences: Although 72% report wanting to stop smoking at some point in their life, only 17% of people declare wanting to stop smoking now. In their study, Gine and coauthors measure the impact of Committed Action to Reduce and End Smoking (CARES), a voluntary commitment savings program offered by Green Bank, on smoking cessation. The basic design of the product allows a smoker to deposit a self-selected amount of his own money that will be forfeited unless he passes a biochemical test of smoking cessation. To enroll people in the CARES program, Green Bank identified regular smokers off the street and asked them if they wanted to participate in a short survey on smoking. All subjects received an informational pamphlet on the dangers of smoking and a tip sheet on how to quit. Subjects were then randomly assigned to the CARES program or to a control group. About 11% of individuals who were offered CARES signed a contract, and 80% made more than one contribution to their CARES account. The average CARES client had a final balance equal to approximately six months worth of cigarette spending. After six months, individuals who were offered a CARES contract were three to six percentage points more likely to pass a urine test for nicotine than those in the comparison group, a substantial effect considering that only 8% of comparison individuals passed the test. The effects of actually entering into a smoking-cessation contract were larger: Clients of the CARES program are estimated to be 30–65 percentage points more likely to pass their urine test after six months than their comparison-group counterparts. Importantly, this effect persisted in surprise tests at 12 months, indicating that CARES produced lasting smoking cessation.

Overall, these two studies suggest that people are quite sophisticated with regard to their time-inconsistent preferences and have a demand for products that enable them to commit to healthy behaviors. This is consistent with the fact that time-inconsistent preferences are often mentioned by individuals who participate in informal saving networks, such as ROSCAs (Rotating Savings and Credit Associations), to commit themselves to specific savings goals (Gugerty 2007). A ROSCA is a group of individuals who come together and make regular cyclical contributions to a fund (the pot), which is then given as a lump sum to one member in each cycle. ROSCA members sometimes use spending agreements that dictate the intended use of the pot. Dupas & Robinson (2011) show that health spending agreements can increase yearly preventative health investments of ROSCA members by more than 100%.

Note that formal credit access, or even simply store credit, could offer the type of

commitment that people need. Indeed, if the cost of default is high, taking on a loan to invest in a health product is one way to tie one´s hands (or one´s household´s hands) and earmark one´s future savings to a specific health investment. Little is known to date about the impact that the expansion of credit access through microfinance is having on preventive health investments, however.

6.2 Nudging People Toward Healthy Behaviors

This section reviews two studies that suggest that small incentives may have a disproportionate impact on take-up of health behaviors. As discussed above, the basic setting of Banerjee et al.'s (2010) immunization experiment in Udaipur, India, was the setup of reliable immunization camps in randomly selected villages. Introduction of these camps increased full immunization rates from 6% to about 17%. Here also the researchers added a twist: Among villages where a camp was set up, a random subset was selected to receive an incentive program. Specifically, parents that brought their children to the camp were given 1 kg of lentils per immunization administered and a set of metal meal plates upon completion of a child´s full immunization course. The value of the lentils was about Rs. 40 (less than US$1), equivalent to three-quarters of one day´s wage. The incentives were provided to help offset the opportunity cost of taking a child to be vaccinated. The impact of these incentives was very large: When added to reliable camps, they help boost full immunization rates from 17% to 38%. The authors interpret this as evidence that small incentives can help solve procrastination problems: By offering immediate gratification for the adoption of a behavior that has only long-run benefits for the parents, the incentives could overcome the natural tendency to delay a slightly costly activity.

Thornton (2008) observes similar results in the context of HIV testing in Malawi. Study participants were offered a free door-to-door HIV test and were given randomly assigned vouchers for between US$0 and $3 redeemable upon obtaining their results at a nearby voluntary counseling and testing center. Thornton finds that monetary incentives were highly effective at increasing result-seeking behavior, the first step toward appropriate care and treatment if one has the HIV virus. Although only 34% of those who received no monetary incentive attended a center to learn their results, respondents who received any cash-value voucher were twice as likely to go. The average incentive was worth about a day´s wage, but even the smallest amount, about one-tenth of a day´s wage, resulted in large attendance gains.

7 Policy Implications

The evidence reviewed above suggests a potentially important role for policy intervention, even in the absence of epidemiological externalities. First, it seems clear that basic information often does not trickle down to rural communities in poor countries, and therefore (credible) information efforts seem a critical component of any public health policy. But, as shown above, information is not always enough. In many cases, experimentation is really what people need to become convinced of the benefits of a given health technology. Moreover, in the presence of either credit constraints or externalities, experimentation levels might be inefficiently low. Two types of public policy interventions can redress this inefficiency: sticks, such as mandates, or carrots, such as price subsidies or financial incentives.

7.1 Mandates

One way for a social planner to increase the adoption of preventive behaviors that are deemed crucial from a public health perspective is to legally require those behaviors. For example, in the United States, it is required by state law that some or all routinely recommended vaccines be given to children prior to the time they attend child care or school. Because the great majority of parents intend to put their children in school, these state laws essentially make vaccination compulsory. In France, three vaccines are mandatory independent of schooling status, and parents who fail to vaccinate their children might lose parental rights. Enforcing these types of mandates might not always be easy, however, especially in low-income countries where governmental budgets and institutions are typically weak. For example, all public transportation vehicles in Kenya are required to have functioning seat belts, but rampant corruption among police officers means that the law has essentially no bite—it is simply not enforced. There are, however, some success stories of governmental mandates in health prevention. In Thailand, a government program called the 100 Percent Condom Program, started in 1991 to combat HIV, required that all sex workers in sex establishments used condoms with their clients. Despite the fact that both prostitution and sex establishments were illegal, the police held meetings with sex-establishment owners and sex workers, and health officials provided them with free condoms. To identify noncompliers, health officials relied on the reports of men seeking treatment for sexually transmitted infections—those men were asked to name the sex

establishment they had used, and health officials would then visit the named establishments to provide them with more information. Condom use by sex workers shot up from 14% in early 1989 to more than 90% by June 1992, and Thailand had 80% fewer new cases of HIV in 2001 than in 1991 (Levine et al. 2004).

7.2 Price Subsidies

The interaction between lack of information and credit constraints (even savings constraints) is a vicious one: People who know little about the effectiveness of a health product are wary of investing meager resources in it, and as a result they do not experiment with the product and never learn how effective it truly is. In such a situation, short-term price subsidies could help foster experimentation and lead to informed decisions by households in the future. Dupas (2010) develops a simple model showing the circumstances under which subsidies can speed up learning. Subsidies are unlikely to increase learning if the product being subsidized has a nonmonetary usage cost (e.g., a side effect) that people underestimate at the onset. In contrast, subsidies can greatly speed up the learning process if people´s priors overestimate the nonmonetary usage cost of the new product. Consistent with these predictions, Dupas (2010) finds, in a randomized study in rural Kenya, that short-run subsidies for new, improved ITNs (which are much more comfortable to use than previous ones) lead to high experimentation rates and higher adoption of the bed nets in the long run (a year later) among both subsidy recipients and their social contacts, whereas Ashraf et al. (2010a), in a randomized study in urban Zambia, find that subsidies for a water-treatment product (which leaves an aftertaste of chlorine in the water) do not increase the level of experimentation in the short run.

7.3 Incentives

Another way to induce a higher level of experimentation is through incentives. Above we see that a small bag of lentils can be enough to encourage parents in Udaipur to immunize their children, and a small financial reward is enough to induce people in Malawi to seek their HIV status. Likewise, Dupas (2005) shows that the distribution of free bed nets at prenatal clinics can have a large impact on the take-up of prenatal care services in Kenya. All these results suggest that combining traditional antipoverty transfer programs with incentives for families to invest in specific human capital investments might be highly

effective: They can resolve the credit constraint, time inconsistency, and intrahousehold conflicts all at once by making the receipt of government transfers conditional on the adoption of a set of behaviors.

Lagarde et al. (2007) review the evidence from a total of six conditional cash transfer programs (all but one in Latin America) for improving uptake of health interventions in low- and middle-income countries. They conclude that such programs are consistently successful in increasing use of health services, increasing the adoption of preventive behaviors, and improving nutritional and anthropometric outcomes. But the results on health status are less systematic, with some studies finding no effect on morbidity. The authors conclude that demand-side strategies, such as conditional cash transfer programs, can only go so far—if the supply of health services remains inadequate, forcing people to visit health clinics to get their transfer payment will not increase their health; it will just waste their time.

Baird et al. (2010a) report on a program in rural Malawi in which monthly cash transfers were made to adolescent girls and their parents, conditional on these girls attending schools. The program also paid school fees in full directly to the secondary school, for those girls of secondary school age. A randomized evaluation of the program finds that the intervention increased re-enrollment rates and reduced dropout rates. Consistent with the finding of Duflo et al. (2011) in Kenya, showing that keeping girls in school longer can decrease teenage pregnancy and marriage rates, Baird et al. (2010a) find that the Malawi conditional cash transfer program led to significant declines in early marriage, teenage pregnancy, and self-reported sexual activity among program beneficiaries after just one year of program implementation. They also find a decrease in HIV infection rates among the beneficiaries of the cash transfers (Baird et al. 2010b). These results imply that the strong positive impacts of conditional cash transfers established in Latin America may apply to Africa.

7.4 Improving the Supply

Let us return to the two stylized facts with which we began: Households have high out-of-pocket remedial health expenditures but underinvest in preventive health. These two facts are obviously linked—the money spent on remedial health cannot be invested in preventive health. One way to free up resources for preventive investments is thus to reduce the remedial health burden. For example, increasing the availability of diagnostic testing

tools and services—by making rapid tests available, as in Cohen et al. (2011), but also making sure that medical professionals are present at work, as in Bjorkman & Svensson (2009)—would go a long way in reducing out-of-pocket expenditures on inappropriate medication or visits to unqualified providers.

But more generally, private health behavior is often not the most important determinant of health. In the United States, public health measures such as improved sanitation, provision of clean drinking water, and hookworm and malaria eradication are the main factors behind the massive improvements in child health in the past 150 years (Currie 2000; Bleakley 2007, 2010). Household behavior played a minor role. Although providing information, subsidies, or incentives might be effective, it might not be as cost-effective as large public health interventions.

8 Conclusion

Good health is both an input into one's ability to generate income and an end in itself. As such, it is not surprising that a relatively vast literature is devoted to understanding the determinants of health behaviors. This literature has recently expanded to the study of health behaviors in low-income settings, for which good data are becoming increasingly available. This review is too short to be exhaustive, but it tries to present the most compelling evidence to date on this issue. The important thing to take away from this review is that when it comes to health behavior in developing countries, there are a substantial number of deviations from the neoclassical model. First of all, people seem to lack basic information, and sometimes have limited ability to process information, because of low education levels. Second, there are market imperfections and frictions, especially credit constraints, affecting people´s ability to invest in health. Finally, there seem to be some deviations from the rational model, with, as has been widely shown in developed countries, a nontrivial share of people exhibiting time-inconsistent preferences as well as myopia.

Overall, this suggests an important role for public policy when it comes to health. Above we identify four important demand-side policy tools: information, mandates, price subsidies, and financial incentives. All appear to have the potential to increase the sustained adoption of preventive behavior. But the success of these demand-side strategies is contingent on the supply side being adequate: on health services and products being

available, with delivery and/or enforcement institutions that are effective. The issue of how to improve service delivery in health is outside the scope of this review, but it has been the focus of a number of recent and ongoing studies that will soon need a review of their own.

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