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Incentivizing Use of Health Care

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PREFACE

The Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat organized an Expert Group Meeting on “Priorities for Improved Survival: ICPD beyond 2014” at the United Nations Headquarters in New York on 21 and 22 October 2013. The meeting was convened to inform substantive preparations for the forty-seventh session of the Commission on Population and Development in April 2014. In light of the twentieth anniversary of the 1994 International Conference on Population and Development (ICPD), the Commission’s theme for 2014 is an “Assessment of the status of implementation of the Programme of Action of the International Conference on Population and Development”.

The meeting brought together experts from different scientific disciplines and regions of the world to address key questions about the progress in improving survival at different stages of life since the ICPD, as well as the challenges and opportunities for future mortality reduction. A selection of the papers prepared by experts participating in the meeting is being issued under the Expert Paper Series published on the website of the Population Division (www.unpopulation.org).

This paper discusses arguments and evidence on the promise of incentives as a development tool for increasing the use of health care services and improving health outcomes. Incentives have been a controversial tool, but prominent initiatives in recent years have increased interest in understanding the circumstances under which they may be efficacious, as well as how they may best be employed in an ethical and cost-effective manner. The paper examines both small, time-delimited incentives and larger repeated incentives embedded in social protection programmes. It summarizes evidence on the way incentive efforts have been used in various health care domains, including family planning, prenatal care, facility-based delivery, immunization, HIV testing, and medication adherence; in promoting non-medical health behaviours such as smoking cessation; and for health outcomes such as weight loss or avoidance of sexually transmitted infections. Finally, the paper considers the most promising areas for future development policy exploration.

The Expert Paper series aims at providing access to government officials, the research community, non-governmental organizations, international organizations and the general public to overviews by experts on key demographic issues. The papers included in the series will mainly be those presented at Expert Group Meetings organized by the Population Division on the different areas of its competence, including fertility, mortality, migration, urbanization and population distribution, population estimates and projections, population and development, and population policy.

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A. INTRODUCTION

This paper discusses arguments and evidence on the promise of incentives as a development tool for increasing the use of health care services and improving health outcomes. Incentives have been a controversial tool, but prominent initiatives in recent years have increased interest in understanding the circumstances under which they may be efficacious, as well as how they may best be employed in a cost-effective manner. The accumulated knowledge base is larger in high-income countries than in less developed settings, with much that is still poorly understood, but it is a highly active area of current research.

The following section of the paper discusses central arguments in favor of incentive-based policies, as well as general concerns about the use of incentives. It elaborates the various pathways through which incentives operate and informs appropriate incentive design. A distinction is made between smaller time-delimited incentives versus larger repeated incentives embedded in social protection programmes such as Mexico's well-known Oportunidades conditional cash transfer programme. Smaller, more frequent incentives may better capitalize on benefits from the psychological pathways described, whereas the longer repeated incentives may yield health benefits, not only through the usual incentive channels, but also through poverty alleviation.

The paper then summarizes evidence on the way incentive efforts have been used in various domains. Examples of efforts to incentivize health care utilization have included maternal and child health care such as family planning, prenatal care, facility-based childbirth, and well child care, including vaccination. Other domains for adult health care incentives have been screening such as HIV testing, and medication adherence such as for tuberculosis. The increasing burden of chronic disease also raises the prospect of using incentives for chronic disease prevention by rewarding non-medical health behaviours such as smoking cessation. Finally, in domains for which risky behaviours cannot be directly observed, there have been efforts to reward specific health outcomes, such as avoidance of sexually transmitted infections. The final section of the paper considers the most promising areas for future development policy exploration.

B. WHY INCENTIVES? ARGUMENTS PRO AND CON

1. *Incentives as a version of price subsidies*

Subsidies have been a staple of efforts to increase use of effective health services in countries worldwide. Traditionally these have taken the form of price subsidies that reduce user fees below cost, or infrastructure subsidies that expand the geographic availability of services thereby improving access and lowering the "time price" to users. Yet supply-side subsidies have often proven difficult to administer. Subsidized health care services are frequently unavailable to the most vulnerable populations, but the quality of care they provide is often sub-standard. Promising efforts are now being made to target subsidies through free voucher schemes and to improve provider incentives for quality care through performance-based financing that rewards providers for targeted activities such as vaccinations, both of which are beyond the scope of this paper.

Even where official prices for quality care are reduced to zero, substantial economic barriers to utilization still remain, including the informal payments sometimes demanded by providers, out-of-pocket travel costs to health care facilities, and the "opportunity cost" of time spent travelling and waiting in long queues. These barriers are compounded by credit constraints, and a lack of future-orientation that is frequently observed in settings characterized by poverty and daily uncertainty and leads people to put off seeking health care. To combat these barriers there has been increasing research and policy experimentation around using positive incentives to reduce user prices below zero: in other words, paying people to utilize targeted health services or to engage in health-enhancing behaviours more generally. This

paper reviews several different forms of positive incentives, including conditional cash transfers that make payments contingent on pre-specified activities such as receiving a certain number of antenatal visits (in contrast to unconditional cash transfers that make no requirements of cash recipients) and non-monetary incentives that include in-kind gifts such as food handouts during immunization campaigns.

Viewed relative to supply-side investments, positive incentives (hereafter, referred to simply as incentives) can be understood as an extreme along a continuum of price subsidies. Given their cost, incentives may be viewed as unaffordable in already over-stretched health care systems, but when designed and administered well for a given setting incentive policies may lower costs and be more cost-effective overall relative to traditional supply-side subsidies. Whether incentives are more cost-effective than supply-side subsidies is a setting-specific empirical question that requires careful assessment of both costs and relative effectiveness. Examples of such an analysis are few. The costs and effectiveness of incentives are especially difficult to assess when the incentives are embedded within conditional cash transfer programmes because the additional administrative costs needed to verify conditionality must be considered. The challenge of verification is related to the potential of incentive-based programmes to exacerbate corruption temptations, which is a concern for any subsidy delivery mechanism, and depends on the nature of systems for monitoring the programme employees and middlemen who disburse the payments.

2. Ethical considerations

All interventions aimed at changing behaviour raise concern about the potential for coercion, i.e. the potential to undermine personal freedom of choice by leading individuals to feel compelled to participate or to ignore risks. Positive incentives have been a particular target of concern, in part because poor, credit-constrained individuals may be particularly susceptible to the “income effect” from the incentives. While the ethical considerations involved are highly nuanced and a full discussion is beyond the scope of this paper, the general concerns are described briefly. A recent ethics working group (London et al., 2012) stated that, “We propose that concerns around the potential for incentives to undermine recipient autonomy are misplaced when incentives are used to overcome economic obstacles or a lack of effective motivation, and when recipients are incentivized to engage in health-related behaviours or practices with which they are already familiar and which they regard as beneficial or worthwhile.” It is a significant challenge to ensure that incentivized individuals have the autonomy to choose whether to engage in the targeted behaviour (for example without a family member preventing them), and that they also have access to the necessary tools, including sufficient availability of the relevant health care services. Gopichandran and Chetlapalli (2012), for example, argued that one high-profile programme incentivizing facility-based childbirth may have been unethical due to uneven access to services, among other considerations. Similar ethical debates surround many other applications of incentives. Supporters of incentive programmes often respond that it would be unethical to ignore the potential for incentives as a tool to decrease mortality and increase well-being, if incentives are substantially more effective than alternatives.

3. Psychological considerations

While traditional economic frameworks suggest that people respond similarly to subsidies and incentives, psychological frameworks suggest that people may well perceive and respond to them differently. The recent surge in research in “behavioural economics,” which lies at the intersection of psychology and economics, has fostered a better understanding of the various pathways through which incentives may operate. Several such pathways are discussed below, including small incentive nudges, along with discussion of how understanding these pathways may inform better incentive design. We do not discuss in depth the interaction of monetary incentives and social preferences such as trust, altruism, and reciprocity; for a review, see Fehr and Falk (2002) and Bowles and Polania-Reyes (2012).

The first pathway through which incentives are understood to operate is by increasing the individual's "extrinsic" motivation—that is, one's motivation to engage in an activity in order to earn a reward or avoid a punishment. Perhaps the most widely discussed concern about the efficacy and sustainability of incentives has been that "extrinsic" motivations (such as monetary incentives) may crowd out "intrinsic" motivation (Deci et al., 1999). In other words, individuals might lose interest in a task if they had previously been paid to complete the same or a similar task. This crowd-out of intrinsic motivation could lead incentive-based approaches to be not only ineffectual as the desired behaviours are not maintained after the incentives are removed, but even counterproductive. For example, it has been hypothesized that short-term incentives could lead to a form of reference dependence in which people come to expect continued incentives, and could become unwilling to engage in a desired behaviour or pay for a health service once the incentives end (Simonson and Tversky, 1992). While there have been examples of crowd-out in laboratory experiments and of reference dependence in certain settings (Simonsohn and Loewenstein, 2006), the field evidence is lacking (Cameron et al., 2001), and some such as Fehr and Falk (2002) have questioned the relevance and strength of the evidence base for real-world economic applications. Indeed, the research community has been developing a more nuanced picture beyond this simplistic intrinsic-extrinsic dichotomy. If people engage in some healthy behaviours out of fear for negative health outcomes, then this fear motivation is less likely to be affected by extrinsic incentives. More generally, in many situations intrinsic and extrinsic motivations are not zero-sum: extrinsic motivations may even help activate intrinsic motivation, and can lead to the formation of good health habits. For example, Charness and Gneezy (2012) find that payments for gym attendance led participants to continue attending the gym even after the payments were removed. Incentives also may help individuals to learn about and experiment with a task, which can boost long-run adoption of the task. Dupas (2013) finds that short-term subsidies for anti-malarial bednets makes the recipients more willing to pay for unsubsidized bednets in the future, in contrast to what would be expected if recipients had experienced reference dependence.

A second pathway through which incentives are understood to operate is by overcoming individuals' tendencies to favour the present over future benefits. Substantial evidence suggests that individuals have a bias for the present, in effect overweighting the value of immediate costs and benefits relative to future costs and benefits. Economic incentives may be able to counter this urge toward immediate gratification. For example, incentivizing smoking cessation may help to offset the potential immediate pleasure that a person derives from smoking. Many of the benefits of smoking cessation are not realized until far in the future, and the incentives are designed to bring forward those benefits into the present. Some researchers have designed incentive packages explicitly to make incentives felt in the present, such as efforts to deliver small, frequent payments for salutary behaviours. For example, Volpp and colleagues (2008a) offered daily incentives to participants who met a daily weight loss goal.

A third set of pathways involve countering feelings of regret, loss aversion, and the tendency for individuals to overestimate small probabilities, per prospect theory (Kahneman and Tversky, 1979). Some researchers have implemented so-called combination lotteries that use two independent lotteries, one with a low probability of a large reward and the other with a high probability of a small reward (Volpp et al., 2008a, 2008b). The systematic overweighting of small probabilities may make a combination lottery more effective than a more conventional lottery with the same expected value. Prospect theory also specifies that individuals tend to avoid potential losses more than they tend to be attracted to potential gains, a concept known as loss aversion. Volpp and colleagues (2008b) entered participants into a daily lottery but only paid out if the winner remained adherent to warfarin, an anticoagulant drug that prevents blood clots. In an effort to mobilize regret from a missed payoff, the investigators notified all non-adherent winners of the amount that they would have won had they been adherent, and non-adherence decreased substantially. Subsequent work showed that the effect is concentrated among patients outside of the therapeutic range at enrolment (Kimmel et al., 2012); overall the empirical literature on activating regret in this way is still limited.

Fourth, there is evidence that even small incentive nudges may be effective by signalling to individuals the importance of the task in the eyes of the designer of the incentives and thus encouraging them to modify their behaviour. A physician who recommends a certain course of treatment makes her preferences known to the patient, and likewise, a government that subsidizes the same treatment sends a signal. However, such contextual inference may also lead a person to surmise from the presence of a reward that an unfamiliar task is not enjoyable, and thus to forgo the task; this represents another potential pathway for crowd-out of intrinsic motivation (Bénabou and Tirole, 2003). Thus, the process of extracting signals from incentives in the environment may have difficult-to-predict outcomes that depend on each person's beliefs and interpretation of the signals; again the empirical evidence on such pathways though is not well developed.

With all of the above pathways, a prerequisite for a nudge to take hold is that the signal—the incentive—needs to be visible to the individual. In such cases, the incentivized task gains a temporary outsized salience as the person contemplates how to earn the incentives. The chance to receive a reward for immunization, for example, may draw a person's attention to planning for the event, which is important given the many demands for the person's daily attention, and commonly observed procrastination. Relatedly, even small incentives may be effective if they provide an alternative frame for justifying healthy behaviours to oneself or friends, such as an alternative reason for taking an HIV test rather than admitting potential risk. These types of small nudges may lose their salience over time, however, and may be best suited to one-time or short-term behavioural changes.

A further contribution from psychology derives from better understanding physiological pathways underlying behaviour. Critical and sensitive periods may exist in which behaviour changes can have more lasting effects, and brain research suggests that adolescents may be especially vulnerable to the adoption of risky health behaviours as well as to longer-run shaping of healthy behaviour patterns. Slow brain development, especially in the limbic system, leads to reduced cognitive control and increased sensitivity to rewards (Richards et al., 2012). Incentives activate those same systems and thus can be used effectively to leverage these enhanced sensitivities for health promotion purposes. This line of research promises further insights in the coming years.

C. DESIGN FEATURES TO ENHANCE INCENTIVE EFFECTIVENESS

The details of how an incentive is designed and delivered may have substantial impacts on incentive effectiveness. Different designs can activate different psychological pathways that moderate or intensify the effects of the incentives. The below discussion focuses on several dimensions of potential importance: the size of the incentives, the delivery schedule, the certainty of reward, the unit incentivized (person, family member, or group), and the targeted population. The research literature on these design features is in a nascent phase, and much is drawn from high-income countries; there is relatively little generalizable knowledge about the circumstances in which certain features are preferred. Often, theoretical arguments are offered in lieu of empirical evidence. Due to the scarcity of research, this discussion is limited to a brief introduction of the issues that relate to each dimension.

All else equal, bigger incentives tend to be more powerful motivators. However, empirical research from behavioural economics concludes that people often discount future payoffs too heavily, ignore decisions that do not rise to the top of the mind, and use heuristics instead of decision rules, among other cognitive shortcuts (DellaVigna, 2009). Thus factors such as timing and salience of incentives may sometimes overwhelm the importance of the size of the incentive. Nevertheless, a larger incentive will always be at least as salient as a smaller incentive and often more so, *ceteris paribus*.

Individuals may be highly sensitive to small, immediate rewards. If a person is indifferent between completing and not completing a health-related task, even a small incentive may be sufficient to motivate a person. For example, Thornton (2008) demonstrated that monetary rewards as small as \$0.10 to \$0.20 increased the willingness of individuals in rural Malawi to accept HIV testing by 43 percentage points. Higgins et al. (1991) was the first to test an escalating reward schedule that paid in increasing increments over time to ward off participant fatigue from setting in. This approach has been repeated in a number of studies that reward abstinence from substance use, similar to Higgins and colleague's (1991) original application of the design to cocaine use.

Another relevant dimension for any incentive-based programme is the schedule of delivery. Behavioural economists such as Loewenstein et al. (2013) have argued that small and frequent payments for good health behaviour can be more effective than programmes with large, lump-sum incentives that are less visible. For example, less salient benefits would include those added to an existing payment, as opposed to a separate additional payment, even if the total amount is held constant. Frequent incentives take advantage of individuals' psychological bias toward immediate rewards while at the same time serving as a counterweight for the lure of immediate gratification from unhealthy behaviours.

Some researchers have experimented with lottery-based incentives. For example, Volpp et al. (2008b) tested an intervention in which participants were eligible for a daily lottery if they met a weight loss goal. A key advantage of lotteries as contingent incentives is their potential cost-effectiveness. The lotteries also make use of people's tendency to over-estimate the probability of rare outcomes and desire to avoid regret (loss aversion) (Kahneman and Tversky, 1979). Head-to-head research on lottery versus other designs is rare though, with apparently conflicting results. Halpern et al. (2011) found that unconditional fixed incentives for clinicians' response to surveys were superior to low-probability and high-probability lotteries. However, Haisley et al. (2012) found that a lottery, the entry to which was conditional on four to eight team members completing a task, was about one-third more effective at promoting personal health risk assessments than were grocery gift certificates and no additional incentives. Petry et al. (2007) found that lotteries were more effective than a fixed-value reward of equal expected value. More research is needed to understand the conditions under which these different incentive schemes are effective.

Another important design feature is the unit targeted by the incentives. The majority of incentives aim to influence individual behaviour. However, others explicitly recognize the social context in which individuals operate by simultaneously targeting the behaviour of multiple household members. Conditional cash transfer programmes are the most common of this variety, often making incentives contingent on the behaviour of all children within a household and sometimes of the parents as well. A newer, less tested approach awards incentives to groups or teams of individuals in an effort to marshal social support and social pressure. The evidence to date indicates that group incentive schemes are a promising approach for promoting smoking cessation (White et al., 2013), physical activity (Babcock et al., 2011), and weight loss (Jeffery et al., 1983), and may be applicable to other health behaviours. A similar unit-level decision is who receives the incentive payment: in some cases providing the payment to mothers or teens may have different effects from payments to fathers (Thomas, 1991; Thomas, 1994).

A further consideration is the population that an incentive-based programme targets. The expansion of conditional cash transfer programmes in Latin America was motivated by a desire to reduce health inequities through the redistribution of resources. The programmes tended to target lower-income households as a way to maximize impact. As similar programmes have spread to countries in Asia and Africa, they have tended to be available to the general population. In part, Governments wish to avoid the potentially large costs of developing and maintaining a targeting mechanism (Ranganathan and Lagarde, 2012). This shift in emphasis toward stimulating population demand for health interventions and away from reducing health inequities gives second-generation programmes a distinctly different flavor from their progenitors.

D. HEALTH AND HEALTH CARE DOMAINS IN WHICH INCENTIVES HAVE BEEN USED

This section reviews the use of incentives across a variety of health and health care domains. As a whole, incentives have been used in a wide variety of contexts. In many of these domains there have been only a few studies though, most of these have been observational with imperfect statistical controls, and failed to fully distinguish incentive effects from other aspects of the interventions. In some domains the accumulated evidence is drawn primarily from high-income countries, with unknown generalizability to developing countries. In other domains the discussion highlights a single major efficacy study, but without confirmatory studies or longer-term effectiveness evaluations from scaled-up implementations.

The discussion divides programmes into three categories based on the target of the incentives: health care-seeking behaviour, non-medical health behaviours, and health outcomes. The first two targets are directed toward the behavioural processes that contribute to a person's health status. The latter target is directed toward aspects of a person's health status itself. Incentives for medical and non-medical behaviours differ in certain important ways from incentives for health outcomes. First, whereas the former categories of incentives seek to directly modify targeted health behaviours, incentives for health outcomes operate more indirectly, leaving it to the discretion of the potential recipient to decide which behaviours to change and how. Second, a major distinction lies in the extent to which the target is under the individual's control. Health care utilization and non-medical health behaviours are more plausibly under an individual's control (assuming supply-side service availability, and reasonable prices relative to income) whereas health outcomes are far less so. A person's genetic make-up, environmental conditions, culture, and economic constraints interact with a person's behaviours to produce a relationship in which a person's health-related behaviours only imperfectly shape subsequent health outcomes. The trade-offs among these types of incentives are further discussed below.

There is also a distinction between incentives employed in stand-alone programmes versus larger incentives embedded in conditional cash transfer programmes. The first part of this section addresses primarily the former, while the last part addresses findings specifically from conditional cash transfer incentives.

1. Incentivizing Health Care Utilization

Due to the major policy focus on maternal and child health services in developing countries, it is not surprising that incentives have been explored in a wide range of related health care areas including family planning, prenatal care, facility-based childbirth, and well child care such as vaccinations, among others. In addition to incentives directed at increasing utilization of those services, this review discusses incentives for health screening such as HIV testing, as well as for the growing emphasis on chronic disease maintenance efforts such as medication adherence.

Family planning

There is a long history of Governments using incentives related to family planning. Heil et al. (2012) recently reviewed the published literature evaluating such efforts, and found that while it is suggestive of substantial impacts, the available studies are primarily observational rather than randomized, generally lack strong statistical analysis, and suffer from possible self-reporting bias concerns. Furthermore, one set of efforts involved incentives for sterilization, which is fraught with ethical problems, and these controversial efforts may have contributed to widespread aversion to the idea of incentives. Somewhat less controversial efforts have included incentives for attending family planning education sessions, continuation of reversible contraceptives, and incentives for altered family size. The last of these has been employed as well by countries attempting to increase low fertility rates, but such efforts have not been systematically evaluated.

Facility-based childbirth

A persistent maternal-infant health concern has been the low share of pregnant women in many poor settings who give birth in health facilities. Lim et al. (2010) reported on a large, national programme in India (Janani Suraksha Yojana, or JSY) offering women \$15-\$30 cash incentives for facility-based deliveries. They found that the programme increased the proportion of in-facility births by over 40 percentage points, with significant accompanying reductions in perinatal and neonatal mortality (the study lacked power to assess maternal mortality). Nevertheless, the programme has been controversial. In many areas of the country the health facilities were unprepared to provide increased capacity or quality of care was low, thus undermining the programme, and uneven implementation resulted in lower take-up among the lowest educated women. Gopichandran and Chetlapalli (2012) argued that these and other problems combined to make the intervention unethical. Amudhan et al. (2013) found in a separate analysis that supply-side service expansions were of limited effect on their own, and that combining supply-side expansions with demand-side incentives yielded the largest increases in facility-based deliveries. The overall determination of whether the JSY programme was cost-effective and a better use of resources than alternatives will be quite complex, but evidence does suggest that this type of incentive is effective. A related study by Powell-Jackson and Hanson (2010) observed a somewhat smaller increase in facility deliveries from a similar programme in Nepal; the authors attributed the relatively smaller magnitude of the treatment effects to challenges in implementing the programme (Powell-Jackson et al., 2009), which is a common and often formidable challenge to such programmes. Nguyen et al. (2012) found that institutional deliveries in affected areas of Bangladesh increased 10-20 percentage points after the introduction of free delivery and transportation vouchers for women and provider incentives.

Prenatal care

The above-mentioned JSY programme incentivizing institutional delivery in India was also found to increase prenatal care, but by a much smaller amount – and it is unclear whether this was due to the delivery incentive or separate provider incentives that were part of the programme. Some have proposed amending the JSY programme to explicitly incentivize prenatal care attendance—but the evidence in support of the proposal is difficult to extrapolate. Again there are scattered studies that provide mixed evidence. Morris et al. (2004) estimated that a conditional cash transfer incentive in Honduras significantly increased prenatal care; in contrast, Barber and Gertler (2008) found no impact of Mexico's Oportunidades conditional cash transfer programme on prenatal care, but this was largely because of very high baseline rates. In another intriguing study, Dupas (2005) found that distributing free bed nets at prenatal clinics in Kenya substantially increased take-up of prenatal services. Thus the evidence reinforces that services such as prenatal care can be responsive to incentives, but the nature of recommended interventions will depend crucially on local circumstances.

Vaccination

Much of the recent evidence on incentives for vaccination comes from conditional cash transfer programmes, discussed further below. But another common tactic has been stand-alone incentives in vaccination programmes, such as free food to parents who bring their children for vaccination. These incentives are particularly attractive for hard-to-reach populations, such as in hotspots in the polio eradication effort. But as with many other uses of incentives, they have rarely been systematically evaluated, much less using randomized methods. One exception is the recent Banerjee, et al. (2010) study of a randomized controlled trial in India, in which villages were randomized to receive either an immunization camp, a camp combined with small food incentives, or neither. After 18 months, child immunization rates were 18 per cent with camps versus 6 per cent in controls, but 39 per cent when food incentives were added. The value of the incentive was designed to be roughly equivalent to the opportunity cost of the mother's time. Relatively unique among such studies, the authors also conducted a cost-

effectiveness analysis and argued that the camps with food incentives had lower costs per immunized child than the camps alone, and that the intervention was cost-effective overall.

Disease screening

One-time screening behaviours are a potentially promising target for incentives, as procrastination is a common barrier to such screenings. An example of this is HIV screening. Thornton (2008) found that in a Malawi HIV screening intervention only 34 per cent of those without an incentive picked-up their HIV test result, but even small incentives on the order of an hour's wages resulted in roughly doubling of the percentage picking up their test results. This example is not directly generalizable to many HIV screening interventions that currently use rapid tests, but the result is nevertheless striking and suggestive of results that could be obtained for other related types of services. For example, Montoy et al. (2013) show in an unpublished working paper that incentives as small as \$10 increased HIV screening rates at a U.S. hospital by 15 percentage points from a 52 per cent base.

Medication adherence

Medication adherence has been frequently suggested as a promising target for incentive use, and there are many examples of programmes harnessing them. Most of the published studies evaluating such efforts have been conducted in high-income countries, with much less systematic evidence gathered from developing countries. Furthermore, much of the literature is based on observational designs, is frequently unable to distinguish the effects of patient incentives from accompanying supply-side efforts, and many studies were conducted among high-risk subpopulations that make generalization difficult. Galárraga et al. (2013) reviews HIV treatment adherence; Lutge et al. (2012) and Beith et al. (2009) both review tuberculosis treatment adherence; and DeFulio and Silverman (2012) and Petry (2012) review the literature across multiple types of medications, with the latter providing a formal meta-analysis. Overall the evidence indicates that indeed such incentives can be effective, but there is fade-out of the effects after removal of the incentives.

2. Incentivizing non-medical health behaviours

Monetary incentives have been used extensively to modify non-medical health behaviours. Researchers began to adopt the approach, one of the first applications of incentives in the health domain, as early as the 1960s. Many behavioural researchers call these incentives contingency management, which is the term used for substance abuse treatment that employs cash incentives to promote drug abstinence. Since the development of contingency management, the thrust of the literature has been on rewarding abstinence from use of addictive substances, including tobacco, although the techniques have been applied to a range of other behaviours. This section discusses the use of incentives for deterring substance use, abstaining from smoking, and promoting physical activity. Although this research is drawn largely from the United States, it is relevant to global health considerations as increasing chronic disease burdens in developing countries will make similar approaches more attractive in coming decades.

A meta-analysis of contingency management programmes for substance use disorders found that they raised compliance 32 per cent on average (Lussier et al., 2006). Studies have also shown a positive effect of incentives an attendance of treatment sessions at a clinic. Most of the included studies focused on patients who were dependent on cocaine or opiates. Whereas pharmacological and psychosocial interventions have often failed to alter the cocaine consumption of users, financial incentives have proven a viable promoter of abstinence. The positive effects have also been found in the handful of studies that have looked at carryover effects after discontinuation of the incentives (Higgins et al., 1993, 2000; Silverman et al., 1996). The effect sizes were larger for studies that offered vouchers of greater monetary value.

Smokers' responsiveness to personal cash incentives for quitting has yielded mixed results. A meta-analysis indicates that contingency management has been more effective for treating opiate and cocaine use than tobacco use (Prendergast et al., 2006). A systematic review on competitions and cash incentives for smoking cessation concludes that, although incentives raise quit rates in the short term, they do not tend to translate into long-run abstinence (Cahill and Perera, 2011). Troxel and Volpp (2012), however, reanalyze the data from Cahill and Perera's (2011) systematic review. Their main finding is that most studies are under-powered to detect small to moderate treatment effects. Many studies included in the systematic review also suffer from high attrition rates, as high as 40-50 per cent in some cases. These limitations imply that the weak empirical designs of published studies do not yet allow researchers to reliably infer the impact of monetary incentives on smoking cessation – a sobering conclusion given the substantial research effort in this area.

Some studies from the cash-for-quit literature have shown positive results. Volpp et al. (2006) found that modest financial bonuses did not lead to lasting quits, whereas Volpp et al. (2009) found that larger financial bonuses (\$250 for six-month test passage, \$400 for 12-month test passage) offered through a workplace programme in the United States increased both short-term cessation and lasting quits. Another area of success has been incentive-based programmes for pregnant and newly postpartum women who smoke. Higgins et al. (2012) conducted a review that indicated the intervention increased fetal growth, birth weight, and breastfeeding duration.

Physical activity is another domain in which monetary incentives have been tested in high-income countries. Mitchell et al. (2013) conducted a systematic review and meta-analysis of the effect of monetary incentives on exercise adherence. In the 11 randomized controlled trials identified by the authors, eight found a significant increase in exercise associated with the incentive and the pooled results were also positive. However, only one of the studies lasted for more than one year (Jeffery et al., 1998). Larger incentives yielded larger effects. The largest gap in the literature is the post-intervention effect of the incentives. Charness and Gneezy (2012) produced the only available evidence on physical activity after the incentives ended; they found that an increase in gym attendance persisted for 5 weeks in one trial and 16 weeks in another. In an unpublished working paper, however, Acland and Levy (2013) replicated the study by Charness and Gneezy (2012) and found that the post-intervention effect tapered over time.

3. Incentivizing health outcomes

Health outcomes represent a relatively unexplored frontier in the incentivizing health landscape. Some of the earliest studies dating back to the 1970s used incentives for weight loss, although very little research on incentives for health outcomes was conducted in the subsequent two decades. Recently there has been a renewal of interest, although the inherent multi-factorial nature of health outcome determination makes it more challenging than providing incentives for discrete, modifiable behaviours that are more plausibly under the control of the incentivized individuals. Below is an overview of research on outcome incentives for weight loss, other chronic disease biomarkers, and sexually transmitted infections.

As obesity rates have climbed in recent decades, some researchers have turned to incentives for promoting weight loss. A series of early studies by Robert Jeffery and colleagues (e.g., Jeffery et al., 1978, 1984) tested various types of deposit contracts or commitment contracts, in which individuals made a deposit that they kept only if they met a pre-specified weight loss target. Jeffery et al. (1993) provided \$25 per week for cumulative weight loss along with behavioural therapy. The incentives had no impact on short-term or long-term weight loss relative to therapy alone. A resurgence of research began with Finkelstein et al. (2007). The authors presented evidence of modest weight loss at three months but no difference at six months for financial rewards ranging from \$7 to \$14 per percentage point of weight reduction. Volpp et al. (2008a) tested an intervention in which participants were eligible for a daily lottery if they met a weight loss goal. The lottery group lost 13 more pounds than the control group at the end of

the 16-week intervention, which persisted to 9 pounds at seven months. However, the advantage disappeared by 32 weeks (John et al., 2011). Cawley and Price (2013) compared a cash bonus to commitment contracts for weight loss in 24 worksites and found that the bonus led to high attrition, whereas the contracts limited take-up but promoted greater weight loss. However, the complicated reward structure, which varied by worksite and was not randomly assigned, did not allow for a clean comparison.

Several employers have experimented with workplace wellness programmes that provide rewards to employees who show improvements on health outcome measures. For example, the Safeway grocery store chain in the United States offers up to \$800 in rebates on an individual's health insurance premiums (up to \$1,600 for families) in exchange for improvements in biomarkers such as blood pressure, fasting glucose, cholesterol, body mass index, and tobacco use. A growing number of employers have implemented such programmes on the promise that they can slow medical cost inflation for the firm and increase worker productivity. Despite some hints that wellness programmes can save money for employers (Baicker et al., 2010), little rigorous research has tested the proposition.

A very different domain in which incentives for health outcomes have been recently tested is the controversial area of sexually transmitted infections, a domain in which the inability to verify risky behaviours makes it impossible to incentivize reducing those behaviours. In settings of high HIV risk progress has been made in slowing the AIDS epidemic, but many such as Padian et al. (2011) are calling for new and expanded prevention efforts. In this context, several recent studies have tested the potential for incentives that reward negative tests for sexually transmitted infections as a marker for risky sexual behaviour. de Walque et al. (2012b) discussed this approach in more detail, but to date only a handful of early studies are available. Kohler and Thornton (2012) tested incentives for HIV-negative individuals in Malawi to stay negative for a 1-year period, finding no significant effect, but the study was not well-powered to examine HIV incidence. de Walque et al. (2012a) reported on a randomized trial in rural Tanzania that followed up every 4 months with incentive rewards for individuals who remained negative on tests for a range of curable sexually transmitted infections. That study found that after 1 year, \$20 incentives every 4-months led to a 27 per cent reduction in infections relative to a control group that received all aspects of the intervention other than the incentive payments. Galárraga et al. (2013) found that at-risk populations in Mexico City such as men who have sex with men, including male sex workers, stated that they were willing to accept money to reduce risks for HIV and other sexually transmitted infections. Similar ongoing trials in other settings are expected to publish further results soon. This area of investigation is quite early still though, as these are largely efficacy trials designed to test whether sexual health outcomes respond to incentives, and no study has yet tested a variant designed to be sustainable for scale-up in low-income settings. As with related conditional cash transfer programmes discussed below, however, even if found to be effective, the sustainability of programmes to incentivize better sexual health may depend critically on the extent to which programme funders consider the incentive payments to be stand-alone efforts to improve health in targeted high-risk populations, or instead as part of larger social welfare cash assistance programmes.

4. Conditional cash transfer programmes

Since the implementation of Mexico's Progresa programme beginning in 1998, a number of governments—mostly in Latin America—have adopted conditional cash transfer (CCT) programmes that have multiple objectives, including both poverty alleviation and building human capital in key areas such as health. Often multi-sectoral in nature, these programmes have commonly included health care conditionality incentives, so that in order to receive recurring cash payments the individuals must have documentation of targeted health care use such as prenatal care, vaccination, and other well child care. Much has been written on the success of these programmes, including reviews by Lagarde et al. (2007), Parker et al. (2008), and Fiszbein and Schady (2009). One of the most recent is a systematic review by Ranganathan and Lagarde (2012), who reviewed the findings from quasi-experimental or experimental

evaluations of 13 different CCT programmes; key findings from this review are summarized below. Despite large contextual differences across programme designs and study settings, CCT programmes have generally been found to be acceptable, scalable, and effective in significantly improving several health-related behaviours and outcomes.

Ten studies have documented the impact of CCTs on the utilization of health services, such as the number of prenatal visits by pregnant women, well-child visits, and use of preventive health services. Uptake of prenatal visits was found to increase significantly in Honduras (Morris et al., 2004) and in India where the incentives were not conditioned on clinic visits (Lim et al., 2010). In Chile, where participating households received an unconditional cash transfer and advice from a social worker, Galasso (2011) reported no change in the share that received regular prenatal visits.

The evidence for preventive health visits among children in participating families is somewhat conflicting. There were no programme effects on well-child visits in Mexico and Honduras but positive effects in Colombia, in Chile (among infants but not other ages), and in Nicaragua. A mixed picture emerged for a programme-related bump in immunization coverage in Colombia, Honduras, Mexico, and Nicaragua. Certain populations of children benefited from increased coverage of certain vaccine types in each country.

One of the biggest successes of the CCT programmes was the observed increase in height-for-age and decrease in stunting of children in participating households. Height-for-age is one of the best physiological measures of a child's health, nutrition, and development and highly predictive of later-life health. A positive impact on height occurred in Brazil, Colombia, Mexico, and Nicaragua.

A key factor underlying the growth of CCT programmes is their potential as a means for poverty alleviation. This could then potentially lead to even larger health and human development benefits in the future generation, i.e. the future children of better educated mothers, but it is too soon for systematic empirical evidence to evaluate such outcomes. Another attraction of CCT programmes has been the potential for reduction of health inequities. Gopalan and colleagues (2014) review the literature and find that the programmes often reach vulnerable populations, although in some cases the programmes fail to reach the neediest households. Identifying poor households and targeting incentives to them is essential for maximizing social impact, but it is an enduring challenge for many CCT programmes.

Recently, a small literature evaluating unconditional cash transfer (UCT) programmes has developed. UCTs differ from CCTs in that the former operate only via income increases, with no use of incentives—the targeted units receive the cash support with no monitoring of health care utilization, etc. Thus comparing UCT to CCT programmes provides a way to test the effects of specific incentives separate from income effects, the latter of which may increase utilization of health care and improve health outcomes through a variety of non-price channels. UCTs are also administratively cheaper, but in the absence of incentives, they may have lower effectiveness in increasing health and health care. Baird et al. (2010, 2012) found that a CCT programme for schooling in Malawi, with only schooling but not health-related incentive conditionality, nevertheless had important spillover effects on health, reducing the prevalence of teen pregnancy and HIV and herpes simplex infections in adolescent female recipients. The authors further compared the schooling effects to a UCT and found that the reduction in teenage pregnancy was due entirely to the impact of the UCT (Baird et al., 2011). In a different setting, Akresh et al. (2012) implemented a two-year programme that randomly distributed transfers to parents that were either unconditional or conditional on routine health visits for infants. The CCT significantly increased the number of visits compared to the control group, whereas the UCT had no effect. Robertson et al. (2013) followed a similar design in Zimbabwe, with the CCT conditioned on several child wellbeing measures, including vaccination, but found no effects on significant effect on vaccinations in either the UCT or CCT group, though the share of children who received birth certificates was highest in the UCT group. Despite

the mixed evidence that shows no CCT advantage over UCTs in some cases, theory suggests that UCT effects on health behaviours may fade-out, as the novelty of the additional UCT income wears off and gets redirected to other less salutary household expenditures more quickly than with CCTs. Nevertheless, these disparate findings on UCT versus CCT programmes reinforce the fact that much is still to be learned about the effects of incentive.

E. DISCUSSION

Incentive approaches to health promotion have been eschewed by many people in debates over promising directions for population and development policies to improve health care utilization and health outcomes. This is often for good reason: incentives will rarely be the first-line policy approach, particularly in settings in which health knowledge is low and the supply of health services is inadequate. Yet some commentators appear to categorically reject the notion of incentives without careful comparison to traditional supply-side subsidies, without deep consideration of the competing ethical imperatives, and without knowledge of the accumulating economic and psychological evidence on their effectiveness. To be sure, some thoughtful and well-informed participants in such debates will continue to reject incentives for a variety of reasons. Yet the overall body of evidence reviewed above, despite its many limitations, conveys sufficient promise so as to suggest an obligation to continue formative research, policy experimentation, and rigorous evaluation of potentially cost-effective incentive-based approaches.

Among incentive approaches, conditional cash transfer programmes have been embraced most widely to date. It is perhaps not a coincidence that the first prominent such programme, Mexico's Progresa, was developed by Mexican policy innovators rather than imposed from outside. The development community has a critical role in conducting evaluations of such programmes, objectively assessing the promise and limitations, and working with local policy-makers to refine their potential ideas for local adaptation of incentive programmes. The wisdom of incentivizing specific domains in any given population, and the detailed design decisions, will depend critically on local considerations. Effectiveness of incentives will depend on many parameters including current prices (fees, time and travel costs), incomes, disease prevalence, health service utilization, knowledge, attitudes, acceptability, administrative capacity, etc. Also crucial for the design of conditional cash transfer programmes is the decision of which health domains to incentivize: limited administrative capacity as well as the incentivized individuals' limited attention both suggest the importance of focusing incentives on a narrow set of highly salient behaviours that reflect major national health priorities. Although none of the potential domains for incentives that were reviewed above are supported by a large body of unequivocally positive results, for many of them there is at least one setting in which a design has been adapted and found to be efficacious or effective.

When considering types of domains, those that incentivize health outcomes have the smallest accumulated evidence base, and policy experimentation is likely to proceed slowly while awaiting a more robust body of knowledge from formative and efficacy studies.

Those domains that reward non-medical health behaviours have been studied in more detail in high-income settings, with few studies in developing countries. Yet growing chronic disease prevalence in developing countries will lead to increased attention to chronic disease prevention strategies in developing countries. Incentivizing health behaviours related to obesity, however, has not yet shown great promise. Substance abuse interventions such as contingency management may have generalizable promise for middle-income countries, and potentially low-income settings as well, though further work on potential cost-effectiveness will be needed. The demand for smoking cessation interventions in developing countries is likely to increase substantially in coming decades as well, and innovative approaches to harnessing incentives to increase their effectiveness holds great promise. As female smoking rates increase, incentives targeted at smoking cessation among pregnant women may become increasingly attractive to explore.

Finally, all of the discussed examples of incentivizing health care utilization hold promise for policy exploration in relevant settings. Maternal and child morbidity and mortality have improved dramatically in many developing countries in recent decades, but there is great scope for further increasing uptake of known effective interventions. Combining health education and health service supply expansions along with demand-side incentives creates potentially powerful synergies. These will require considerable administrative capacity, but mobile and digital technologies that are rapidly diffusing to even the lowest income settings may help reduce some of the administrative barriers. The increasing trend toward rigorous impact evaluation of policy experimentation will also help accelerate the ability to learn from successes and failures, so as to generate a much stronger evidence base to inform increasing development policy experimentation with incentives for health care utilization over the coming decades.

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