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Centre for International Development Issues Nijmegen

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# Do People Invest in Local Public Goods with Long-Term Benefits

## Experimental Evidence from a Shanty Town in Peru<sup>1</sup>

Thomas de Hoop<sup>1</sup>, Luuk van Kempen<sup>1</sup> and Ricardo Fort<sup>2</sup>

<sup>1</sup> Centre for International Development Issues Nijmegen (CIDIN),  
Radboud University Nijmegen, the Netherlands

<sup>2</sup> Grupo de Análisis para el Desarrollo

### Correspondence:

Thomas de Hoop, Email: [t.dehoop@maw.ru.nl](mailto:t.dehoop@maw.ru.nl),

Postal Address: P.O. Box 9104, 6500 HE, Nijmegen, The Netherlands

Phone: 31 24 361 1169 Fax: 31 24 361 5957

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## **Abstract**

This paper discusses voluntary contributions to health education in a shanty town in Peru, using a new experimental setup to identify voluntary contributions to local public goods. The experiment enables individuals to contribute to a health education meeting facilitated by an NGO, which they know will only be organised if the cumulative investment level exceeds a certain threshold value. In contrast to expectations of aid distributors, individuals contributed a substantial amount of money, despite the long-term nature of the health benefits from health education. High discount rates only seem to have had a detrimental effect on investment in a poorer subsample. Results from a complementary experiment, which identifies donations to a nutrition program, suggest that positive beliefs about short-term benefits from health education in the form of learning effects have played an important role in the investment decision. The results indicate that channelling decision-making power about public good provision to beneficiaries not necessarily implies a crowding out of investment in local public goods with long-term benefits. Hence, particular attention is given to the potential role of cash transfers in the financing of local public goods.

**Keywords.** Health education, Field Experiment, Public Good

## 1. Introduction

Aid distributors have traditionally been reluctant to provide cash to beneficiaries. An important motivation behind this reluctance was the belief that beneficiaries would spend it on immediate consumption goods (Riddell, 2007). The past decade, however, has shown a recent expansion in (conditional) cash transfer programs, often supported by official aid donors. After the introduction of the large-scale conditional cash transfer program PROGRESA (now known as *Oportunidades*) in Mexico in 1997, other cash transfer programs were, amongst others, implemented in Colombia, Nicaragua, Honduras, Brazil, Argentina, Ecuador and Turkey (Attanasio et al, 2010). Transfer payments are usually conditional on children's participation in schooling. In this way, the short-term benefits of cash are complemented with long-term schooling benefits.

Despite the recent upsurge of (conditional) cash transfer schemes in official development aid, the ultimate recipients of *non-governmental* aid often do not receive aid in cash. Instead, it typically reaches them in the form of public goods and services, like schools, hospitals, roads etc.<sup>1</sup> Lately, other types of local public goods have also been initiated, which we will label as “behaviour-oriented NGO services”, wherein NGO donor agencies put efforts in changing the behaviour of beneficiaries through educating, mobilizing and empowering village communities (Swidler and Watkins, 2009). Participatory components are often included in behaviour-oriented NGO services. By having beneficiaries themselves manage the problems in their communities, NGOs try to bring sustainable benefits (ibid.). The focus of this paper is on educational services aimed at health promotion and disease prevention, which is a prominent example of an area in which responsibilities are increasingly transferred to communities themselves.

The intended benefits of behaviour-oriented NGO services usually occur in the long-run. Possibly for this reason, aid distributors tend to assume that beneficiaries' voluntary

contributions to this type of public goods will be limited: “The poor, especially the poorest are unlikely to access reproductive health education and services without the incentives of immediate benefit” (UNFPA and Microcredit Summit Campaign, 2009, p.15). Free-rider opportunities supposedly add to the disincentives for contributing to behaviour-oriented NGO services. In this paper we purport to test the assumption that transferring cash to beneficiaries would result in low investment in local public goods with long-term benefits.

In principle, granting decision making power regarding public good provision to beneficiaries is considered favorably, because the public goods selected by the beneficiaries should more closely reflect the preferences of the population they are meant to serve (Hoddinott, 2002, Kilby, 2006, Ostrander, 2007). Community-driven development initiatives in which beneficiary communities have direct control over management of investment funds show that the channelling of decision making power to beneficiaries can, under the right circumstances, improve the quality of projects (Mansuri and Rao, 2003). A contingent valuation study in Nepal, moreover, showed that both beneficiaries and non-beneficiaries have a positive willingness-to-pay (WTP) for health promotion programmes (Borghi and Jan, 2008). Altruism<sup>ii</sup> was identified as one of the main motives for willingness to pay (ibid.), and might thus mitigate the negative effect of myopic preferences on voluntary contributions to behaviour-oriented NGO services. Despite the encouraging WTP study in Nepal, it remains to be seen to what extent beneficiaries actually contribute in a *revealed* preference setting. The current paper presents such a stricter test by conducting a field experiment in a shanty town of Lima in Peru.

Public good games can be used to observe whether people facing free-riding opportunities contribute to behaviour-oriented NGO service provision by adding a description of the contents of this public good to the game (see Cardenas, 2004, for an example). For public goods that are relatively lumpy and cannot be broken down into smaller units, the so-

called “threshold” public good game could identify voluntary contributions. In this game, a public good of pre-determined size is provided only if the sum of contributions equals or exceeds a certain threshold (Rondeau et al, 1999).

Although the public good game integrates revealed preferences in the investment decision, it only includes monetary gains for participants, which does not fit well with the type of local public goods that ultimate aid recipients normally receive. It is, therefore, unclear whether field referents can overcome confusion in this game, which could result in loss of control at a basic level (Harrison and List, 2004). Moreover, excluding incentives related to time preferences could result in an overestimation of investment levels in public goods with long-term benefits. Individual discount rates are generally higher for the poor (Carvalho, 2008, Tanaka et al, 2006), and the exclusion of these incentives could, therefore, result in an even larger upward bias in developing countries.

We propose an experimental setup that can be changed depending on the contents of the local public good and contains both revealed preferences and incentives related to time preferences, to identify voluntary contributions to local public goods with long-term benefits. Rather than investing in a common pool of money, participants are asked to contribute to a local public good distributed by an NGO, to avoid confusion and loss of control. The participants are informed that the local public good will only be distributed if the cumulative sum of investment of participants exceeds a certain threshold value, as in the threshold public good game. By using this mechanism, contributions of participants determine whether the NGO service will actually be provided, which increases the decision making power of beneficiaries. Contribution rates indicate the degree of compatibility of increased decision making power for beneficiaries with investment in local public goods with long-term benefits.

It should be noted that even public goods which are mainly associated with long-term benefits may bring certain short-term gains as well. This is clearly the case for health

education, for instance, where we can make a distinction between *decisional* and *non-decisional* value. The long-term health benefits could be seen as the decisional value of health education (Borghini and Jan, 2008). The non-decisional value of the same is linked to the learning element and could include decreased concern for disease incidence, increased self-esteem, improved social status and an entertainment value, or simply the joy of learning (Borghini and Jan, 2008; Drèze and Kingdon, 2001). Such non-decisional value, which should positively affect voluntary contributions, is likely to be larger, the stronger the participatory character of behaviour-oriented NGO services.

In order to be able to distinguish factors influencing contributions to behaviour-oriented NGO services with long-term benefits from factors influencing contributions to programs with long-term benefits but without a participatory component, we contrast health education in our experiment to a program that finances distribution of milk to children of school-going age (*Vaso de Leche*, henceforth abbreviated to VdL). Participants in the experiment will also be asked to donate to this non-participatory program. The comparison allows to identify the relative importance of the non-decisional value of health education in the investment decision.

In our experimental setup we observe that people are willing to contribute a positive and substantial amount of money to health education. More than 50% of the available money was invested. Although donations to VdL are significantly lower than to health education, people also seem to be willing to donate a substantial amount of money to the VdL program. Although our small experiment provides only a first indication, we argue that it seems premature, if not unwarranted, to assume that disbursing cash directly to aid beneficiaries will not result in investments in local public goods with long-term benefits. The contribution rates in our experiment starkly contrast with the pessimistic assumption of aid distributors about voluntary contributions to behaviour-oriented NGO services. This pessimism is not exclusive

to the UNFPA and the Microcredit Summit Campaign (2009). The local NGO that has been in close contact with the community where the experiment was conducted for a considerable period, did not expect that participants in our experiment would make any significant contribution to health education.

All participants in the experiment were also included in a recent household survey. Contribution rates in the experiment could therefore be related to individual and household level characteristics. Time preferences seem to play a role in the investment decision, but only for the poorest section in the shanty town. Both investment in health education and donations to VdL are significantly lower for participants with high discount rates, but only if participants' households have a below-median consumption level. The short-term non-decisional value of health education could partially explain the lower contributions to VdL. It appears from the analysis that those who recognise the short-term benefits from participation are more likely to contribute a higher amount to health education than to VdL. In the remainder of the paper we also discuss a number of possible complementary interpretations of our results.

The paper is structured as follows. Literature related to public good provision is discussed in section 2. Hereafter, we describe the field experiment in section 3, followed by some descriptive statistics about participants and non-participants in section 4. Subsequently, we describe and analyze the results of the field experiment in section 5. We conclude our paper with a discussion.

## **2. Preferences in public good provision under conditions of poverty**

Public good problems are characterized by situations in which individual self interest is at odds with group interest. If four participants in a linear public good game are each given \$5 with the choice to invest some or all in a group project and an experimenter doubles the



amount of contributions to share equally among the participants, game theory predicts that none of the participants will contribute anything. This set of strategies (zero contribution rates for each participant) is the unique best response to the strategies of all the other players for each participant and, therefore, the only Nash equilibrium (Wydick, 2008). If this same mechanism applies to investment in behaviour-oriented NGO services, game theory would also predict zero contribution rates to health education for each beneficiary. Generally, linear public good games indicate, however, that total voluntary contributions lie between 40 and 60% of the group optimum (Ledyard, 1995). These contribution rates strongly outbid the game-theoretical solution. However, contribution rates still elicit suboptimal provision of the public good.

Linear public good games have also been played repeatedly with the same participants. Cooper et al. (1996) show that although voluntary contributions of college-aged participants in the US are generally positive, they tend to decline over time. Repeated public good games generally lead to higher cooperation rates among poor participants in Africa and Southeast Asia than among college-aged participants in the US, however. On the other hand, poor slash and burn horticulturalists in Peru cooperate less than college-aged participants in the US (Cardenas and Carpenter, 2008). It is, therefore, unclear whether the free-rider problem has stronger detrimental effects on investment in public good games in low-income societies.

Isaac et al. (1989) showed that introducing threshold costs of provision of public goods yields multiple Nash equilibria in the public good game. With a threshold, there is no longer only one best response to the strategies of all the other players. Both zero (as in the linear public good game) and positive contributions can be Nash equilibria in the threshold public good game. Introducing thresholds in public good games could thus result in an increase in voluntary contributions by shifting from an equilibrium with zero contributions to one with positive contributions. Andreoni (1998) formally shows that zero contributions only

strictly dominate positive contributions if no person is willing to provide the funds to reach the threshold for the public good alone or if the threshold is too high and there is no private benefit from contributing, such as altruism. In all other cases, reaching the threshold through a contribution of one or more persons can also be a Nash equilibrium (Andreoni, 1998).

Empirical findings about the positive effect of threshold costs of provision on contributions in public good games are mixed. Croson and Marks (2000) showed that the success rate of reaching a threshold varies widely (between 10 and 82%) across studies. More recent studies also show ambiguous results. Rondeau and List (2008) found higher contributions for higher threshold levels in a fund raising field experiment, but the increase in contributions was insignificant. Rauchdobler et al. (2009) showed that imposing thresholds in public good games could also result in lower contribution rates.

Evidence on the extent of free-rider behaviour in (threshold) public good games is clearly inconclusive. Introducing long-term benefits of public goods should, however, normally increase free-riding incentives, especially if players are relatively impatient (high discount rates), which is usually the case among poor individuals. People in poorer villages in Vietnam were shown to be less patient (Tanaka et al, 2006) and poor households in Mexico showed a markedly higher discount rate than relatively rich U.S. households (Carvalho, 2008). It is also conceivable that myopic preferences matter more to the poor. Evidence from Uganda suggests, for example, that poor people invest less in the long-term benefits of insecticide-treated bednets, because of liquidity constraints (Hoffman et al, 2009). Introducing long-term benefits in a public good game could, therefore, result in strong declines in voluntary contributions in developing countries. Community-driven development, in which beneficiary communities have direct control over management of investment funds (Mansuri and Rao, 2003), might thus cause crowding-out of public goods with long-term benefits.

Time-inconsistent preferences could also lead to lower investment in long-term benefits if self-control is inadequate (Laibson, 1997). Evidence for time-inconsistent preferences has been gathered in such diverse places as Kenya and India. Farmers in Kenya were shown not to save for investing in fertilizers, even if this investment was presumed to be highly profitable (Duflo et al, 2008). Small time-limited reductions in the cost of purchasing fertilizer at the time of harvest did, however, lead to large increases in fertilizer use (Duflo et al, 2009). Mothers in India were also shown not to vaccinate their children, despite obvious long-term benefits. A complementary food staple gift was nevertheless sufficient to ascertain an increase in the number of vaccinations (Banerjee et al, 2008). Apparently, a very small short-term incentive was able to reduce self-control problems significantly. Problems of self-control tend to be larger for the poor than for the wealthy. The wealthy could have the possibility to resist the purchase of immediate consumption goods in the presence of time-inconsistent preferences, by holding their wealth in non-liquid assets. The poor often do not have this possibility (Mullainathan, 2004).

As discussed in the introduction, public investment may also induce altruism. This holds especially for investment in the health of others. Altruism has been found to be paternalistic with respect to health. When participants in an experiment could either donate money or nicotine patches to a smoking diabetes patient, whose willingness to pay for nicotine patches is positive but below the market price, more than 90% of the donations were given in kind rather than cash (Jacobsson et al, 2007). Participants in our experiment that perceive others to gain more from health education might, therefore, benefit more from participation of others in health education than from direct monetary benefits for themselves. Paternalistic altruism might thus mitigate the negative effect of myopic or time-inconsistent preferences on contributions to health education.

Another factor that might mitigate negative effects on voluntary contributions is social norm activation. Fehr and Gächter (2001) argue that the public good game could be seen as an approximation of how social norms are maintained and established. Participants that do not voluntarily contribute to the public good could be seen as violators of the social norm to contribute. The social norm that everybody should make a contribution could thus have a positive impact on contributions to health education. This social norm could be activated by explicit mentioning of a choice between consumption of private goods and investment in public goods with long-term benefits. Sometimes, people do not voluntarily contribute, because they are not given the choice (Bekkers and Wiepking, 2007). Our field experiment provides insight in the likelihood that cash transfers would be partially allocated to local public goods with long-term benefits, when beneficiaries would explicitly be told that they have the choice to allocate their endowment to this type of public goods.

In short, previous studies have shown that voluntary contributions to public goods can be substantial under the right circumstances. It still remains unclear, however, whether beneficiaries will also contribute substantial amounts of money to local public goods with long-term benefits. Factors that could influence voluntary contributions to local public goods with long-term benefits are free rider behaviour, threshold costs of provision, liquidity constraints, time preferences, (paternalistic) altruism and social norms. These factors will be discussed in the interpretation of our results in section 5.3.

### **3. The Field Experiment**

#### *3.1 Background*

Participants in the experiment were selected from a baseline survey we carried out one year prior to the experiment among 400 households, consisting of 1719 individuals, in *Lomo de Corvina*, a shanty town in the district of Villa El Salvador, located in the southwestern part of

Lima. Lomo de Corvina represents an area first invaded in 1994, but which saw its largest expansion only after 2002. Compared to other sectors of Villa El Salvador, which emerged as a consequence of a relocation operation from invaded lands in 1971, Lomo de Corvina hosts a number of relatively young settlements, which is reflected in poor access to public services, even for shanty town standards, for its estimated fifty thousand residents.

For example, piped water supply is virtually absent in Lomo de Corvina (although its construction is in an advanced stage), while 76% (INEI, 2005) of the households in Villa El Salvador were receiving piped water in 2005 and 2004, respectively. Data from 2005 also show that 17.9% of the households in Villa El Salvador obtained water from cistern-trucks (INEI, 2005). This percentage is 81% in Lomo de Corvina, which even contrasts unfavourably with the level of dependence on cistern-trucks (68%) of those living in conditions of extreme poverty in the whole of Villa El Salvador (INEI, 2005).

Given the lack of proper water supply, it is not surprising that the incidence of water-borne diseases is high. Forty percent of the children under 5 years old in our sample had suffered from diarrhea in the last year. In such an environment, preventive behaviour (e.g. improved hygiene practices such as hand washing) can be an important strategy to improve health. Health education is one of the strategies that NGOs use to encourage preventive behaviour. Although health benefits from education are long-term and uncertain, it could be an effective strategy in an environment such as Villa El Salvador.

### *3.2 Participant selection*

From our database (excluding persons living far away from the primary school where we organised the experiment), we selected 163 persons at random and invited them for an experiment.<sup>iii</sup> We only invited one person per household.<sup>iv</sup> In a formal letter we stated that the participants would receive ten Peruvian *soles*<sup>v</sup> for their participation in a meeting in which their opinion would be requested, with an opportunity to gain additional money during the

meeting. The median daily income per household member in our sample is equal to 7.5 soles. To gain their trust, participants were invited by the same persons that carried out the survey in 2007. The surveyors presented and explained a formal invitation letter personally, and came back several times when the person invited was not present at the time of the first visit. The experiment was organized on a Sunday, because observations made clear that church attendance on Sunday was generally low.

Out of the 163 selected persons, we were able to invite 108 persons personally (67%), 13 persons (8%) had moved and 42 persons (26%) were not found at their home. Forty participants were invited for a morning session of the experiment, and 68 participants were invited for an afternoon session. Persons invited were informed they had been selected to participate in an important community meeting regarding health. They were not informed about the exact subject of the meeting: education on hygiene practices in relation to water use.

### *3.3 Experimental design*

Out of the 108 invited persons, 50 (46%) showed up for the experiment. The morning session counted 16 participants, while the afternoon session counted 34 participants. The experiments were scheduled shortly after each other to prevent communication between the two groups. During the experiment participants were first updated about an NGO's request for funds to a Dutch organization, to organize a health education meeting in Villa El Salvador. They were informed that this health education meeting would be organised in the week after the experiment, in the same primary school where the experiment was conducted. Thereafter, participants were informed that the NGO would only receive money to organize the health education meeting, if the people from Villa El Salvador would show interest in the program. Subsequently, they were told that the NGO decided to organize the current meeting, to identify the degree of interest in the health education meeting. Thereafter, participants were informed about a simple game, wherein they could participate. Next, participants were

informed that the health education meeting would be about personal water use to prevent diarrhea. This was followed by the announcement that worldwide two million children die from diarrhea every year, to inform the participants about the seriousness of the issue. It was also mentioned that 40% of the children of 5 years and younger and 20% of the adults in Lomo de Corvina had suffered from diarrhea in the last year. Finally, it was reported that health education, in combination with nutritional supplements, had led to a reduction of diarrhea by 20% among children below five in Mexico (Gertler and Boyce, 2001). Although this might be considered as framing, we believe it could result in more realistic contribution rates in our experiment, as it is common practice for NGOs to provide beneficiaries with information about the importance of their projects.

After having received a participation fee of ten soles, participants were led to a central hall in the school. In the central hall, participants were given four envelopes, two for the choice on health education and two for the allocation to VdL, and two times 20 soles of play money similar to dollars. Each envelope contained the first and last name of the participant as recorded from the survey. Participants were given the choice whether and how much of their 20 soles they would invest in the health education meeting. Participants in the morning session were informed that the health education meeting would continue if 100 soles were collected in total. In the afternoon session, the collective price of health education was adjusted to the number of participants and was set to 200 soles. Contrary to an experiment of Bohm (1972), wherein the willingness to pay for a television show was estimated, we also would have let people pay if we would not have collected enough money for the continuation of the health education meeting. In the experiment of Bohm (1972) the goal was to estimate willingness to pay, but without the possibility that participants lost money without benefits. The goal of our experiment was to see whether contributions to health education are high even when there is a possibility that the money is lost. To allow for a comparison, contributions to

a different good in the form of the VdL program were also requested. The VdL program is a State-organised national program, but is run at the local level by women in their community. The program provides milk to children and pregnant mothers (Clark and Laurie, 2000). Just as in the first experiment, participants were given the choice whether and how much of their 20 soles they would invest in VdL. Contrary to the first experiment, participants were told that all their donations would be transferred to the VdL program. No threshold was introduced in this experiment.

It was explained that the play money the participants kept would be exchanged for real soles after the game in a private room. To prevent wealth effects, the decisions in the two experiments were made simultaneously. It was explained that only for one of both decisions participants were allowed to keep the money they did not invest, and that we would toss a coin in a private room to decide for which of the decisions the participants were allowed to keep the money. A number of examples were given and a number of questions asked to make sure that the participants understood the experiment. After the instruction the participants were told to put the respective amounts that they wanted to invest in the health education meeting and in VdL in the corresponding envelopes. Envelopes were used to guarantee private decision making during the experiment. There were no signs that participants misunderstood the procedure (all participants used the correct envelopes). After the private exchange of play money for soles, participants were asked to fill out a small questionnaire.

#### **4. Descriptive Statistics**

Comparing participants with non-participants can give us some idea about the likelihood that the low turnout in the experiment presents a bias. Socio-economic conditions are slightly worse for the participants in our experiment, which could result in a downward bias in the contribution rate in the experiments. At the household level, consumption (self-reported sum



of expenditures on food and non-food items) per capita does not differ significantly for participants and non-participants in the experiment. Wealth (self-reported sum of the value of durables) per capita is, however, significantly lower for participants. Another factor that could potentially bias the rate of voluntary contributions is the composition of the household. Participants have significantly more children under 6 years old in their household, which could result in an upward bias in the contribution rate in the experiments. Parents of young children might invest more in health education, because of the potential danger of diarrhea for their children. Moreover, we would expect a higher contribution to VdL for parents of young children, because the eligibility of a household for the VdL program is based on the number of children per household (Clark and Laurie, 2000).

At the individual level our data show that women are overrepresented in the experiment and that Catholics and people with Spanish as the first language (as compared to an indigenous language) are underrepresented. There are no significant differences in age, education and trust (as measured by the level of agreement with the statement “Most people can be trusted” on a 5-point Likert scale). With regard to health our results suggest that diarrhea occurrence in the year before the survey was significantly lower among participants. There are, however, no significant differences in self-reported health (‘1=Very Bad, 5=Very Good’). Descriptive statistics of participants and non-participants are presented in table 1.

**Table 1: Descriptive statistics**

	(1) Mean	(2) Mean Participants	(3) Mean Non- Participants	(4) t-test/ Chi <sup>2</sup> test <sup>a</sup>
(1) Consumption per capita	2637.9 (1802.3)	2529.6 (2199.0)	2653.1 (1743.0)	-0.45 <sup>b</sup> P=0.65
(2) Wealth per capita	603.2 (1068.4)	346.8 (330.8)	639.0 (1129.5)	1.80 <sup>b</sup> P=0.07*
(3) Number of children<6	0.70 (0.75)	0.88 (0.73)	0.68 (0.75)	1.78 <sup>b</sup> P=0.08*
(4) Male	0.46 (0.50)	0.32 (0.47)	0.47 (0.50)	4.20 <sup>c</sup> P=0.04**
(5) Age	33.33 (10.01)	33.64 (8.31)	33.31 (10.05)	0.22 <sup>b</sup> P=0.82
(6) Did not finish secondary school	0.45 (0.50)	0.52 (0.50)	0.44 (0.50)	1.22 <sup>c</sup> P=0.27
(7) Catholic	0.83 (0.38)	0.72 (0.45)	0.84 (0.37)	4.37 <sup>c</sup> P=0.04
(8) First language Spanish	0.77 (0.42)	0.66 (0.48)	0.78 (0.42)	3.52 <sup>c</sup> P=0.06*
(9) Trust	2.05 (0.69)	2.02 (0.71)	2.05 (0.69)	-0.28 <sup>b</sup> P=0.78
(10) Self-Reported Health	3.28 (0.78)	3.22 (0.84)	3.28 (0.78)	-0.53 <sup>b</sup> P=0.60
(11) Diarrhea Incidence	0.13 (0.34)	0.04 (0.20)	0.14 (0.35)	4.06 <sup>c</sup> P=0.04**

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  a) T-values or Chi<sup>2</sup>-values are reported in these columns, depending on the applicable test. b) t-value reported

c) Pearson Chi<sup>2</sup> reported

Notes: Standard errors in parentheses.

## 5. Results

### 5.1 Investment in health education and Vaso de Leche

Participants in the experiment contributed substantial shares of their endowment to health education. Although only 6.25 soles and 5.88 soles were needed for realization of the health education meeting in the morning session and the afternoon session, respectively, participants donated on average 10.8 soles to ensure the organization of the health education meeting. The lowest contribution to health education was 3 soles. There were two participants that donated the maximum amount of 20 soles to the continuation of the health education meeting. There were no significant differences in investment in health education between participants in the morning session and participants in the afternoon session ( $z=0.91$ ,  $P=0.36$ ). Although contribution levels are slightly concentrated at the mean and right-skewed, a normal distribution of the density plot cannot be rejected ( $\chi^2=2.827$ ,  $P=0.24$ ). The contributions to

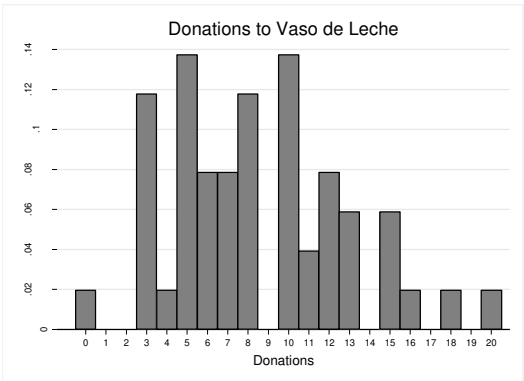
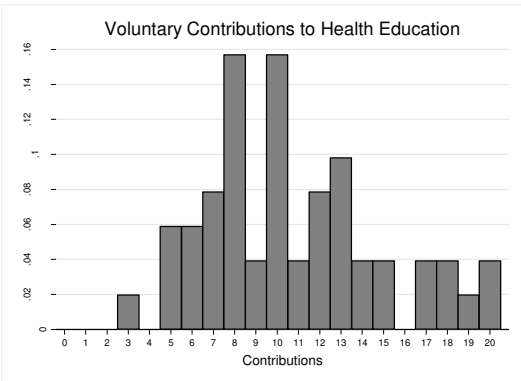
health education are significantly different from 0, and even a contribution of 9 soles falls outside the 95% confidence interval of investment in health education (9.61-11.98 soles).

Figure 1 shows the distribution of contributions to health education.

Donations to VdL were 8.64 soles on average. Only one participant abstained from donations to VdL. A normal distribution of the density plot of donations to VdL cannot be rejected ( $\chi^2=2.108$ ,  $P=0.35$ ). Contributions to the continuation of health education are significantly higher than donations to VdL ( $z=4.031$ ,  $P=0.00$ ). Contributions to VdL are, however, also substantial and fall within a 95% confidence interval of 7.42-9.86 soles for the participants in the experiment. Figure 2 shows the distribution of donations to VdL.

**Figure 1: Contributions to health education**

**Figure 2: Donations to Vaso de Leche**



Although contributions to health education and VdL are strongly rank correlated ( $Rho=0.600$ ,  $P=0.00$ ), only 13 participants contributed the same amount of money to health education as to VdL. The difference in investment purpose, therefore, seems to have been sufficiently salient to trigger different responses and to regard the two experimental tasks as separate ones.

*5.2 Voluntary contributions and participants' characteristics*

Household consumption per capita is not significantly related to contributions to health education, but donations to VdL are significantly higher for households with a higher consumption level. Both contributions to health education and donations to VdL show a

significant positive relationship with wealth per capita. The relatively low wealth status for participants, which we encountered in section 4, has thus most likely produced a downward bias in voluntary contributions, which gives extra reason to be confident about the high willingness-to-contribute that we observed. A downward bias in voluntary contributions could also result from the overrepresentation of parents with children of 6 years and younger in the experiment. As stated in section 4, we expected that households with more children below 6 years old would contribute more to health education and VdL. Surprisingly, however, households with more children under 6 years old, contribute significantly less to health education and VdL. We also observe that women contribute significantly less to both health education and VdL than men, which is in line with the result from Kruse and Hummels (1993), who find higher contributions for men in a threshold public good game. We find no significant relationships between voluntary contributions and age, education, religion, language used in daily life, trust and diarrhea incidence. Self-reported health (‘1=Very Bad, 5=Very Good’) is positively related to contributions to health education, but the positive relationship with donations to VdL is not significant. Table 2 provides an overview of the relationships between voluntary contributions and household characteristics.

**Table 2: Relationships between individual and household characteristics and voluntary contributions to health education and donations to VdL respectively**

	(1) Mean	(2) Standard Deviation	(3) Relationship with Voluntary Contributions to Health Education	(4) Relationship with Donations to VdL
(1) Consumption per capita	2529.62	2199.01	Rho=0.20, P=0.18	Rho=0.25, P=0.09*
(2) Wealth per capita	346.83	330.81	Rho=0.25, P=0.09*	Rho=0.29, P=0.04**
(3) Number of children <6	0.88	0.73	Rho=-0.25, P=0.08*	Rho=-0.29, P=0.04**
(4) Male	0.32	0.47	z=3.03, P=0.00***	z=2.78, P=0.00***
(5) Age	33.64	8.31	Rho=0.12, P=0.40	Rho=0.11, P=0.46
(6) Did not finish secondary school	0.46	0.54	z=0.37, P=0.75	z=0.45, P=0.65
(7) Catholic	0.72	0.45	Z=-1.03, P=0.30	z=-0.92, P=0.36
(8) First language Spanish	0.66	0.48	Z=-0.35, P=0.73	z=-1.48, P=0.14
(9) Trust	2.02	0.71	Rho=-0.12, P=0.41	Rho=-0.10, P=0.49
(10) Self-Reported Health	3.28	0.78	Rho=0.37, P=0.01**	Rho=0.21, P=0.16
(11) Diarrhea Incidence	0.04	0.20	Z=0.08, P=0.94	z=0.40, P=0.69

$p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Note: Rho indicates a relationship derived from a Spearman rank correlation and z indicates a relationship derived from a Wilcoxon rank sum test.

### *5.3 Interpretation*

#### *5.3.1 Liquidity, thresholds, information provision and learning benefits*

Given the predominantly long-term nature of the benefits, the incentives for free-rider behaviour, and the acute poverty of the participants, the question arises how the result that beneficiaries are willing to contribute substantial amounts of money to health education (and to a lesser extent to VdL as well) can be explained. The relatively high voluntary contributions could be related to the participation fee and the experimental endowment that participants received at the start of the experiment. If this would be the case, liquidity constraints to finance local public goods with long-term benefits could be partially relaxed by cash transfer programs. There are, however, a number of alternative explanations that we will discuss in the remainder of this paper. Let us first discuss some possible explanations for the higher contributions to health education than to VdL.

First, the higher amount of contributions to health education than to VdL could be related to the introduction of threshold costs of provision. As shown in section 2, imposing thresholds could result in higher voluntary contributions to public goods. However, section 2 also showed that empirical evidence about the impact of imposing thresholds in public good games is mixed. Moreover, free-rider behaviour still limits the possibility to reach the aggregate valuation of the public good in both experiments. It is, therefore, unclear whether differences in contributions to health education and VdL are related to the introduction of a threshold in the experiment related to health education. Our data unfortunately do not allow us to test for this relationship.

Second, the higher contributions to health education might be related to the information participants received at the outset of the experiment about effectiveness of health education in Mexico.<sup>vi</sup> The information has most likely led to less ambiguity about the

benefits of health education.<sup>vii</sup> This interpretation is to some extent supported by the finding that 44 participants in our experiment (88%) agreed or highly agreed with the statement that they liked meetings in the community, because they learned a lot from these meetings.

Learning benefits, which we labelled as one of the components of the non-decisional value of health education in our introduction, could be seen as positive returns to investment in health education in the short run and are a potential third reason for higher contributions to health education than to VdL. We will explore the relationship between learning benefits and the differences in investment levels to health education and VdL in later stages of this paper. We first take a closer look at the relationship between time preferences and contributions to health education and VdL. As discussed in section 2, this relationship might be stronger for the poor because of liquidity constraints. Short-term benefits could, however, result in a relatively weak relationship between time preferences and contributions to health education. One would expect a stronger relationship between time preferences and donations to VdL, because of the lower non-decisional value of the VdL program.

### *5.3.2 Voluntary contributions and time preferences*

In order to test whether contributions vary systematically with respondents' degree of (im)patience, we inferred stated time preferences in two ways. First, we asked participants in the experiment whether they preferred 30 soles today or 39 soles tomorrow. Those who preferred 30 soles today (39 soles tomorrow) are considered to have a high (low) discount rate. Second, we also tried to distinguish time preferences related to health from "financial" time preferences by asking participants whether they would prefer a medicine against diarrhea today that guaranteed protection from diarrhea for one year, or a medicine against diarrhea next year that guaranteed protection from diarrhea for one year and a half.<sup>viii</sup> Participants with high discount rates related to health would prefer the medicine against diarrhea today.<sup>ix</sup> These questions only provide us with dichotomous data, whereas we would ideally like to have more

detailed information. We believe, however, that our measures of time preferences can give us some idea for this exploratory study.

Wilcoxon rank sum tests<sup>x</sup> do not show significantly lower investment in health education for participants with high “financial” discount rates or high discount rates related to health. We also do not find a significant relationship between “financial” time preferences and donations to VdL or time preferences related to health and donations to VdL. Rows 1 and 2 of table 3 present the relationships between time preferences and investment in health education and time preferences and donations to VdL, respectively.

As stated in section 2, time preferences could have different implications for the poor than for the rich. To test whether time preferences have a differential impact on voluntary contributions for participants belonging to the poorest households than for participants in not-so-poor ones, we divide our experimental pool in two groups; 1) participants with a per capita consumption level above the median consumption level in the complete sample population (n=25), and 2) participants with per capita consumption below the median (n=25).

Wilcoxon rank sum tests for the two subsamples confirm our hypothesis that investment in health education is significantly lower for the participants with high “financial” discount rates in the poorer subsample. Apparently, the short-term non-decisional value of health education does not fully mitigate the negative effect of impatience on investment in health education among the poorest households. However, there appears to be no significant correlation between time preferences related to health and investment in health education for the poorest households. For participants belonging to the top half of the local income distribution there does not seem to be any relationship between contributions to health education and “financial” time preferences or time preferences related to health.

Results are similar for the relationship between donations to VdL and time preferences. Donations are significantly lower for poorer people with high financial discount

rates, but not for poorer people with a high discount rate regarding health. Results are shown in rows 3-6 of table 3.

**Table 3: Relationships between time preferences and voluntary contributions to health education and donations to VdL respectively**

(1) Variable	(2) Mean	(3) Standard Deviation	(4) Relationship with Voluntary Contributions to Health Education	(5) Relationship with Donations to VdL
(1) Dummy for high financial discount rate	0.5	0.51	$z=-1.22, P=0.22$	$z=-1.63, P=0.10$
(2) Dummy for high discount rate related to health	0.64	0.48	$z=-0.53, P=0.60$	$z=-0.24, P=0.81$
(3) Dummy for high financial discount rate in relatively poor subsample	0.44	0.51	$z=-2.23, P=0.02^{**}$	$z=-2.49, P=0.01^{**}$
(4) Dummy for high discount rate related to health in relatively poor subsample	0.68	0.48	$z=-1.03, P=0.31$	$z=-0.65, P=0.52$
(5) Dummy for high financial discount rate in relatively rich subsample	0.56	0.51	$z=0.28, P=0.78$	$z=-0.06, P=0.96$
(6) Dummy for high discount rate related to health in relatively rich subsample	0.60	0.50	$z=0.48, P=0.78$	$z=0.22, P=0.82$

Note: Z indicates a relationship derived from a Wilcoxon rank sum test.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 5.3.3 Short-term benefits of health education

The heterogeneous effect of time preferences on contributions to health education and VdL can be interpreted in multiple ways. We already discussed liquidity constraints as a possible explanation for the stronger relationship between time preferences and voluntary contributions for the poor in section 2. Regarding health education, the rather weak relationship between time preferences and investment behaviour could also be related to the short-term benefits of health education. To analyze this relationship, we relate beliefs about benefits of community meetings to the difference between contributions to health education and donations to VdL. This difference could be seen as a proxy for the perceived importance of the participatory component in health education. Multiple other factors could be at play in determining this difference, as discussed earlier in this paper. There is, however, no reason to assume that the positive framing of benefits from health education by giving examples from



Mexico or a possible threshold effect have heterogeneous impacts on the difference between investment in health education and donations to VdL. For this reason, we feel that we can meaningfully relate beliefs about short-term benefits of health education to the difference between investment in health education and donations to VdL, in order to analyze the importance of short-term benefits in health education.

Indicators for beliefs about short-term benefits of health education were operationalized with 5-point Likert scales ('1=Completely Disagree, 5=Completely Agree'). Participants in the experiment were asked for their agreement with the following statements; 1) "I like to participate in community meetings because in general I learn a lot from these meetings", 2) "I like to participate in community meetings because I meet a lot of people I know during these meetings" and 3) "Meetings wherein information is provided could be of more interest to me than for the majority of the people in Villa El Salvador".

Spearman rank correlations fail to show any significant relationships between on the one hand the difference between investment in health education and investment in VdL and on the other the belief in learning possibilities of meetings, the belief in social networking possibilities of meetings and the perception of relative benefits of meetings, respectively. Wilcoxon rank sum tests, however, show a significantly stronger belief in learning possibilities and a significantly stronger perception of relative benefits from meetings for those participants in the experiment who at least contribute 1 sol more to health education than to VdL. The relationship between a positive difference between investment in health education and donations to VdL and the belief in social networking possibilities of meetings also gravitates towards the positive. When we define participants with a strong belief in the benefits of health education meetings as participants with the maximum score of 5 on either the belief in learning possibilities or the belief in social networking possibilities, Wilcoxon rank sum tests show that a strong belief in the benefits of health education is even more

convincingly related to a positive difference between investment in health education and donations to VdL. Arguably, the short-term participatory component of the health education meeting has played a role in the relatively high contributions to health education. All results are shown in table 4.

**Table 4: Relationships between beliefs about benefits of health education and difference between contributions to health education and donations to VdL**

(1) Variable	(2) Mean	(3) Standard Deviation	(4) Spearman Rank Correlation with Contributions to Health Education – Donations to VdL	(5) Relationship with dummy for positive difference between Contributions to Health Education and Donations to VdL
(1) Belief in learning possibilities of meetings	3.96	0.95	Rho=0.18, P=0.20	z=1.66, P=0.10*
(2) Belief in social networking possibilities of meetings	3.62	1.07	Rho=0.14, P=0.35	z=1.54, P=0.12
(3) Perception of relative benefits of meetings	3.94	1.16	Rho=0.15, P=0.30	z=1.92, P=0.05*
(4) Strong belief in benefits of health education meetings	0.30	0.46	z=1.25, P=0.21	z=2.49, P=0.01**

Note: Rho indicates a relationship derived from a Spearman rank correlation and z indicates a relationship derived from a Wilcoxon rank sum test.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 5.3.4 Self-control and time-inconsistent preferences

Another potential explanation for the heterogeneous effect of time preferences on voluntary contributions concerns the presence of time-inconsistent preferences, which may induce problems of self-control. Poverty increases vulnerability in this respect, as discussed in section 2. Time-inconsistent preferences could thus have a larger negative effect on voluntary contributions for the poorest compared to the not-so-poor group.

By adding an extra question about time preferences, we were able to distinguish between high “financial” discount rates and time-inconsistent “financial” discount rates. We asked participants in the experiment whether they preferred 30 soles one month after the experiment (36%) or 39 soles one month and one day after the experiment (64%). Participants with time-inconsistent preferences (24%) would prefer 30 soles today but 39 soles one month and one day after the experiment. If the self-control ability of the ‘rich’ is more effective than for the ‘poor’, time-inconsistent preferences should have a higher negative impact on

investment in public goods with long-term benefits for the ‘poor’ than for the ‘rich’. Testing for relationships between voluntary contributions with time-inconsistent preferences by deriving Wilcoxon rank sum tests, we find weak evidence for lack of self-control among the poor as an explanation for the heterogeneous relationship between time preferences and voluntary contributions.<sup>xi</sup> Although relatively poor participants with time-inconsistent preferences donate significantly less to VdL than relatively poor participants that prefer 30 soles today ( $z=-2.24$ ,  $P=0.03$ ), the relationship with investment in health education is less clear ( $z=-1.54$ ,  $P=0.12$ ). Possibly, the short-term non-decisional value of health education has mitigated the negative relationship between investment in health education and time-inconsistent preferences.

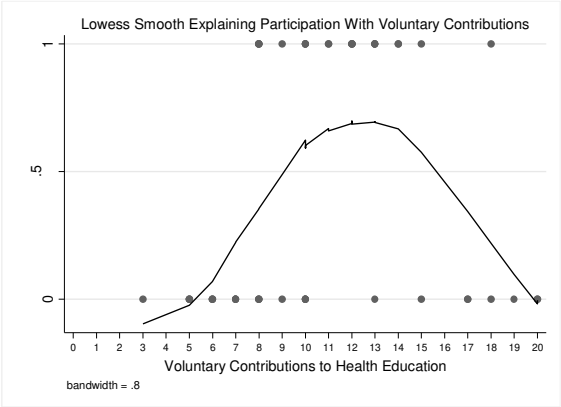
#### *5.3.5 Paternalistic altruism*

As discussed in section 2, paternalistic altruism could result in higher contributions to health education and VdL, hereby mitigating the negative effect of myopic preferences on voluntary contributions to health education and VdL. We use the relationship between investment in health education and actual participation in the health education meeting organized a week after the experiment to pay closer attention to the likelihood that paternalistic altruism has resulted in the relatively high contributions to health education. Attendees in the health education meeting (46%) differ from absentees (54%) in two respects. First, the household consumption level of attendees is higher ( $z=1.94$ ,  $P=0.05$ ). Second, among attendees, a higher share has at least finished secondary school ( $z=1.77$ ,  $P=0.08$ ).

Investment in health education is significantly higher for attendees ( $z=1.92$ ,  $P=0.06$ ), but a closer look reveals that the relationship is highly non-linear. We visualize the non-linear relationship with a non-parametric univariate lowess smooth (see figure 3). It depicts the local relationship between participation and investment in health education over parts of their ranges, and shows that attendance and investment in health education are only positively

correlated for relatively low levels of investment in health education. For higher investment levels the relationship seems to be negative, as witnessed by the inverted U-shape of the lowess smooth.

**Figure 3: Lowess smooth explaining actual participation in health education with voluntary contributions to health education**



Arguably, participants in the experiment with a relatively high investment level in health education could be paternalistically altruistic and value future health benefits for participants in health education more than monetary benefits for themselves. The interpretation of altruism-induced collective action is, however, empirically difficult to distinguish from social norm activation. Participants in the experiment with a relatively high investment level in health education could also have acted for the greater good beyond the individual level to prevent the violation of social norms, as discussed in section 2.

### 6. Discussion

This paper puts forward a new methodology to identify voluntary contributions to local public goods with long-term benefits. We incorporated revealed preferences in our research design, but rather than playing a traditional public good game we let players contribute to health education offered by an NGO. We argue that the experiment is less sensitive to confusion and a lack of control at a basic level in developing countries, in which public goods are normally

not provided in monetary form and often contain long-term benefits. Participants were informed that the health education meeting would only materialize if the cumulative sum of investment exceeded a certain threshold value. In this way, we were able to incorporate long-term health benefits and the bias against matching private money with development aid in our experiment. Moreover, we gained better understanding of the possibilities for financing local public goods with long-term benefits via cash transfers to beneficiaries.

Aid distributors did not expect high voluntary contributions. Pure free-rider behaviour is, however, non-existent in our experimental sample and contributions to health education are remarkably high. People do not necessarily seem unwilling to invest in local public goods with long-term benefits. Results from a complementary experiment show that the high contribution rate to health education does not stand on its own. Although significantly lower than voluntary contributions to health education, donations to the VdL program were positive and substantial.

The result provides food for thought for aid policy. The relatively high willingness to invest in local public goods with long-term benefits invites to rethink the optimal level of donor control on aid funds. Ostrander (2007) concludes that donor control over philanthropy has grown since 1990, which undermines the agency of beneficiaries to exercise control over these funds. Our results suggest that a more participatory allocation of aid does not inevitably lead to crowding-out of projects with long-term benefits by private goods and/or projects generating immediate rewards, which would be an additional argument for questioning high degrees of donor control over the allocation of philanthropic funds.

Only a small fraction of aid is currently given directly to poor people in the form of cash (Riddell, 2007, pp. 407). Cash transfers could reduce liquidity constraints considerably for poor people. It might be worthwhile to pilot a program with cash transfers, in which beneficiaries are asked to distribute the transfers over private goods and different public goods

with short-term and/or long-term benefits. So far, poor communities have not often been invited to distribute their resources to public goods with long-term benefits. Although community-driven development initiatives are growing, they still represent a small proportion of development aid. Our experimental results indicate that the poor, when given the choice and without liquidity constraints, might invest substantial amounts of money in public goods with long-term benefits without losing the agency to exercise control over funds. Even if actual decisions would not change, perceptions about the quality of institutions could improve after participatory allocation of funds. Introducing representative-based meetings in Indonesia did not result in changes in actual decisions, but satisfaction among villagers increased dramatically (Olken, 2008).

We have to be cautious in interpreting our results, however. The windfall character of the gain for the participants in our experiment could have created an upward bias in the sense that the experiment reflects a situation in which beneficiaries do not anticipate on receiving aid, whereas in fact they often do, and may concomitantly raise ex-ante consumption levels. Besides, strategic behaviour in the public good game could have produced a bias in the level of voluntary contributions to health education. This bias is, however, not likely to be upward, because of possible free-rider behaviour.

High discount rates only seem to have detrimental effects on voluntary contributions for the most deprived. Arguably, short-term benefits of health education, such as the joy of learning, could be the reason for the relatively weak correlation between discount rates and investment in health education. This notion is supported by a significant positive relationship between beliefs about short-term benefits of health education and a positive difference between contribution to health education and donations to VdL. Possibly, long-term benefits of public goods should be complemented with short-term benefits, to ascertain high levels of investment of cash transfers in local public goods with long-term benefits. Several

complementary interpretations for the behaviour in our experiments can, however, be identified, such as time-inconsistent preferences and paternalistic altruism.

Independent of the motivation, it remains remarkable that relatively poor people are willing to give up a substantial amount of cash income for investment in local public goods with long-term benefits. Given the exploratory character of our research, more research about the motivations behind this behaviour is clearly needed.

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<sup>i</sup> These public goods are sometimes also provided in the form of official development aid. However, unlike non-governmental aid organizations, official development aid organizations complement the financing of the provision of these public goods with cash transfer programs.

<sup>ii</sup> We define altruism as the sum of ‘warm glow’ (cf. Andreoni, 1990) and pure altruism.

<sup>iii</sup> Two respondents per household answered questions about attitudes in our survey. Only these persons were invited for our experiment. Generally, the household head and his/her spouse answered these questions, but whenever these persons were not available, other adult persons in the same household from the same gender replaced them.

<sup>iv</sup> We were not able to prevent 1 household to participate with 2 persons in the experiment. All results are robust to exclusion of these subjects from our analysis.

<sup>v</sup> At the time of the experiment \$1 was equal to 3.23 soles.

<sup>vi</sup> Impact evaluations of health education programs show a mixed but slightly positive picture of effectiveness of health education. Although health education focused on preventing worms in Kenya was found not to be effective (Miguel & Kremer, 2007), research from Mali reported that complementary malaria education alongside donations of insecticide-treated bednets led to more bednet impregnation (Rhee et al, 2005). Besides, combining nutritional supplements with health education led to a reduction of diarrhea of 20% among children of 5 years and younger (Gertler and Boyce, 2001).

<sup>vii</sup> Stifel and Alderman (2006) do not find evidence for impact of the VdL program on nutritional outcomes of young children. People might, however, consider the benefits of VdL to be more self-evident and certain because of the perceived direct nutritional impact.

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<sup>viii</sup> The disadvantage of hypothetical rewards is the uncertainty about whether people are motivated for serious introspection concerning what they would do if outcomes were real (Frederick et al, 2002). With real rewards, however, we would not have been able to infer time preferences regarding health. Moreover, real rewards would have resulted in transaction costs for collecting the money, which could result in a bias in the estimated discount rate, given the fact that some participants live closer to the school where the experiment was conducted than others. With hypothetical rewards respondents might still take transaction costs into account, but this is likely to be less salient in respondents' minds, because any mention of where the stakes would have to be collected is avoided in a hypothetical setting.

<sup>ix</sup> One factor that could potentially bias the discount rate with regard to health is the fact that diarrhea is usually more dangerous, in the sense that it is sometimes life threatening, for young children. Parents with young children might, therefore, prefer the medicine against diarrhea today because of the danger of diarrhea for their children. We find no evidence for this relationship, however. Time preferences with regard to health are not significantly related to the number of children below 6 years old in the household of the participant ( $z=0.13$ ,  $P=0.90$ ).

<sup>x</sup> The Wilcoxon rank sum test is a non-parametric test, for which the statistic is the sum of the ranks for observations from one of the samples. We use a non-parametric alternative for the two-sample t-test to account for the low sample size and a possible non-normal distribution.

<sup>xi</sup> Five respondents (10%) produced unintelligible answers to the time preferences questions and were consequently excluded from further analysis.