

Lagarde, Mylène; Riumallo Herl, Carlos

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## Stronger together: Group incentives and the demand for prevention

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TI 2023-0010/V  
Tinbergen Institute Discussion Paper

# Stronger together: Group incentives and the demand for prevention

*Mylène Lagarde*<sup>1</sup>

*Carlos Riumallo Herl*<sup>2</sup>

<sup>1</sup> Department of Health Policy, London School of Economics and Political Science

<sup>2</sup> Erasmus University Rotterdam and Tinbergen Institute

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Tinbergen Institute Rotterdam  
Burg. Oudlaan 50  
3062 PA Rotterdam  
The Netherlands  
Tel.: +31(0)10 408 8900

# Stronger together: Group incentives and the demand for prevention\*

Mylène Lagarde

Carlos Riumallo Herl

## Abstract

We study the power of social incentives to increase individuals' investment in preventive health using small financial incentives with group conditionality. In a field experiment in El Salvador, we compare those to equivalent individual incentives. Despite the uncertainty about others' behavior, group incentives are as effective as individual ones and double the demand for prevention. They achieve these effects by increasing communication, peer pressure, and coordination between members to reduce information asymmetry and address behavioral barriers that limit prevention take-up. Incentives leveraging social interactions may act on both present bias and inaccurate beliefs that limit investment in health services.

JEL codes: C93, D91, I12

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\*Lagarde: Department of Health Policy, London School of Economics and Political Science (email: M.Lagarde@lse.ac.uk). Riumallo-Herl, Department of Applied Economics, Erasmus School of Economics, Erasmus University Rotterdam, Tinbergen Institute (email: riumalloherl@ese.eur.nl). We benefited from comments and suggestions from Paul Gertler, Pablo Celhay, and Marcos Vera-Hernandez; seminar participants at the LSE and Erasmus University; and conference participants at the 2021 Conference of the American Society of Health Economists, the 2021 World Congress on Health Economics, and the 2022 AEA-ASSA Conference. We thank Ricardo Segovia and Sara Segovia from ASEI for their support of the study. We are grateful to Manuel Sanchez-Masferrer, David López, and Estela Armijo for project management, logistical support, and infrastructure. We also thank Maribel Escobar and Margarita Lucano for the project management support and fieldwork coordination. The project would not have been possible without the dedication of all the fieldworkers, ASEI staff at the Soyapango agency, especially Edwin Montano, and the clinic staff. The study protocols received approval from the Research Ethics Committee of LSE and the National Ethics Committee for Health Research in El Salvador. The experiment and pre-analysis plan were registered as [AEARCTR-0004690](https://www.earctr.org/0004690) (Lagarde and Riumallo-Herl 2019). Riumallo Herl received funding from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement no. 840591. This study was funded through grant MR/S012524/1, funded by the Department of Health and Social Care (DHSC), the Foreign, Commonwealth & Development Office (FCDO), the Global Challenges Research Fund (GCRF), the UK Medical Research Council (MRC), and the Wellcome Trust. The findings, interpretations, and conclusions expressed in this article are those of the authors and do not necessarily represent the views of the funders.

## 1. Introduction

Every year, millions of people in low- and middle-income countries die of diseases that could be prevented by the use of simple products or by early preventive screening and treatment.<sup>2</sup> Low demand of preventive care is partly due to the direct and indirect costs that individuals face to access services (Thornton 2008, Banerjee et al. 2010, Dupas 2011). It is also driven by behavioral factors, such as inaccurate beliefs about the benefits of prevention (Baicker, Mullainathan, and Schwartzstein 2015), or present bias, which causes procrastination and delays the take-up of preventive technologies (O'Donoghue and Rabin 2015). While financial incentives that reward individuals for adopting specific behaviors have been an effective tool to overcome some of these barriers (Thornton 2008, Banerjee et al. 2010, Okeke and Abubakar 2020, Banerjee et al. 2021), information frictions and behavioral biases can persist (Banerjee et al. 2010, Kremer et al. 2019). Meanwhile, recognizing that social forces—expressed through communities, schools, or other networks—have a key impact on individual behavior, a growing interest has emerged to understand how interventions can use social interactions to encourage the adoption of beneficial behaviors by addressing some of these barriers (Karing 2018, Breza and Chandrasekhar 2019).

In this paper, we study whether group incentives can leverage the dynamics of social networks to enhance the encouragement effect of monetary incentives. Several arguments suggest that incentives conditional on group behavior (hereafter "group incentives") could be equally if not more effective than individual ones. First, the literature on other-regarding preferences shows that having other people's rewards linked to one's own behavior can create powerful sources of motivation, whether in the form of altruism to make others benefit or guilt to penalize them (Babcock et al. 2015). Second, insights from social psychology indicate that individuals can be more motivated to act when they share a common goal (Kozlowski and Ilgen 2006), and there is evidence of the contagious nature of healthy behavior adoption through social connections (Jackson et al. 2015). Group incentives can also be more efficient since they are only paid if several or all members of a group comply with the desired behavior. Finally, these incentives can be implemented in settings where social networks—based on geographical, social, or occupational proximity—already exist and often serve as platforms for public or private organizations.<sup>3</sup> Despite these potential advantages, group incentives have

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<sup>2</sup> Insecticide-treated bednets and water chlorination dramatically reduce the incidence of infectious diseases such as malaria or diarrhea, while non-communicable diseases such as diabetes, hypertension, and even certain cancers can be easily treated or managed if they are detected early through preventive screening.

<sup>3</sup> For example, women's groups in India are instrumental to the implementation of two large-scale community engagement initiatives of the government (the National Rural Livelihoods Mission and the National Health Mission) that promote desirable saving and healthy behaviors. Similarly, micro-finance institutions throughout the world have long used the power of social connections among informal workers to expand their activities through group

rarely been tested outside team production in firms or in low- and middle-income settings. This could be because rewards linked to collective behaviors appear less powerful than equivalent individual incentives. Especially in situations where behaviors cannot be easily verified, uncertainty about others' behaviors de facto makes the reward uncertain. Even with full knowledge or trust about others' behaviors, a complying individual might have to wait for others to comply in order to receive the promised reward. In situations where present bias limits individual action, this potential deferred payment could lessen the benefits of group incentives. Whether the pitfalls of group incentives outweigh their benefits remains an open empirical question.

To study the effect of group incentives, we partner with a micro-finance institution (MFI) in El Salvador that promotes preventive check-ups to improve the detection and monitoring of risk factors for cardiovascular diseases (CVDs). We enroll 400 existing loan groups and provide a voucher to all group members for a free preventive check-up, which includes a blood test and a medical consultation. Loan groups are randomized into treatment arms to receive no incentive (control), incentives linked to individual behavior (individual incentives), or incentives tied to the behavior of all group members (group incentives). Importantly, all incentives are financially equivalent, worth USD5 in expectation to individuals. We implement two different designs for group and individual incentives to assess the effect of a delayed payment for group incentives compared to individual ones. In the first design (*cash reward*), the individual (group) incentive is a small monetary reward paid after the individual (all group members) completes the preventive check-up. With this design, individual and group incentives differ not only in terms of the conditionality but also in the timing of their payment. Specifically, in the group variant, the first member of a group who completes their check-up must wait until the last group member completes theirs to earn the reward. To isolate the effect of the group incentive in the absence of this potential negative feature, we implement a second design where the payment timing is the same for individual and group incentives. In this second design (*lottery*), all individuals (groups) are informed that at the end of the study period, some individuals (groups) will be randomly chosen and earn a large prize provided they (all members of the group) had completed the preventive check-up. We carefully design the incentives to ensure that, from an individual standpoint, the expected reward is the same across all treatment arms (USD5). Using administrative data from the voucher system, we have precise information on the timing of the visits to the laboratory and to the clinic, and we follow up with participants after one to three months using phone surveys, given the pandemic-related constraints in 2020.

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loans, where individuals' motivation to preserve their social capital and standing in a group act as a substitute for material collateral.

We first find that group incentives have similar (and sometimes stronger) effects as individual incentives. Without incentives, only 15.5% of individuals complete the free preventive check-up. Incentives more than double this level of demand, increasing the take-up rate by 19 percentage points (pp) with individual conditionalities and 22 pp with group conditionalities. When incentives take the form of *cash rewards*, individual and group incentives have a similar effect, suggesting that the social effects of group incentives compensate for the delayed payment due to the collective conditionality. When incentives are *lotteries* and the payment timing is the same whether the conditionality is individual and collective, there is suggestive evidence that group incentives outperform individual ones, increasing the demand by 22.2 versus 14 pp.

Second, we find that group and individual incentives act through different behavioral levers. The most effective individual incentives (*cash rewards*) achieve their impact by nearly eliminating the share of those doing the blood test but not completing the medical consultation. This so-called diagnosis dropout represents only 4% in the individual cash reward arm, versus 10%–12% in the other incentive arms. Since the individuals in this treatment arm know the first visit is useless without the second one, this result strongly supports the idea that small incentives, received immediately after the consultation, address the psychological or self-control barriers created by present bias problems (Kremer et al. 2019). By contrast, the effectiveness of group incentives appears more driven by their ability to motivate new individuals to start the two-step process of the preventive check-up. They increase the proportion of those doing the lab test by 21 pp compared to the control group, versus 15 pp for the individual incentive group ( $p=0.137$ ), a difference particularly significant for the lottery design.

Related to these different behavioral mechanisms, we find that the effect of group and individual incentives is stronger in different subsets of the population. The impact of individual incentives is concentrated among groups who have higher perceived benefits of prevention: those with higher baseline CVD risk and those who have completed preventive check-ups in the past. This finding reinforces the idea that small individual incentives act by compensating short-term costs and addressing present bias issues rather than by changing the perceived benefit of prevention. Meanwhile, the absence of the targeting effect of group incentives is consistent with their objective of universal inclusion, regardless of individual needs. We find that group incentives have a higher impact in all-female groups, presumably because greater social cohesion may accentuate the strength of interactions and solidarity between members.

Next, we explore a range of interactions between members that can help overcome the uncertainty about others' behaviors in a group as well as encourage the take-up of the preventive check-up. We find evidence that communication about the preventive visit between group members is higher but, more importantly, more effective. We interpret this increased communication as a form of monitoring that reduces information asymmetry and conveys useful information about the check-up between members. We also find that group incentives increase social pressure, in the form of advice or encouragement given to others to act. Finally,

collective action is more common with group incentives by increasing coordination with fellow group members to attend the lab or the clinic. These strategies serve several purposes, from monitoring to a social commitment device. Together, this evidence demonstrates that group incentives amplify the intensity of social interactions that act as targeted interventions (e.g., reminders, motivational chats, social commitments to go to the clinic), which not only increases the perceived value of the preventive visit but can also help individuals overcome self-control problems.

We also find that the preventive check-up increases the detection of new risk factors for CVDs by 45 pp. Since group incentives are only paid when *all* members complete the check-up, on average, group incentives are more cost-effective than individual ones, at USD26.4 versus USD30.6 per new diagnosis. Assuming individuals have an average probability of managing their diagnosed risk factors, all financial incentives appear as cost-effective interventions to improve health outcomes, at USD499 per disability-adjusted life-year (DALY) averted for group incentives and USD568 for individual incentives.

Our paper contributes to several strands of the economics literature. First, we contribute to the empirical literature on group incentives. Despite their potential effectiveness and ubiquity in the workplace, very few studies have looked at their impact outside of firms and have rarely compared them to equivalent individual incentives.<sup>4</sup> A few studies have examined the effects of group incentives in firms where production is organized in teams (Burgess et al. 2010, Bandiera et al. 2013, Friebe et al. 2017). Like ours, these studies often consider endogenously formed teams but do not compare group incentives to individual ones and are concerned with issues of free-riding relevant to team production. The closest study to ours is Babcock et al. (2015), who compare individual and group incentives and find that the latter increase student productivity by 9%–17% relative to former. Our study adds to this literature in several ways. First, we study the relative effectiveness of group versus individual incentives in a more realistic setting, with a large sample of groups whose members share existing social links. To our knowledge, it is also the first study to look at group incentives in a low-income setting. Second, we consider two variations of incentive designs (cash rewards or lotteries) to explore how much a delay in payment created by group conditionality hampers the effectiveness of group incentives. Third, we explore the causal mechanisms through which individual versus group incentives operate, teasing out both the behavioral barriers that they each help to overcome and the type of social interactions they trigger. We show how group incentives can achieve similar or greater impacts than individual incentives by harnessing

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<sup>4</sup> Our study is also related to a few empirical studies in the medical literature testing the effects of group incentives to encourage healthy behavior (Haisley et al. 2012, Kullgren et al. 2013, Patel et al. 2016). Among those, only Kullgren et al. (2013) compare the effectiveness of group-based incentives to individual-based ones, but in their design the success of one teammate creates a negative externality on others.



interactions among group members and fostering targeted actions that directly address behavioral barriers that limit the demand for prevention.

Second, we contribute to the literature studying the role of social incentives on individuals' behaviors. As with group incentives, most of the evidence in economics relates to the workplace and focuses on how social interactions within organizations shape agents' effort choices (Ashraf and Bandiera 2018). Some studies in low-income settings have shown the role of social learning to acquire information or adopt new technologies (Kremer and Miguel 2007, Oster and Thornton 2012, Dupas 2014). A growing literature is looking at how interventions can best harness the power of social networks to encourage desirable behaviors, such as increasing savings (Kast et al. 2018, Breza and Chandrasekhar 2019) or adopting new technologies in agriculture (Beaman et al. 2021) or health (Karing 2018, Karing and Naguib 2018). The use of existing groups has also been found to be an effective strategy to deliver interventions because of its ability to harness interactions among group members (Díaz-Martin et al. 2022). In this study, we show how group incentives can harness social incentives to overcome concerns over uncertainty. The range of social interactions we identify—from communication to peer pressure, reminders, and coordination mechanisms—not only reduce information asymmetry within groups but also contribute to addressing barriers that limit the demand for prevention by acting as targeted behavioral nudges. As group incentives create room for social utility as a driving force for individual behavior, we show that it comes at the expense of efficiently targeting individuals with higher private benefits.

We also contribute to the literature on investments in preventive health in low-income settings. A sizable experimental literature demonstrates the sensitivity of investments in preventive health products or services to small price changes (Ashraf et al. 2010, Okeke et al. 2013, Cohen et al. 2015, Dupas et al. 2016) or small incentives (Banerjee et al. 2010, Okeke and Abubakar 2020, Banerjee et al. 2021).<sup>5</sup> We add to this body of work by showing how group incentives can be a cost-effective alternative to individual incentives by fostering social interactions and behavioral solutions that encourage the take-up of preventive health behaviors. We do this in the context of non-communicable diseases, where symptoms and health needs may be less salient than in more studied investments preventing acute conditions (e.g., malaria, diarrhea, maternal care).

Finally, we contribute to the debate on the role of present bias in explaining the underuse of preventive services in low-income settings (Dupas and Miguel 2017, Kremer et al. 2019). Our finding that only small incentives received immediately after completing the check-up narrows the dropout rate between the first and second visit is consistent with individuals perceiving large benefits for the check-up but facing short-term costs that make them

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<sup>5</sup> For recent reviews, see Dupas and Miguel (2017) and Kremer et al. (2019).

procrastinate and fail to fulfill their intentions. At the same time, the effectiveness of social incentives embedded in group incentives suggest that some individuals underuse services due to inaccurate beliefs about the returns to prevention. Whether social interactions help them correct their beliefs or increase the value of the preventive check-up indirectly through guilt or altruism (Babcock et al. 2015) is not entirely clear in our context, but it is a positive result nonetheless. Finally, our finding that incentives are effective at sustaining the motivation of individuals who value the preventive service enough to start the process provides additional evidence of the potential role of present bias in curtailing the demand for preventive care services (Banerjee et al. 2010).

## 2. Background

### 2.1. CVDs and preventive care

In 2019, an estimated 17.9 million people died from CVDs, representing 32% of all global deaths and surpassing deaths due to infectious diseases, nutritional deficiencies, and maternal and perinatal conditions combined (Murray et al. 2020). Three quarters of these deaths occurred in low- and middle-income countries. Because people often fail to access services to detect the risk factors for CVDs, or detect them in the early stages of the disease, people in low- and middle-income countries die at younger ages from CVDs, often in their most productive years.

The main pathological process behind the development of CVDs, called atherosclerosis, is influenced by several risk factors: tobacco use, an unhealthy diet, and physical inactivity, which together result in obesity, elevated blood pressure (hypertension), abnormal blood lipids (dyslipidemia), and elevated blood glucose (diabetes). Continuous exposure to these risk factors causes CVD to become worse. This can then result in the narrowing of blood vessels and obstruction of blood flow to vital organs, such as the heart and the brain, causing, respectively, heart attacks or strokes, which often leads to death or severe disability.

Despite their ubiquity, many deaths caused by CVDs can be prevented through timely and sustained lifestyle interventions and, when needed, the use of effective drug treatment to manage diagnosed risk factors such as hypertension, high cholesterol, or diabetes (World Health Organization 2007). Evidence-based recommendations on how to manage individuals with asymptomatic CVD depend on their estimated total CVD risk, defined as their probability of experiencing a CVD event over a given period—typically 10 years. Identifying an individual’s CVD risk requires detecting risk factors, but because these risk factors (and atherosclerosis) can remain asymptomatic for a long time (Bovet et al. 2015), many people remain undiagnosed and untreated, particularly in disadvantaged groups and in low- and middle-income countries (Chow et al. 2013, Ataklte et al. 2015). For this reason, the World Health Organization (WHO) recommends opportunistic and routine screening by health care providers, especially in the presence of known risk factors (e.g., obesity). Once risk factors are detected, regular monitoring

is necessary. For lower-risk individuals, it is recommended that they are monitored on an annual basis, while higher-risk individuals should have routine appointments every three months.

## **2.2. Study setting**

This study occurred in El Salvador, a lower-middle-income country in Central America, where deaths from CVDs account for about a third of mortality (Barceló et al. 2011). Efforts in recent decades to reduce mortality from CVDs have remained ineffective (Ordunez et al. 2015), mainly because of the combination of the high incidence of CVD risk factors<sup>6</sup> and low access to preventive services, particularly among the poorest segments of the population, which limits both early detection and effective monitoring (World Health Organization 2018). In El Salvador, 70% of the population receive health services from the public sector. To enhance access to these health services, including better monitoring and detection of non-communicable diseases, the government introduced a major reform in 2009 that increased coverage through a network of primary care units and abolished user fees at the point of care. Nevertheless, indirect costs and quality issues—long waiting times, medication shortages—remain considerable barriers (Carrillo et al. 2020, Sánchez et al. 2020). As a result, many individuals prefer to delay care or use a well-developed private sector if they can afford it.

This study was developed in collaboration with ASEI, an MFI that operates in El Salvador and provides loans to more than 23,000 local micro-entrepreneurs through a network of 11 agencies in urban and rural areas. Having identified hypertension, diabetes, and obesity as some of the main health problems of its clients, ASEI encouraged them to invest in preventive care. In 2014, the MFI organized a text messaging campaign raising awareness about CVD risks and encouraging routine preventive medical visits. In 2018 and 2019, it opened a clinic next to its agencies in San Salvador and Soyapango, giving the opportunity to all clients to receive free consultations with a medical doctor. As consultations at the clinics remained low, we partnered with ASEI to explore new ways to encourage the demand for preventive CVD check-ups.

## **3. Experimental setting and design**

### **3.1. Experimental setting**

The study was conducted between September 2019 and January 2020 at the agency of ASEI in Soyapango. To be offered a group credit, at least three individuals must approach the MFI

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<sup>6</sup> Estimates suggest that in 2015 almost 40% of adults suffered from hypertension, 25% were obese, and 12% had diabetes (Ministerio de Salud/Instituto Nacional 2015).

together and undergo a financial screening.<sup>7</sup> If their application is successful, the group receives the loan on the condition that all group members be present on the day of disbursement and all remain jointly liable for repaying the credit, in weekly installments. Groups applying to both types of loans were eligible to participate in the study as long as at least three individual members of the group were willing to participate. There was no restriction of age or health status, and groups were invited to participate in the study on the day of their first loan disbursement.

Once a group agreed to take part in the study, enumerators administered a baseline survey to each member individually. The survey covered demographics and socio-economic characteristics, basic health measures (height, weight, and blood pressure taken as the average of three separate measures), individual preferences (risk and time), relationships with other members of the group, and questions about known diagnoses of the main CVD risk factors (hypertension, diabetes, obesity, and high cholesterol). We combined demographic (gender and age) and health characteristics (obesity, blood pressure, diabetes) to estimate an individual-specific 10-year CVD mortality risk by following the Globorisk algorithm (Hajifathalian et al. 2015).

Immediately after the baseline survey was administered, each respondent was given a voucher to access a free health check-up within two months. The preventive check-up consisted of two distinct parts. First, a blood test was to be undertaken at a local laboratory to obtain measures of three key markers of CVDs (glucose, total cholesterol, and high-density lipoprotein cholesterol). Second, after the blood test results were available—usually the next day—the individual could go to the MFI clinic for a medical consultation with a doctor.<sup>8</sup> The consultation would focus on discussing their CVD risk factors, lifestyle and dietary habits, and the potential need for medical treatment.<sup>9</sup> Overall, the check-up represented a high-quality healthcare service, estimated at USD38.<sup>10</sup>

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<sup>7</sup> ASEI offers two types of group credits, called Grupos Solidarios (GS) and Bancos Comunes (BC), which differ in group size, maximum loan amount, and monitoring requirements. BC target poorer individuals and must include a minimum of seven members, while GS include a minimum of three and maximum of seven members. The individual loan that BC members can obtain is capped at a lower level than for GS members. Finally, BC clients are required to meet weekly with MFI staff to receive support and financial literacy education.

<sup>8</sup> Note that the two components of the check-up were only valuable in combination since individual blood tests could not be obtained from the laboratory but from the clinic.

<sup>9</sup> Although drugs were not dispensed as part of the preventive check-up, MFI clients could consult a doctor for free at the clinic and obtain prescriptions for any necessary treatment.

<sup>10</sup> In the private sector, a similar blood test would be charged approximately USD16 for the blood test, and a consultation with a medical doctor would cost USD22.

### 3.2. Experimental design

After all members of a group had completed the baseline survey and received a voucher, they attended a short talk together. They first received basic health information on the prevalence of CVDs in El Salvador, their causes and potential consequences, and the benefits of regular preventive controls (early detection and treatment, monitoring). They were then given detailed information about the voucher, including its conditions of use and any incentive offered for using it.<sup>11</sup>

There were five types of incentives offered, randomized at the loan group level, stratified by group type and size (see the experimental design in Appendix Figure A2 and more details about the randomization procedures in Appendix B): no incentive (control), an individual cash reward, an individual lottery, a group cash reward, or a group lottery:<sup>12</sup>

- In the control arm, participants were not offered any incentive to use the voucher. They only received information about CVDs, the benefits associated with screening and monitoring of risk factors, and how to use the voucher for the free medical check-up.
- In the *individual cash reward* arm, individuals were offered USD5 for doing the full check-up. The reward would be paid to individuals immediately after the medical consultation.
- In the *individual lottery* arm, participants had a 5% chance of winning USD100. Specifically, they were informed that out of the 400 individuals expected to be part of this treatment arm, 20 would be drawn at the end of the study period.<sup>13</sup> If whoever won the lottery had completed the check-up, they would receive USD100 ; if the lottery winner had not done the check-up they would receive nothing.<sup>14</sup>
- In the *group cash reward* arm, groups of N members were offered a reward worth  $N \times \text{USD}5$ , received after the last member had completed the full check-up. Hence, unless all group members did their consultation at the same time, there would be a delay between the moment the first member of the group completed the medical consultation and when he/she received the incentive.

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<sup>11</sup> Anyone could ask questions to clarify any information, and each person received a leaflet providing a summary of all the information received orally. The voucher itself clearly indicated the key information, including its expiry date, the services offered, and relevant incentives. Appendix Figure A1 shows an example of the five types of vouchers used.

<sup>12</sup> To prevent any manipulation of the allocation of groups to treatment arms, the MFI staff were all blinded to the randomization sequence.

<sup>13</sup> Because enrolled groups were on average smaller than expected, only 331 individuals were part of this treatment arm and entered into the individual lottery. Hence the true probability of winning conditional on completing the take-up was 20 out of 331, or 6% (0.0604). Since participants were only ever aware of the 5% expected probability (20 out of 400), the discrepancies between arms are trivial and would not have affected individual decisions.

<sup>14</sup> This amount is far from substantial and would not provide winners an opportunity to improve their status (Friedman and Savage 1948). However, it remains significant and highly valuable, equivalent to about a quarter of the average loan requested by an individual to the MFI.

- In the *group lottery* arm, groups of  $N$  members could win a prize worth  $N \times \text{USD}100$ . They were told that out of the 80 groups expected to be part of this treatment arm, four would be randomly chosen in a lottery at the end of the study period, corresponding to a 5% chance of winning.<sup>15</sup> Similar to the individual lottery, the prize would only be paid to a winning group if *all* members of the group completed the full check-up (blood test and medical consultation).

Hence, assuming a group splits the cash evenly between group members,<sup>16</sup> in both types of group incentives, the expected value of the incentive, from an individual standpoint, is the same for group and individual incentives: USD5.<sup>17</sup> The key difference between group and individual incentives is the payment conditionality, which is linked to the behavior of *all* members in group incentives. In other words, if anyone defaults, no one earns anything. This is a stringent condition and one that departs from the few group incentives tested in the medical literature, where only some members of a group have to comply with the conditionality (Haisley et al. 2012, Kullgren et al. 2013). The advantage of our design is that it eliminates concerns of free-riding and only leaves open the role of social effects (Babcock et al. 2015). It is also consistent with the WHO objective of opportunistic screening and monitoring check-ups, where the objective is to encourage everyone to come forward.

### 3.3. Administrative data and follow-up interview

For everyone enrolled in the study, we have detailed data from the voucher use, including whether and when an individual used their voucher to do the blood test at the lab and whether and when they went to the subsequent medical consultation. We also know whether an individual requested to obtain their blood results from the clinic without doing a medical consultation. We planned to conduct face-to-face interviews with all respondents from our baseline survey, but the COVID-19 epidemic and the stringent lockdown measures introduced in El Salvador at the end of March 2020 forced us to conduct the follow-up interviews by phone instead.<sup>18</sup> Despite the challenging and unexpected circumstances of the follow-up survey, we were able to successfully reach 96.5% of the baseline participants.<sup>19</sup> Of all baseline participants, 0.86% refused to respond and 2.64% could not be reached despite multiple attempts and contacts with their fellow group members. Appendix Table A1 shows that

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<sup>15</sup> Only 79 groups ended up being allocated to the group lottery arm, leading to a probability of 0.0506.

<sup>16</sup> To our knowledge, this never happened.

<sup>17</sup> Using data from a pilot study, we estimated that the average cost of a round trip from home was approximately USD0.70. Hence the USD5 reward was more than enough to cover the travel costs of two return trips needed to do the blood exam and the consultation separately.

<sup>18</sup> While the start of the pandemic disturbed the follow-up survey, use of the vouchers was not because the last voucher expired at the end of January 2020.

<sup>19</sup> To increase survey participation, individuals were entered into a lottery to win vouchers worth USD50 to spend at a local grocery store chain.

attrition was not systematically different across treatment arms. The follow-up interview was designed to identify the ways in which the incentives had worked and to capture the potential benefits of prevention. The phone interview had to be short, so it only included four main modules: health-related behaviors and outcomes, information received during the CVD consultation, group interactions, and reasons for not using the voucher.

### 3.4. Sample characteristics and balance

Table 1 displays summary statistics, with the full sample in column 1. Study participants are predominantly women (84.7%), with limited education (60.2% have no or basic education), and 53.8% live under the poverty line.<sup>20</sup> On average, they are 43.5 years old, and 23.6% are being treated for hypertension, high cholesterol, or diabetes. They also have many undiagnosed health issues. Our baseline health measures show that 59.5% of the participants have a BMI higher than 30, but 66.8% of them have never been diagnosed as obese. In addition, 30.3% are hypertensive,<sup>21</sup> but about half have not been diagnosed with hypertension. Combining health outcomes with individual characteristics (age, sex, smoking status), we find that nearly 15.7% of the population has a medium or high CVD mortality risk.<sup>22</sup> Usage of services is generally high, with 1.1 visits to a healthcare facility in the past three months, but only 14.8% have ever done a preventive visit.<sup>23</sup>

Column 2 displays the sample means for the control group. Columns 3–6 report the coefficient of a regression of each of the variable on a set of dummy variables for the four incentive treatments, effectively indicating the difference between each incentive group and the control group. The last column reports the result of a joint test of significance. There are a few marginally significant differences though nothing beyond what we would expect to find by chance: in the group cash reward people are 4 pp more likely to smoke ( $p=0.083$ ). Compared to the control group, the proportion of individuals being treated for diabetes is significantly different in at least one arm (F-test:  $p=0.080$ ). All our results are robust to including these two sets of unbalanced characteristics as controls.<sup>24</sup>

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<sup>20</sup> We used the Poverty Probability Index (Desiere et al. 2015), which combines information of 10 questions on household members and assets to calculate a score between 0 to 100. Each score is associated with a probability of being below the USD2.50 per day 2005 purchasing power parity World Bank poverty line.

<sup>21</sup> An individual is defined as hypertensive if they are currently being treated for hypertension or if the average of the three consecutive measures of blood pressure we took at baseline are above the WHO thresholds (systolic blood pressure above 140 mmHg or a diastolic pressure above 90 mmHg).

<sup>22</sup> Medium risk corresponds to a 10%–20% probability of dying from a CVD within 10 years; a high risk corresponds to a probability greater than 20%.

<sup>23</sup> We defined this as a consultation undertaken even though the individual did not have specific symptoms to discuss or a specific issue to seek treatment for.

<sup>24</sup> The results are available from the authors upon request.

## 4. The effects of group versus individual incentives

### 4.1. Estimation strategy

To evaluate the effect of group incentives on the take-up of a preventive CVD check-up, we first compare the average voucher use in the pooled group versus individual arms. We estimate regressions of the following form:

$$y_{ig} = \alpha + \beta_1 \mathit{individual}_g + \beta_2 \mathit{group}_g + Z'_g \zeta + X'_{ig} \lambda + \varepsilon_{ig}, \quad (1)$$

where  $y_{ig}$  is an indicator variable reflecting the take-up decision for individual  $i$  in loan group  $g$ . The binary variables  $\mathit{individual}_g$  and  $\mathit{group}_g$  indicate whether group  $g$  was randomly assigned into an individual incentive arm or a group incentive arm, respectively, and the coefficients  $\beta_1$  and  $\beta_2$  capture the impact of incentives. We include a vector of group-level characteristics  $Z_g$  containing variables used for stratification as well as a vector of individual-level characteristics  $X_{ig}$  containing pre-specified covariates that may predict take-up (e.g., being over 50 years old, being a man, being educated, having a high CVD mortality risk at baseline, travel costs to the clinic). In addition, we estimate another specification where controls are chosen using the double LASSO procedure of Belloni et al. (2014). Standard errors are clustered at the loan-group level, the unit of randomization.

We also evaluate separately the average effect of the four incentive designs, estimating regressions of the following form:

$$y_{ig} = \alpha + \beta_{11} \mathit{indiv\_cash}_g + \beta_{21} \mathit{group\_cash}_g + \beta_{12} \mathit{indiv\_lott}_g + \beta_{22} \mathit{group\_lott}_g + Z'_g \zeta + X'_{ig} \lambda + \varepsilon_{ig}, \quad (2)$$

where  $\mathit{indiv\_cash}_g$ ,  $\mathit{group\_cash}_g$ ,  $\mathit{indiv\_lott}_g$ , and  $\mathit{group\_lott}_g$  are binary variables indicating whether group  $g$  was randomized to the individual cash reward, group cash reward, individual lottery, or group lottery treatment arm, respectively; and the coefficients  $\beta_{11}$ ,  $\beta_{21}$ ,  $\beta_{12}$ , and  $\beta_{22}$  capture each incentive's impact. For all results, we estimate two specifications: one where all community- and individual-level controls were pre-specified and another where controls are chosen, within the list of pre-specified controls, using the double LASSO procedure (Belloni et al. 2014).

### 4.2. Effects of incentives

Table 2, Panel A presents the pooled results (equation 1). Column 1 reports estimates from a model that includes pre-specified individual and group controls, and column 2 shows the LASSO estimates. In the text, we only refer to the LASSO estimates as this is our preferred specification. The preventive service take-up is low in the control group, with only 15.5% of individuals doing the medical consultation. Against this backdrop, group incentives lead to similar increases in the demand for preventive health as individual ones ( $p=0.350$ ). Individual



incentives increase the likelihood of completing the preventive check-up by 18.2 pp, versus 22.0 pp for group incentives, corresponding to relative increases by 118% and 142%, respectively. The size of the effect of both individual and group incentives is comparable to the average impact of incentives for CVD screening in high-income settings (Cheong et al. 2017).

Table 2, Panel B presents the disaggregated results (equation 2). In the form of small cash rewards, individual and group incentives are equally effective at increasing the demand for prevention, respectively, by 22.4 and 21.4 pp. The fact that group incentives perform as well as individual incentives is remarkable given that it occurs *despite* the difference in timing to receive the monetary reward: immediately after the consultation for individual cash rewards versus with a delay for some group members in the group cash reward. When incentives are designed as a lottery, group incentives are more effective than individual ones. The group lottery increases the take-up of the medical consultation more than individual lotteries (22.4 pp versus 13.8 pp), although this difference is not statistically significant at standard levels ( $p=0.117$ ). These results confirm that the uncertainty from group incentives does not make them less effective than individual ones. Group incentives are as effective as individual incentives that are earned sooner and are more effective with similar payment schedules. In a separate analysis presented in Appendix C, we show that incentives encourage individuals to do the medical consultation faster than in the control group. However, whether they are offered group or individual incentives, individuals attend the consultation at the same rate.

The large effect on the demand for prevention induced by small monetary incentives suggests two potential behavioral mechanisms (Dupas and Miguel 2017, Kremer et al. 2019). On the one hand, if individuals are indifferent due to low perceived private benefits and low costs, a small incentive will be sufficient to shift their behavior. On the other hand, small rewards can help those who value the long-term benefits of prevention but procrastinate or fail to follow through with their intention due to the weight put on short-term costs. Given that the preventive check-up involves two separate trips—one to the laboratory and one to the clinic<sup>25</sup>—observing the impact of incentives on each trip separately tells us more about the behavioral barriers limiting prevention in such a context. If the increased take-up is driven by an increase in the share of individuals starting the process—i.e., more individuals go to the lab—both mechanisms may be at play. However, if incentives reduce the diagnosis dropout between the lab and clinic visits (i.e., the proportion of individuals who, conditional on going to the lab, do not go to the clinic), it must be that they relieve the psychological barriers and self-control problems of those with high perceived benefits since already they started the process. This is because in our context, unlike in the case of vaccination dropout (Banerjee

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<sup>25</sup> In theory, if a blood test was done early in the morning, the lab could send it to the clinic on the same day. However, this was quite unlikely, and individuals were informed that they would have to make two trips. In the end, only 1.6% of consultations were done on the same day as the blood test.

2010), there is no ambiguity about the fact that individuals know that the first step (blood test) is useless without the second one (obtaining the results).

To determine if group and individual incentives act through different behavioral levers, we consider two outcomes: the proportion of individuals who go to the lab for a blood test (Table 2, columns 3–4), which signals that share of those who value the preventive service ; and the proportion of those who, having done the blood test, maintain their motivation to come back for the second step, i.e. the medical consultation (Table 2, columns 5–6). Three results emerge that suggest that group and individual incentives operate through different channels. First, all incentives are effective at reducing the diagnosis dropout rate observed in the control group, where 25% of those who do the blood test fail to go to the clinic afterwards for the consultation. Conditional on completing the blood test, both types of conditionalities appear equally effective at increasing the demand, reducing dropout rates to only 7% and 11% for individual and group incentives, respectively. However, individual cash rewards appear the most effective at sustaining motivation after the lab visit. They increase the demand for the consultation by 22.4 pp, versus 14–16 pp for the other incentives, leading to a dropout rate of only 4%, versus 10%–12% for the others. Since this is the only treatment group where individuals earn the reward immediately after the consultation, present bias seems to be the main reason behind diagnostic dropout as we can rule out the idea that individuals did not understand the value of the second step (Dupas and Miguel 2017).

Finally, group incentives seem to attract a larger proportion of people to the initial blood test: 41.6% versus 35.7% for individual incentives, a 20.8 pp increase compared to the control group versus a 14.8 pp increase for individual incentives, but not significant at standard levels ( $p=0.137$ ).<sup>26</sup> More individuals going to the lab suggests that group incentives increase the perceived private benefits of the visit for some or help them fulfill their intentions. In the next sections, we explore for whom this happens and through which mechanisms to determine whether this response addresses problems of present bias or low perceived value of preventive care.

### 4.3. Heterogeneous effects

In this section, we examine whether the treatment effects differ depending on some pre-specified individual and group characteristics. Table 3 presents the results from the double LASSO. Column headings list the interacted variable: individual characteristics in columns 1–3 and group interactions in columns 4–5. Appendix Table A2 shows that these results are the same when including the whole set of pre-specified controls. Following mixed evidence on the efficiency of incentives (Ashraf et al. 2010, Dupas 2014, Dupas et al. 2016), we examine whether group and individual incentives differentially impact those considered at higher risk of

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<sup>26</sup> This difference is mostly driven by the gap in the lotteries. For cash rewards, the take-up of the blood test is 37.7% for the individual variant and 39.4% for the group one. For lotteries, this is 30.5% and 42.6%, respectively.

developing a CVD at baseline.<sup>27</sup> We find that only individual incentives have a targeting effect. A 10% increase in the baseline 10-year CVD mortality risk increases the probability of completing the check-up by 0.67 pp with individual incentives, an effect concentrated in the individual cash reward treatment (column 1, Panel B of Table 3).<sup>28</sup> Take-up of the preventive check-up is also differentially higher for those who have used preventive services before only in the individual incentive arms: the probability of completing the consultation is 16.5 pp higher (column 2), an effect that is also concentrated in the individual cash reward arm (Panel B). These results confirm that individual incentives, particularly small cash rewards, are effective at encouraging individuals who already value prevention more, acting as a small nudge to overcome a financial and psychological barrier or self-control problems.

The lack of the targeting effect of group incentives is not entirely surprising. Given that all members are required to complete the screening, group incentives mechanically push for universal inclusion or over-inclusion. The distribution of within-group take-up, presented in Appendix Figure A3, illustrates this pattern. Twenty-six percent of groups randomized into group incentive arms achieve universal take-up (all members completed the check-up), while only 10% of groups who are offered individual incentives do so. However, the inclusion effect of group incentives has limits: in 28% of groups some, but not all, group members complete the check-up. Further heterogeneity analysis may explain why certain individuals do not bow to group pressure.

We also find that the demand for prevention is differentially lower for those facing higher costs.<sup>29</sup> A 10% increase in costs reduces the probability of completing the check-up by 0.7–0.9pp (column 3), meaning that moving from the 50<sup>th</sup> to the 75<sup>th</sup> percentile of the cost distribution (USD6.20 to US10.83) reduces the take-up by 3.8pp for individual incentives and 2.7pp for group incentives. Finally, unlike recent studies pertaining to health behaviors (Björkman Nyqvist et al. 2018, Aggarwal et al. 2020), we find no evidence that risk or time preferences influence the way in which people respond to incentives (see Appendix D).

While individual characteristics do not lead to much differential treatment effect for group incentives, group characteristics might. In particular, one might expect the effectiveness of

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<sup>27</sup> While individuals were not aware of this score, they knew some or all of the demographic and health characteristics used to compute it, and they were reminded at baseline of the importance of these factors.

<sup>28</sup> This means that moving from the 50<sup>th</sup> to the 75<sup>th</sup> percentile of the CVD risk distribution (from 4 to 7.4, which is still below the threshold of 10, which defines a medium risk status) increases the take-up of the check-up by 8.1 pp for pooled individual incentives and by 8.8 pp for individual cash rewards.

<sup>29</sup> We compute a composite cost measure faced by individuals by adding the transport costs to reach the clinic and income lost due to the trips taken. To calculate the latter, we combine the time taken (transport time plus an estimated 10 minutes for the blood test or consultation) with the average daily revenues from an individual's economic activity.

within-group dynamics (e.g., monitoring or coordination) might be easier in smaller groups or social effects stronger in close-knit groups. However, when including an interaction with an indicator for large groups, we find no meaningful interaction effects (column 4, Table 3). Similarly, with more complex measures of group clustering or group strength derived from the social network literature and pre-specified at baseline, we find no meaningful interaction effect (see Appendix E). These null results could be due to the relative homogeneity of the groups included in the study: groups were generally small (between 3 and 7 members, with 87% of groups with fewer than 6 members), and group members were in regular contact with one another because of the loan. Still, within-group dynamics may explain the effectiveness of group incentives, as suggested by our finding that belonging to an all-female group increases the probability of completing the check-up by 16.9 pp with group incentives, a result mainly driven by group lotteries. This result echoes the experimental literature that has identified the role of social interactions in women’s groups to enhance the delivery of interventions (Díaz-Martin et al. 2022).

## 5. Mechanisms

In this section we examine the mechanisms through which incentives operate to explore whether group incentives are more able than individual ones to leverage a range of interactions between group members. Table 4 reports the effects of incentives on three mechanisms: communication, social pressure, and collective action. The estimates presented are from specifications with controls selected with double LASSO, but the results are robust to including all pre-specified controls (Appendix Table A3).

### 5.1. Communication

A fundamental problem of group incentives is the uncertainty about other members’ behavior. In the absence of monitoring mechanisms, group members are likely to increase communication to gain information about others’ intentions and behaviors as well as to share their own decisions with others. We look at four outcomes to assess the prevalence and effectiveness of communication within groups about the voucher and its use, reported in Table 4, columns 1–4. In the control group, communication is high: 79% say they spoke to others about the voucher (column 1), 76% of those who did a consultation spoke to fellow group members about it (column 2), and 24% of individuals report that they heard about a fellow member’s consultation (column 3). Incentives, especially group ones, increase these levels of communication. The proportion of people talking to others about the voucher increases only with group incentives, by 8.2 pp. The likelihood that someone who completed the check-up reports talking to others about it increases by about 9.7 pp with group incentives, an effect nearly twice as large as the one observed with individual incentives (4.8 pp), although none are statistically significant at conventional levels due to lack of power in this sub-sample. There is also suggestive evidence that the share of individuals reporting that they heard about

someone's visit increases more with group incentives than individual ones (15.9 pp versus 9.8 pp,  $p=0.123$ ).

To assess the extent to which communication improves learning about the decisions of others, we asked each respondent at endline whether their group members had completed a consultation or not. We combine responses with data on voucher use to compute a knowledge index capturing the share of fellow members whose decisions are accurately known to an individual. The results are reported in column 4. Against a relatively low level of knowledge in the control group (37%), we find that communication increases learning in groups randomized into the group incentive arms three times as much as the individual incentive arms ( $p<0.001$ ). With group incentives, individuals know the decisions of 58% of their peers (a 60% increase compared to the control group), versus 44% with individual incentives (a 20% increase).

Together, these results provide strong evidence that group incentives increase the quantity and quality of communication about the medical consultation, an effective strategy to reduce information asymmetry within a group and uncertainty about others' behaviors.

## 5.2. Social pressure

We ask respondents at endline if they reminded or motivated others to use the voucher and whether they *were* reminded or motivated by others. Note that such peer pressure can be driven by altruistic motives (encouraging others to take up a beneficial action) or selfish ones for people randomized into group incentive arms (obtaining a reward when all comply with the conditionality). A concern is that those driven by selfish motives may under-report their encouragement compared to those driven by altruistic motives. Hence, we consider reports of peer pressure received from others as more reliable. In the control group, 72% report that they encouraged others to use the voucher, and 84% say they received encouragement from others. Group incentives increase the likelihood that respondents reminded or motivated others to use their vouchers by 6.4 pp, an effect similar to that of individual incentives (4.5 pp). The probability of being encouraged by others, our preferred measure of peer pressure, increases by 7.7 pp with group incentives, an effect twice as large as the impact of individual incentives ( $p=0.102$ ).

These effects only report the prevalence of encouragements, not their effectiveness. To determine their effectiveness, we consider the share of individuals encouraged by others in the sample of individuals who completed the consultation. The more effective the peer pressure, the higher this proportion should be. The results displayed in Appendix Figure A4 suggest that peer pressure is more effective in group incentives, as 85% of those who completed the consultation say they were reminded by others, versus only 77% with individual incentives

( $p=0.008$ ).<sup>30</sup> Overall, these results suggest that group incentives not only induce more peer pressure but also make advice and encouragement by peers more effective.

### 5.3. Collective action

We ask participants if they coordinated with others to go to the lab or the clinic. While 40% of people in the control group report to have coordinated with others to complete the consultation at the clinic, this share raises by more than 60% (25 pp increase) in the presence of group incentives, versus a 36% increase (14.5 pp increase) with individual incentives (Table 4, column 7). To construct a more objective measure of coordination, we use time-stamp data of the lab and clinic visits and assume that an individual coordinated with someone in their group if their visit to the lab (clinic) occurred on the same day as at least one fellow group member.<sup>31</sup> Unlike self-reported coordination, actual coordination is rare in the control group, where only 8.5% of individuals coordinated their visit to the lab and 2.7% to the clinic. Group incentives significantly increase these proportions, by 12.5 pp and 15.9 pp, respectively, for coordination to the lab (column 8) or the clinic (column 9). These effects on coordination are two to three times larger than the one observed for individual incentives.

There are several reasons for why we observe such levels of coordination in group incentives. Coordination is a form of collective action that serves several purposes, some of which are particularly relevant for group incentives. It can be a form of social commitment device, to reduce procrastination and help individuals follow through with their intentions. Coordination is also an extreme form of monitoring fellow group members' behaviors. Finally, in the case of group cash rewards, going to the clinic at the same time as the last non-compliers of a group ensures there will be no delay between one's visit and receipt of the incentive payment.<sup>32</sup> These different motives are not mutually exclusive and instead reinforce one another.

## 6. The impact of preventive check-ups

For policymakers, the impact of prevention matters as much as the demand for prevention. A question of interest here is whether the check-up leads to the detection of new CVD risk

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<sup>30</sup> Peer pressure effectiveness could come from a supply- or demand-side effect. On the one hand, those providing encouragement could be more persuasive or insistent due to self-interest motives. On the other hand, those receiving encouragement could be more susceptible to them because of other-regarding concerns.

<sup>31</sup> We construct two alternative measures of coordination: one where coordination is defined as a visit occurring within 30 minutes of another group member, and another where it is considered to happen when at least three members attend jointly. With both alternative measures, the effect of group incentives is even stronger; see Appendix Table A4.

<sup>32</sup> Appendix Table A5 shows the breakdown of all coordination events observed. It shows that 72% of all coordination events at the clinic that lead to immediate completion of the group occur with group incentives.

factors, as well as to an increase in individuals' knowledge, and ideally an improvement in health-related behaviors. To measure these effects, we use information collected in the follow-up telephone interview. To estimate the impact of the check-up, we use the random assignment to an incentive group as an instrument for attending the visit. The results are reported in Table 5. Column 1 reports the impact on the probability of being diagnosed with a new CVD risk factor. Columns 2–4 report the effects on individuals' beliefs about CVD risks and attitudes toward behavior change, and columns 5–8 report effects on health behaviors.

The table shows that the check-ups increase the probability that an individual knows at endline that they suffer from a previously unknown risk factor by more than 47 pp ( $p < 0.001$ ). This is a substantial and important benefit, especially given that the program was offered to a “mixed” population that included individuals who already knew they had one or more CVD risk factors. Turning to the effects of the check-up on individuals' attitudes and behaviors, we find suggestive evidence that it leads to small improvements, though it is not large enough to be statistically significant. Looking at the beliefs about CVD risks, there is no evidence that the check-up increases the proportion of individuals believing they have a medium to high risk of developing a CVD event (column 2). They also report a positive attitude toward behavior change (column 3–4), although it is not statistically significant. While there is no evidence that the check-up changes the consumption of fast food, there is some weak evidence that participants consume fruits or vegetables more often (0.5 more days,  $p = 0.374$ ) and sugar-sweetened beverages less often (0.8 fewer days in the past week,  $p = 0.293$ ).

To address the issues inherent to these self-reported measures, we implemented an incentivized raffle where individuals had to choose between investing in healthy or unhealthy food.<sup>33</sup> Individuals who completed the check-up invested one more ticket in the raffle to win a basket of healthy food ( $p = 0.126$ ). Looking at the intention-to-treat (ITT) effect of incentives on this outcome (Appendix Table A6), we find that group cash rewards increase the value of prevention significantly, while individual cash rewards do not. This result is consistent with the idea that the social effects of group incentives increase investments in preventive health by increasing the perceived value of prevention.

Overall, the effects on self-reported attitudes and behaviors are certainly not of the magnitude necessary to expect significant improvement in health outcomes. This lack of impact does not seem to be due to the doctor's failure to discuss during the consultation the key topics of CVD prevention, which most respondents remembered (see Figure A5 in Appendix). It could

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<sup>33</sup> Participants were told that they could allocate nine tickets between two different raffles: in one, they could win \$50 to spend on pizzas and in the other they could win \$50 to spend on vegetables and fruits. We consider the number of tickets allocated to the healthy tombola as a measure of their willingness to invest in their health.

be that individuals did not pay much attention during the consultation. For example, only 30.6% correctly remembered their own level of CVD risk,<sup>34</sup> a key information given during the consultation (see Appendix Figure A6). Despite this, the medical consultation had some small effects. Evidence suggest that those with unhealthy behaviors but normal results during the consultation may have interpreted the reassuring news as a validation of their behaviors (Marteau et al. 1996). Our results also echo the modest benefits of similar preventive screening (Deutekom et al. 2011) and the challenges to encourage behavioral change, particularly in low-income groups (Bull et al. 2014).

## 7. Incentive cost and benefits

We present a cost-effectiveness comparison across the four types of incentives in Table 6. Column 1 shows the treatment effects for the average amount paid per person. The total cost per arm are presented in detail in Appendix Table A7. Costs include payment of the blood test at the lab and the incentives to individuals or groups. We exclude the cost of clinic staff because it is sensitive to the scale of the prevention program and specific decisions around staffing at the clinic.<sup>35</sup> The results show that all four incentive designs yield similar additional costs—between USD2 and USD3 more per person than the control group. Group incentives have slightly lower costs, which is driven by the structure of incentives: for example, in the individual cash reward arm, 100% of people who completed the check-up received their USD5 reward, but only 72% of compliers in the group cash reward arm did due to lack of completion by others. Still, the similarity of costs across treatments suggests that differences in the impact on the decision to do a blood test, which incurs lab costs, and to complete the consultation are not large enough to make a significant difference to average payments.

We next consider the cost-effectiveness of incentives. Column 2 reproduces the treatment effect on the indicator variable for completing the check-up using the double LASSO model, shown in Table 2. Column 4 shows the ITT effect on an indicator variable for receiving a diagnosis for a new risk factor, also presented in Appendix Table A6.<sup>36</sup> Columns 3 and 5 show the cost per additional check-up and per additional risk factor diagnosed, calculated by dividing the cost estimates in column 1 by the effect estimates in columns 2 and 4 for each treatment. We first consider cost-effectiveness for additional preventive check-ups. Except for the

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<sup>34</sup> At the consultation, based on their blood results and main characteristics, patients were told whether they had with a low, medium, or high risk of mortality within the next 10 years.

<sup>35</sup> In agreement with ASEI, we hired a full-time doctor to receive all participants coming for their medical consultation. This decision was based on concerns that a large influx of patients would disrupt the normal functioning of the clinic and the provision of other services. In practice, the daily flow of patients coming for the medical check-up was between 1 and 15, which could have been handled by a part-time doctor. It also meant that the new doctor had the capacity to contribute to other activities in the clinic, hence spreading the fixed cost of this recruitment.

<sup>36</sup> Note that this effect is the ITT effect, and hence it is smaller than the local average treatment effect estimated with an instrumental variable presented in Table 5.



individual lottery arm, which is significantly less effective and therefore less cost-effective, differences in costs and effects across incentive designs are not large enough to yield differences in cost-effectiveness. The cost per additional check-up comes at around USD11 for group incentives (column 3), which is only slightly more cost-effective than individual ones (USD14), although this lower efficiency is mainly driven by the poor performance of individual lotteries.<sup>37</sup> When considering new diagnosed risk factors, the trade-off between treatment effects and cost-effectiveness is more salient. For this outcome, the treatment effects are smaller and less precise (column 4), but the differences across incentives are more pronounced.

We also find that, on average, group incentives are more cost-effective than individual ones, at USD26.4 per additional diagnosis, versus USD30.6 for individual incentives. However, due to their larger impact on the likelihood of detecting a new diagnosis, individual cash rewards are more cost-effective than group cash rewards, with a cost of USD23.5 per new diagnosis compared to USD34.3 for group rewards. Meanwhile, individual lotteries are less than half as effective at detecting new diagnoses than group lotteries, and as a result, the cost-effectiveness gap between the two is wide: group lotteries have a cost of USD23.4 per new diagnosis compared to USD54.7 for individual ones.

To go one step further, we use the cost per new diagnosis and follow the approach of Berry et al. (2020) to estimate the cost per DALY averted for the different incentives (see Appendix F for more details). We assume that an individual diagnosed with a particular risk factor avoids a CVD death if she manages well her risk factor, which happens with a probability estimated in the medical literature. Following estimates from the Global Burden of Disease (Global Burden of Disease Collaborative Network 2020), we then relate these deaths averted to DALYs averted in Salvador. Because these effects highly depend on the type of risk factor diagnosed, we report three scenarios: an upper bound scenario where all individuals are diagnosed with the risk factor with the highest probability of being managed (diabetes), a lower bound scenario where all new diagnoses made have the lowest management probability (hypertension), and one average scenario where we compute a composite management probability following the actual risk profiles of individuals.

The pooled results, presented in Figure 1, show that group incentives are more cost-effective than individual ones, at USD499 versus USD568 per DALY averted in our average scenario. The disaggregated results, presented in Appendix Figure F1, show the marginal cost per DALY averted ranges from USD411 with group lotteries to USD1,324 with individual ones. This confirms that group lotteries are much more efficient than individual lotteries and are as cost-effective as individual cash rewards despite their lower targeting power. All of these values fall below the cost-effectiveness thresholds typically used by policymakers of one to three times

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<sup>37</sup> The cost per additional check-up is USD18 per additional visit for individual lotteries, while all three other incentive arms are close to USD11 per additional visit.

the annual per capita GDP (at purchasing power parity)—which was USD9,402 for El Salvador at the time of our study (Hutubessy et al. 2003).<sup>38</sup>

## 8. Conclusion

The popularity of team incentives in the private sector is driven by organizational factors (existence of team production) as well as the belief that individuals can be motivated by within-group dynamics. In a randomized trial organized in El Salvador with 400 micro-loan groups, we provide the first evidence that group dynamics can indeed be leveraged to enhance the effects of incentives and be used to encourage the adoption of desirable behaviors outside the context of team production and private firms. Despite the uncertainty about others' behaviors, we find that incentives relying on group and individual conditionalities are equally effective at increasing the demand for a preventive health check-up even when the payment of individual incentives occurs more quickly. When payment schedules are the same, incentives based on collective conditionality perform better.

We also identify a range of social interactions between members—prevalence and effectiveness of communication, peer pressure, and coordination—that are both more prevalent and more effective with group incentives. Together, we suggest that these act as targeted interventions, which not only overcome uncertainty about others' behaviors but also increase the demand for prevention by increasing the value of the preventive service and addressing individual self-control problems. Since they mechanically encourage universal take-up in our design, group incentives do not create the same efficient self-selection mechanism as individual incentives, which attract more of those who are at greater risk of developing a CVD ex-ante. Despite this, they remain a highly cost-effective intervention to detect undiagnosed risk factors in low-income populations.

The study has several policy implications. First, group incentives could be another effective tool to increase the demand for products or services, which is naturally stifled by incorrect beliefs (low perceived value) as well as self-control problems. Beyond health, organizations encouraging the take-up of a behavior through small incentives should consider experimenting with collective conditions as well as individual ones. This strategy should also be considered for those spending resources on reminders or promotional messages; using group lotteries could prove a simpler and more effective way to generate similar actions, with greater impact. A second and related implication of our study is that group incentives may be better suited for

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<sup>38</sup> To be conservative, for GDP per capita, we use the 2019 figure because there was a sharp decline in GDP in 2020 due to the Covid pandemic.

promoting services whose coverage should be (near) universal. If there is a heterogeneity of needs within group members, incentives based on collective conditionalities will mechanically lead to over-inclusion. Still, given the evidence on the low take-up of cost-effective technologies in low-income settings, there are many potential areas of application where targeting concerns are limited, such as vaccinations in health or the adoption of new technologies in agriculture.

Further research on understanding the performance of group incentives to encourage behavioral change would be highly valuable. Our results suggest at least two directions. The first follows from the specificity of our context. Unlike many studies before, we explore the effect of group incentives in groups that were already formed, sometimes for many years. If such incentives were to be scaled up, it would be important to know to what extent they can be used beyond endogenously formed groups. One concern might be that the effects we find are an artifact of the strong social links in the groups. A few studies in high-income settings provide some reassurance that team incentives are effective in exogenously formed groups (Babcock et al. 2015), including for health behaviors (Haisley et al. 2012, Kullgren et al. 2013, Patel et al. 2016). Nevertheless, if the mechanisms driving group incentives are less likely to occur in groups of strangers, it would be important to know if they are replaced by alternative ones (e.g., social image concerns) or if group incentives are less effective. Whether incentives perform better in endogenously or exogenously created groups is an avenue for further research. Second, in our exploratory analysis we found no evidence that group characteristics such as the size and strength of connections affected the impact of group incentives, although an all-female membership did. This mixed evidence suggests further investigation of the role of group characteristics on group incentives and within-group dynamics more generally. It is likely that the influence of group characteristics may be context and service specific, so finding general answers may be difficult. Iterations between the field and the lab would be useful in understanding how different characteristics of a group may influence the impact and channels of group incentives compared to individual ones.

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**Table 1. Sample composition and descriptive statistics**

	Full sample	Control Group	Control – Individual Reward	Control – Group Reward	Control – Individual Lottery	Control – Group Lottery	Joint test
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Panel A: Individual characteristics</b>							
Female	0.847 (0.360)	0.842 (0.365)	0.026 [0.033]	0.006 [0.036]	-0.036 [0.037]	0.028 [0.034]	0.340
Age	43.453 (12.852)	43.421 (13.138)	-0.409 [1.162]	0.336 [1.139]	-0.412 [1.106]	0.689 [1.131]	0.861
Primary education or less	0.602 (0.490)	0.597 (0.491)	-0.022 [0.046]	-0.007 [0.044]	0.019 [0.044]	0.034 [0.046]	0.779
Is under poverty level	53.777 (19.353)	54.575 (20.140)	-1.597 [1.604]	-1.681 [1.616]	-0.704 [1.646]	-0.001 [1.526]	0.708
Currently smoking	0.075 (0.263)	0.061 (0.239)	0.011 [0.020]	0.040 [0.023]	0.027 [0.022]	-0.007 [0.019]	0.212
Ever diagnosed with diabetes	0.131 (0.338)	0.121 (0.327)	0.037 [0.029]	0.027 [0.027]	0.003 [0.028]	-0.017 [0.026]	0.219
Ever diagnosed with high cholesterol	0.207 (0.405)	0.221 (0.416)	-0.036 [0.033]	0.022 [0.035]	-0.040 [0.033]	-0.016 [0.035]	0.287
Under treatment for hypertension	0.157 (0.364)	0.170 (0.376)	-0.005 [0.031]	-0.012 [0.030]	-0.019 [0.034]	-0.028 [0.031]	0.898
Under treatment for high cholesterol	0.068 (0.252)	0.082 (0.275)	-0.016 [0.022]	-0.006 [0.022]	-0.012 [0.022]	-0.034 [0.021]	0.491
Under treatment for diabetes	0.106 (0.307)	0.109 (0.312)	0.017 [0.027]	0.017 [0.025]	-0.015 [0.026]	-0.037 [0.023]	0.080
Under treatment for any risk factor	0.236 (0.425)	0.270 (0.444)	-0.024 [0.038]	-0.030 [0.034]	-0.034 [0.039]	-0.080 [0.036]	0.239
Is hypertensive (measured or under treatment)	0.303 (0.460)	0.330 (0.471)	-0.046 [0.037]	-0.024 [0.037]	-0.022 [0.041]	-0.046 [0.039]	0.722
Is obese (measured)	0.595 (0.491)	0.606 (0.489)	-0.022 [0.042]	-0.000 [0.041]	-0.002 [0.042]	-0.032 [0.042]	0.894
Has medium or high 10-year CVD risk	0.157 (0.363)	0.179 (0.384)	-0.044 [0.031]	-0.008 [0.032]	-0.025 [0.032]	-0.034 [0.033]	0.572
In good or very good health (self-reported)	0.485 (0.500)	0.494 (0.501)	-0.021 [0.038]	0.001 [0.040]	0.011 [0.039]	-0.037 [0.037]	0.742
Health care visits in last 3 months	1.113 (1.530)	1.115 (1.663)	0.037 [0.141]	0.072 [0.135]	-0.096 [0.131]	-0.017 [0.140]	0.648
Ever done a preventive consultation	0.148 (0.355)	0.145 (0.353)	0.004 [0.026]	0.028 [0.030]	-0.003 [0.027]	-0.016 [0.028]	0.691
Observations	1,629	330	334	317	331	317	

**Panel B: Group characteristics**



Number of members in group	4.072 (1.154)	4.177 (1.248)	-0.054 [0.190]	-0.215 [0.191]	-0.091 [0.192]	-0.165 [0.182]	0.791
In a <i>Grupo Solidario</i>	0.907 (0.290)	0.911 (0.286)	-0.010 [0.046]	0.001 [0.045]	-0.010 [0.046]	-0.000 [0.046]	0.998
Number of past loans together	1.630 (2.830)	1.911 (3.005)	-0.097 [0.473]	-0.486 [0.459]	-0.467 [0.446]	-0.354 [0.462]	0.756
Observations	400	79	81	80	81	79	

Notes: Column 1 shows mean values and standard deviations in parenthesis for the full sample. Column 2 shows means and standard deviations in parenthesis for the control group. Columns 3 to 6 report the coefficients and standard errors in brackets for OLS regressions in which the variable is included as the dependent variable is regressed on the full set of treatment indicators. Column 7 presents an overall F-test showing whether all four incentives are jointly equal to zero.

**Table 2. Impact of incentives on the demand for prevention**

	Completed the check-up		Did the blood test		Completed the medical consultation [conditional on doing blood test]	
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: Pooled incentive designs</b>						
Individual incentive	0.183 (0.036)	0.182 (0.036)	0.151 (0.039)	0.148 (0.038)	0.181 (0.063)	0.193 (0.063)
Group incentive	0.220 (0.041)	0.220 (0.041)	0.210 (0.042)	0.208 (0.042)	0.140 (0.064)	0.152 (0.064)
P-value for group vs. individual incentives	0.376	0.350	0.151	0.137	0.161	0.138
<b>Panel B: Disaggregated incentive designs</b>						
Individual Reward	0.225 (0.044)	0.224 (0.044)	0.180 (0.045)	0.177 (0.045)	0.213 (0.062)	0.224 (0.062)
Group Reward	0.215 (0.055)	0.214 (0.054)	0.200 (0.056)	0.198 (0.056)	0.153 (0.069)	0.159 (0.069)
Individual Lottery	0.140 (0.044)	0.138 (0.044)	0.121 (0.048)	0.119 (0.047)	0.141 (0.072)	0.146 (0.070)
Group Lottery	0.222 (0.049)	0.224 (0.049)	0.218 (0.050)	0.217 (0.049)	0.129 (0.068)	0.144 (0.068)
P-value for group vs. individual reward	0.872	0.863	0.732	0.722	0.118	0.079
P-value for group vs. individual lottery	0.136	0.117	0.082	0.074	0.802	0.959
Control mean	0.155	0.155	0.206	0.206	0.750	0.750
Fixed effects	Yes	-	Yes	-	Yes	-
Pre-specified controls	Yes	No	Yes	No	Yes	No
Lasso-selected controls	No	Yes	No	Yes	No	Yes
# of Groups	400	400	400	400	229	229
# of observations	1,629	1,629	1,629	1,629	555	555

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable in columns 1-2 is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). The dependent variable in Columns 3-4 is a binary indicator whether an individual completed the blood exam. The dependent variable in columns 5-6 is binary indicator whether an individual completed the medical consultation conditional on having completed the blood exam. Fixed effects include group type (Banco Comunal, Small Grupo Solidario, or Large Grupo Solidario) and interview week fixed effects. A pre-specified set of controls is used in the models presented in columns 1, 3, and 5 which include whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic. In columns 2, 4 and 6 controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The samples in columns 1-4 include all individual from all incentive groups. The sample in columns 5 and 6 includes only individuals who completed the blood test.

**Table 3. Heterogeneous effects of incentives**

	Interacted variable (individual)			Interacted variable (group)	
	10-year CVD risk (log) (1)	Used preventive care before (2)	Opportunity cost (log) (3)	Group has at least 4 members (4)	All female group (5)
<b>Panel A: Pooled incentive designs</b>					
II: Individual incentives	0.086 (0.054)	0.158 (0.036)	0.346 (0.077)	0.167 (0.045)	0.109 (0.053)
GI: Group incentives	0.176 (0.062)	0.216 (0.043)	0.351 (0.077)	0.211 (0.049)	0.115 (0.061)
Interacted variable	0.061 (0.038)	-0.123 (0.038)	0.021 (0.035)	0.229 (0.141)	-0.004 (0.054)
II × Interacted variable	0.071 (0.031)	0.165 (0.064)	-0.088 (0.035)	0.049 (0.074)	0.137 (0.073)
GI × Interacted variable	0.030 (0.032)	0.029 (0.070)	-0.071 (0.034)	0.035 (0.091)	0.169 (0.083)
<b>Panel B: Disaggregated incentive designs</b>					
IR: Individual Reward	0.110 (0.064)	0.197 (0.043)	0.362 (0.099)	0.185 (0.054)	0.135 (0.062)
GR: Group Reward	0.054 (0.065)	0.117 (0.044)	0.343 (0.090)	0.141 (0.054)	0.072 (0.064)
IL: Individual Lottery	0.149 (0.078)	0.206 (0.057)	0.353 (0.098)	0.213 (0.059)	0.128 (0.079)
GL: Group Lottery	0.195 (0.077)	0.223 (0.052)	0.353 (0.091)	0.205 (0.060)	0.080 (0.072)
Interacted variable	0.059 (0.037)	-0.123 (0.038)	0.027 (0.035)	0.218 (0.142)	-0.017 (0.055)
IR × Interacted variable	0.085 (0.038)	0.185 (0.081)	-0.074 (0.043)	0.094 (0.089)	0.154 (0.089)
GR × Interacted variable	0.062 (0.036)	0.142 (0.077)	-0.113 (0.043)	-0.007 (0.091)	0.128 (0.087)
IL × Interacted variable	0.044 (0.037)	0.064 (0.088)	-0.075 (0.043)	0.022 (0.128)	0.139 (0.106)
GL × Interacted variable	0.019 (0.040)	-0.010 (0.092)	-0.069 (0.041)	0.060 (0.108)	0.232 (0.099)
Control group mean	0.155	0.155	0.155	0.155	0.155
LASSO selected controls	Yes	Yes	Yes	Yes	Yes
# of groups	400	400	400	400	400
# of observations	1629	1629	1629	1,629	1,629

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Column 1-5 report heterogeneous results using: (1) the log transformation of Globorisk 10-year CVD mortality risk; (2) whether the

respondent had ever gone to a preventive consultation before; (3) the log transformation of the complete prevention opportunity cost; (4) a binary indicator for whether the individual belongs to a group of at least 4 members; and (5) whether the individual belongs to an all-female group. Controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The pre-specified set of controls include fixed effects (group type and week fixed effects) and individual controls such as whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

**Table 4. Mechanisms**

	Communication				Peer pressure		Collective action		
	Talked to other(s) about voucher	Discussed own visit with others	Heard from someone about their visit	Knowledge of fellow members' decisions	Reminded or motivated others to attend	Was reminded or motivated to attend by other members	Coordinated with other members to go to lab or clinic	Attended Lab with another member	Attended Clinic with another member
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Panel A: Pooled incentive designs</b>									
Individual incentive	0.010 (0.027)	0.048 (0.057)	0.098 (0.039)	0.057 (0.034)	0.045 (0.025)	0.038 (0.032)	0.135 (0.040)	0.041 (0.030)	0.066 (0.021)
Group incentive	0.082 (0.025)	0.097 (0.056)	0.159 (0.040)	0.211 (0.036)	0.064 (0.025)	0.077 (0.032)	0.243 (0.040)	0.125 (0.034)	0.159 (0.029)
P-value for group vs. individual incentives	0.002	0.137	0.123	<0.001	0.282	0.102	0.002	0.011	0.002
<b>Panel B: Disaggregated incentive designs</b>									
Individual Reward	-0.012 (0.034)	0.041 (0.061)	0.103 (0.050)	0.066 (0.040)	0.036 (0.029)	0.043 (0.037)	0.137 (0.046)	0.037 (0.035)	0.084 (0.029)
Group Reward	0.099 (0.027)	0.118 (0.061)	0.114 (0.051)	0.249 (0.043)	0.069 (0.028)	0.088 (0.037)	0.244 (0.049)	0.129 (0.046)	0.171 (0.042)
Individual Lottery	0.033 (0.030)	0.056 (0.062)	0.092 (0.045)	0.048 (0.041)	0.054 (0.027)	0.033 (0.037)	0.133 (0.047)	0.044 (0.037)	0.049 (0.024)
Group Lottery	0.066 (0.031)	0.077 (0.061)	0.203 (0.048)	0.171 (0.045)	0.058 (0.028)	0.067 (0.036)	0.243 (0.044)	0.122 (0.041)	0.146 (0.036)
P-value for group vs. ind. reward	0.001	0.091	0.857	<0.001	0.180	0.196	0.033	0.062	0.066
P-value for group vs. ind. lottery	0.304	0.664	0.036	0.011	0.879	0.309	0.018	0.090	0.011
Control means	0.785	0.759	0.237	0.368	0.838	0.723	0.405	0.085	0.027
LASSO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1572	500	1572	1552	1572	1572	1572	1629	1629

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Outcomes in columns 1 -3 are binary and represent whether the individual talked about using the voucher with another group member, shared their experience of the check-up with other members or if they heard from other members about their screening experience. Column 2 only relies on sample individuals who attended the full check-up. The outcome in column 4 is a knowledge index ranging from 0 to 1 that represents the percent of fellow group members whose decision to do the check-up or not is accurately known by the respondent. Columns 5 and 6 are binary outcomes whether the individual reminded others to use the voucher or whether they were reminded by other group members to use it. Column 7 is a binary outcome if the individual self-reported to have coordinated the process (lab or clinic) with another group members. Columns 8 and 9 are binary outcomes whether the individual attended the lab or clinic the same day as another member of the group based on the administrative records. Columns 1 – 7 are missing 57 individuals who did not participate in the follow up survey. Controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The pre-specified set of controls include fixed effects (group type and week fixed effects) and individual controls such as whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

**Table 5. Effects of preventive check-up (IV estimates)**

	Diagnosis	Knowledge	Attitude towards behaviour change		Healthy behaviours			
	Diagnosed with new risk factor	Believes has medium/high risk of developing CVD	Willing to change habits to improve health	Believes CVD risk factors cannot be changed	# of days eating fast food	# of days eating fruits or vegetables	# of days drinking SSBs	# of tickets for healthy lottery prize
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Did the CVD check-up	0.472 (0.065)	0.091 (0.152)	0.160 (0.123)	-0.050 (0.116)	0.053 (0.508)	0.542 (0.610)	-0.808 (0.768)	0.967 (0.632)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,629	1,493	1,572	1,572	1,572	1,572	1,572	1,571

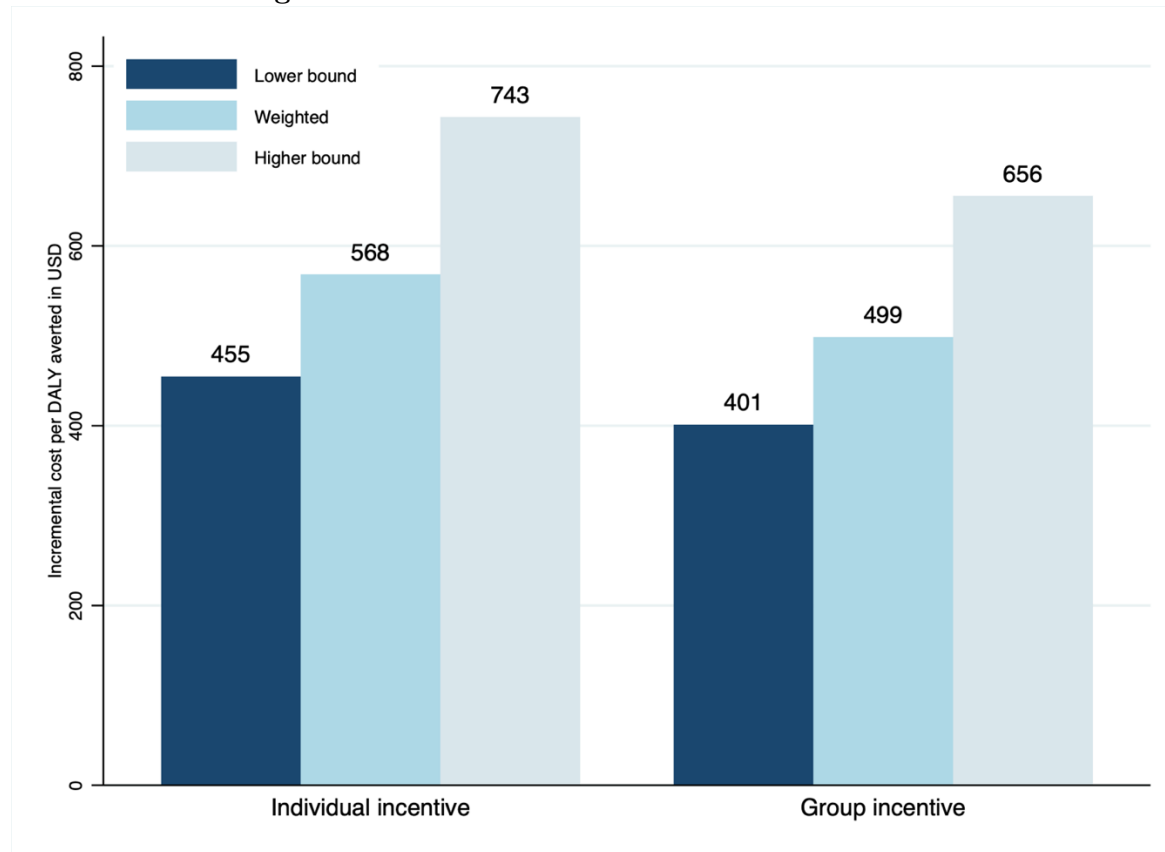
Notes: Table presents 2SLS estimates with standard errors clustered at the group level in parenthesis and treatment group dummies as instrumental variables for completing the full medical check-up. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Dependent variables are defined as follows: Column 1 presents whether the individual has been diagnosed with at least one CVD risk factor in the follow up survey; Column 2 is a binary dependent variable whether the individual perceives their risk of developing CVD to be medium or high; Column 3 is a binary indicator whether the individual was willing to change their habits to improve their health; Column 4 is a binary variable whether the respondent believes something can be done to improve CVD risk factors; Column 5 is a continuous measure of the number of days in the last week in which the respondent ate fast food; Column 6 is a continuous measure of the number of days in the last week in which the respondent ate either fruits or vegetables; Column 7 is a continuous of the number of days in the last week in which the respondent consumed sugar sweetened beverages; and Column 8 is a continuous measure ranging from 0-10 on how many tickets they choose for the health lottery prize. Fixed effects include group type and week fixed effects. Group types can be Banco Comunal, Small Grupo Solidario, or Large Grupo Solidario. Individual controls include a binary indicator whether the individual is over the age of 50, gender, a binary indicator for whether the individual has basic education or higher, 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

**Table 6. Cost effectiveness of completed check-up and new diagnosis**

	Amount paid per person (1)	Preventive checkup		Diagnosis	
		Completed check-up (2)	Cost per check-up (3)	New diagnosis (4)	Cost per new diagnosis (5)
<b>Panel A: Pooled incentive designs</b>					
Individual incentive	2.511 (0.460)	0.182 (0.036)	14.139 (2.342)	0.086 (0.022)	30.647 (8.429)
Group incentive	2.298 (0.714)	0.220 (0.041)	10.837 (1.720)	0.094 (0.025)	26.445 (7.315)
<b>Panel B: Disaggregated incentive designs</b>					
Individual reward	2.712 (0.414)	0.224 (0.044)	11.987 (0.992)	0.118 (0.029)	23.522 (4.916)
Group reward	2.235 (0.510)	0.214 (0.054)	10.959 (1.286)	0.078 (0.031)	34.330 (20.506)
Individual lottery	2.308 (0.801)	0.138 (0.044)	18.029 (6.252)	0.053 (0.026)	54.771 (110.892)
Group Lottery	2.361 (1.320)	0.224 (0.049)	10.819 (2.960)	0.109 (0.032)	23.415 (8.770)
LASSO selected controls	Yes	Yes		Yes	
N	1629	1629		1629	

Notes: Columns 1,2 and 4 present OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable in column 1 is the amount paid to the participant, the outcomes in columns 2 and 4 are binary outcomes of whether an individual completed a check-up or whether they were given a new risk factor diagnosis. Columns 3 and 5 are the cost per completed check-up and cost per new diagnosis respectively. Estimates and standard errors in columns 3 and 5 obtained from bootstrapped multiple dependent multivariate regressions with the amount paid per person and the completed check-ups for column 3 and the amount paid per person and the number of new diagnoses for column 5. Values in table represent the average ratio and standard errors of the ratio distribution are presented in parenthesis.

**Figure 1. Incremental cost effectiveness estimates**



Note: the figure plots, for each type of conditionality (individual or collective) the additional cost per DALY averted compared to the control group. The lower (higher) bound estimates represent an extreme scenario where for all new CVD risk factors detected individuals would have the lowest (highest) average probability of managing to subsequently manage them. The weighted estimates are calculated following the actual risk profile of individuals and applying disease-specific management probability. All details can be found in Appendix F.



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## Appendix A: Additional Tables and Figures

Table A1. Attrition at endline

	(1)	(2)	(3)
	1 = No follow up	1 = Refused	3 = Could not be reached
Individual Reward	0.004 (0.013)	0.004 (0.006)	-0.000 (0.011)
Group Reward	0.014 (0.015)	-0.000 (0.007)	0.014 (0.013)
Individual Lottery	0.008 (0.015)	0.009 (0.008)	-0.000 (0.012)
Group Lottery	0.005 (0.014)	-0.000 (0.006)	0.005 (0.012)
Over the age of 50	-0.015 (0.011)	-0.002 (0.005)	-0.014 (0.009)
Education: No or basic education	0.024* (0.009)	-0.004 (0.005)	0.028*** (0.008)
Male	0.029 (0.016)	0.013 (0.009)	0.016 (0.015)
BMI	-0.000 (0.001)	-0.000 (0.000)	-0.000 (0.001)
10-year CVD risk	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)
Daily gross income in USD	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Total cost of preventive visit (Opportunity and transport)	-0.000 (0.001)	-0.000 (0.000)	-0.000 (0.001)
Constant	0.009 (0.041)	0.023 (0.031)	-0.014 (0.027)
Observations	1,629	1,629	1,629
Fixed effects	Yes	Yes	Yes

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable in column 1 is a binary variable whether the individual was not followed up, in column 2 is a binary variable whether the participant refused to be followed up and column 3 is a binary variable whether the individuals could not be reached.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table A2. Heterogeneous effects of incentives

	Interacted variable (individual)			Interacted variable (group)	
	10-year CVD risk (log)	Used preventive care before	Opportunity cost (log)	Group has at least 4 members	All female group
	(1)	(2)	(3)	(4)	(5)
<b>Panel A: Pooled incentive designs</b>					
II: Individual incentives	0.086 (0.054)	0.160*** (0.037)	0.359*** (0.077)	0.165*** (0.045)	0.109* (0.053)
GI: Group incentives	0.176** (0.062)	0.216*** (0.043)	0.358*** (0.077)	0.212*** (0.049)	0.115 (0.061)
Interacted variable	0.062 (0.038)	-0.119** (0.039)	0.028 (0.035)	0.233 (0.141)	-0.004 (0.054)
II × Interacted variable	0.071* (0.031)	0.162* (0.063)	-0.095** (0.035)	0.049 (0.073)	0.137 (0.073)
GI × Interacted variable	0.030 (0.032)	0.030 (0.070)	-0.074* (0.034)	0.034 (0.091)	0.169* (0.083)
<b>Panel B: Disaggregated incentive designs</b>					
IR: Individual Reward	0.109 (0.064)	0.198*** (0.044)	0.372*** (0.098)	0.184*** (0.054)	0.142* (0.062)
GR: Group Reward	0.055 (0.065)	0.120** (0.045)	0.358*** (0.091)	0.143** (0.055)	0.080 (0.064)
IL: Individual Lottery	0.152 (0.078)	0.207*** (0.057)	0.359*** (0.099)	0.215*** (0.060)	0.137 (0.079)
GL: Group Lottery	0.196* (0.077)	0.222*** (0.052)	0.362*** (0.090)	0.206*** (0.061)	0.087 (0.072)
Interacted variable	0.059 (0.038)	-0.120** (0.039)	0.034 (0.035)	0.227 (0.139)	-0.005 (0.054)
IR × Interacted variable	0.085* (0.038)	0.181* (0.081)	-0.079 (0.043)	0.098 (0.089)	0.140 (0.089)
GR × Interacted variable	0.062 (0.037)	0.139 (0.077)	-0.120** (0.043)	-0.007 (0.088)	0.117 (0.086)
IL × Interacted variable	0.043 (0.038)	0.065 (0.088)	-0.078 (0.043)	0.017 (0.129)	0.127 (0.107)
GL × Interacted variable	0.018 (0.040)	-0.011 (0.094)	-0.075 (0.040)	0.051 (0.107)	0.217* (0.100)
Control group mean	0.155	0.155	0.155	0.155	0.155
Fixed effects	Yes	Yes	Yes	Yes	Yes
Pre-specified controls	Yes	Yes	Yes	Yes	Yes
# of groups	400	400	400	400	400
# of observations	1629	1629	1629	1,629	1,629

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable for is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Column 1-5 report heterogeneous results using: (1) the log transformation of Globorisk 10-year CVD mortality risk; (2) whether the respondent had ever gone to a preventive consultation before; (3) the log transformation of the complete prevention opportunity cost; (4) a binary indicator for whether the group consisted of at least 4 members; and (5) whether the group only included female members. Fixed effects include group type (Banco Comunal, Small Grupo Solidario, or Large Grupo Solidario) and interview week fixed effects. A pre-specified set of controls is used in the models presented in columns 1, 3, and 5 which include whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

Table A3. Mechanisms

	Communication				Peer pressure		Collective action		
	Talked to other(s) about voucher	Discussed own visit with others	Heard from someone about their visit	Knowledge of fellow members' decisions	Reminded or motivated others to attend	Was reminded or motivated to attend by other members	Coordinated with other members to go to lab or clinic	Attended Lab with another member	Attended Clinic with another member
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Panel A: Pooled incentive designs</b>									
Individual incentive	0.009 (0.027)	0.060 (0.059)	0.101* (0.039)	0.073* (0.033)	0.056* (0.025)	0.042 (0.033)	0.143*** (0.039)	0.041 (0.030)	0.068** (0.023)
Group incentive	0.081** (0.025)	0.109 (0.058)	0.153*** (0.040)	0.218*** (0.035)	0.071** (0.024)	0.083* (0.033)	0.248*** (0.039)	0.131*** (0.034)	0.162*** (0.030)
P-value for group vs. individual incentives	0.002	0.147	0.186	<0.001	0.405	0.093	0.002	0.008	0.002
<b>Panel B: Disaggregated incentive designs</b>									
Individual Reward	-0.012 (0.034)	0.056 (0.064)	0.106* (0.049)	0.083* (0.039)	0.046 (0.028)	0.047 (0.038)	0.145** (0.046)	0.035 (0.035)	0.084** (0.030)
Group Reward	0.100*** (0.027)	0.138* (0.063)	0.105* (0.052)	0.260*** (0.042)	0.079** (0.027)	0.096* (0.038)	0.255*** (0.049)	0.134** (0.047)	0.176*** (0.042)
Individual Lottery	0.032 (0.030)	0.065 (0.064)	0.095* (0.045)	0.063 (0.040)	0.067* (0.027)	0.038 (0.037)	0.141** (0.045)	0.048 (0.037)	0.052 (0.027)
Group Lottery	0.064* (0.031)	0.085 (0.062)	0.198*** (0.046)	0.176*** (0.044)	0.063* (0.027)	0.069 (0.036)	0.242*** (0.043)	0.128** (0.040)	0.147*** (0.035)
P-value for group vs. ind. reward	0.001	0.081	0.994	<0.001	0.189	0.145	0.029	0.046	0.047
P-value for group vs. ind. lottery	0.321	0.676	0.047	0.018	0.852	0.358	0.026	0.081	0.014
Control means	0.785	0.759	0.237	0.368	0.838	0.723	0.405	0.085	0.027
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-specified controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1572	500	1572	1552	1572	1572	1572	1629	1629

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Outcomes in columns 1 -3 are binary and represent whether the individual talked about using the voucher with another group member, shared their experience of the check-up with other members or if they heard from other members about their screening experience. Column 2 only relies on sample

individuals who attended the full check-up. The outcome in column 4 is a knowledge index ranging from 0 to 1 that represents the percent of fellow group members whose decision to do the check-up or not is accurately known by the respondent. Columns 5 and 6 are binary outcomes whether the individual reminded others to use the voucher or whether they were reminded by other group members to use it. Column 7 is a binary outcome if the individual self-reported to have coordinated the process (lab or clinic) with another group members. Columns 8 and 9 are binary outcomes whether the individual attended the lab or clinic the same day as another member of the group based on the administrative records. Columns 1 – 7 are missing 57 individuals who did not participate in the follow up survey. Fixed effects include group type (Banco Comunal, Small Grupo Solidario, or Large Grupo Solidario) and interview week fixed effects. A pre-specified set of controls is used in the models presented in columns 1, 3, and 5 which include whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table A4. Group coordination for screening

	Attended Lab within 30 minutes another member (1)	Attended Clinic within 30 minutes of another member (2)	Attended Lab with at least two other members (3)	Attended Clinic with at least two other members (4)
<b>Panel A: Pooled incentive designs</b>				
Individual incentive	0.042 (0.029)	0.036** (0.014)	0.021 (0.019)	0.012 (0.014)
Group incentive	0.120*** (0.033)	0.095*** (0.019)	0.097*** (0.027)	0.081*** (0.024)
P-value for group vs. ind. Incentive	0.018	0.002	0.006	0.006
<b>Panel B: Disaggregated incentive designs</b>				
Individual Reward	0.040 (0.034)	0.048** (0.019)	0.015 (0.023)	0.015 (0.019)
Group Reward	0.119** (0.045)	0.087*** (0.023)	0.111** (0.038)	0.120** (0.039)
Individual Lottery	0.044 (0.036)	0.023 (0.015)	0.027 (0.023)	0.009 (0.015)
Group Lottery	0.120** (0.039)	0.104*** (0.026)	0.083* (0.035)	0.041 (0.024)
P-value for group vs. individual reward	0.102	0.149	0.017	0.012
P-value for group vs. individual lottery	0.090	0.003	0.144	0.204
Control mean	0.082	0.018	0.018	0.009
LASSO	Yes	Yes	Yes	Yes
# of observations	1629	1629	1629	1629

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). The dependent variable in columns 1-2 is a binary indicator whether an individual attended the lab and attended the clinic within 30 minutes of another group member respectively. The dependent variable in columns 3-4 is a binary indicator whether an individual attended the lab and clinic on a day that at least other two group members attended. Controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The pre-specified set of controls include fixed effects (group type and week fixed effects) and individual controls such as whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table A5. Coordinating events

	Control	Individual reward	Group reward	Individual lottery	Group lottery	Total
Blood exam						
Coordination events	13	19	26	19	27	104
% of total	12.5	18.3	25.0	18.3	26.0	
Clinic						
Coordination events	4	17	23	11	25	80
% of total	5.0	21.2	28.8	13.8	31.2	
Non-completing events	3	14	13	8	17	55
% of total	5.5	25.5	23.6	14.5	30.9	
Completing events	1	3	10	3	8	25
% of total	4.0	12.0	40.0	12.0	32.0	

Notes: Table presents the number of coordination event for each of the treatment arms. A coordination event at the lab is defined as an instance where at least two members of the same group went to the lab on the same day. A coordination event at the clinic is defined as an instance where at least two members of the same group went to the clinic on the same day. We distinguish of coordination events at the clinic: (1) non completing events- occur when there is at least one other group member who has not completed the medical consultation and (2) completing events- when the coordination event leads to the completion of the whole group.

Table A6. ITT effects of incentives of health behaviours

	Diagnosis	Knowledge	Attitude towards behaviour change		Healthy behaviours			
	Diagnosed with new risk factor	Believes has medium/high risk of developing CVD	Willing to change habits to improve health	Believes CVD risk factors cannot be changed	# of days eating fast food	# of days eating fruits or vegetables	# of days drinking SSBs	# of tickets for healthy lottery prize
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Panel A: Pooled incentive designs</b>								
Individual incentive	0.086*** (0.022)	0.044 (0.035)	0.039 (0.028)	-0.044 (0.028)	-0.119 (0.119)	0.016 (0.143)	-0.115 (0.179)	0.221 (0.139)
Group incentive	0.094*** (0.025)	0.003 (0.036)	0.026 (0.028)	-0.010 (0.028)	0.018 (0.117)	0.162 (0.140)	-0.168 (0.181)	0.265 (0.147)
P-value for group vs. ind. Incentive	0.773	0.159	0.576	0.148	0.114	0.175	0.703	0.728
<b>Panel B: Disaggregated incentive designs</b>								
Individual Reward	0.118*** (0.029)	0.049 (0.040)	0.041 (0.030)	-0.026 (0.032)	-0.037 (0.139)	0.017 (0.163)	-0.163 (0.203)	0.197 (0.163)
Group Reward	0.078* (0.031)	0.004 (0.041)	0.011 (0.032)	-0.001 (0.033)	0.017 (0.128)	0.129 (0.159)	-0.315 (0.200)	0.366* (0.180)
Individual Lottery	0.053* (0.026)	0.039 (0.040)	0.036 (0.033)	-0.061 (0.032)	-0.203 (0.127)	0.014 (0.163)	-0.065 (0.205)	0.245 (0.161)
Group Lottery	0.109*** (0.032)	0.002 (0.044)	0.042 (0.031)	-0.018 (0.032)	0.019 (0.138)	0.193 (0.159)	-0.023 (0.212)	0.166 (0.169)
P-value for group vs. individual reward	0.274	0.250	0.310	0.465	0.666	0.459	0.429	0.359
P-value for group vs. individual lottery	0.111	0.395	0.845	0.176	0.067	0.242	0.835	0.649
Control mean	0.076	0.582	0.788	0.249	1.713	5.427	2.352	7.191
LASSO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	1629	1493	1572	1572	1572	1572	1572	1571

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Dependent variables are defined as follows: Column 1 presents whether the individual has been diagnosed with at



least one CVD risk factor in the follow up survey; Column 2 is a binary dependent variable whether the individual perceives their risk of developing CVD to be medium or high; Column 3 is a binary indicator whether the individual was willing to change their habits to improve their health; Column 4 is a binary variable whether the respondent believes something can be done to improve CVD risk factors; Column 5 is a continuous measure of the number of days in the last week in which the respondent ate fast food; Column 6 is a continuous measure of the number of days in the last week in which the respondent ate either fruits or vegetables; Column 7 is a continuous of the number of days in the last week in which the respondent consumed sugar sweetened beverages; and Column 8 is a continuous measure ranging from 0-10 on how many tickets they choose for the health lottery prize. Controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The pre-specified set of controls include fixed effects (group type and week fixed effects) and individual controls such as whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.



\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table A7. Breakdown of outputs and costs

	Control	Individual reward	Group reward	Individual lottery	Group lottery
<b>Panel A: Outputs</b>					
Screenings					
# of lab tests	68	126	125	101	135
# of preventive consultations	51	124	114	91	121
# of preventive consultations for at-risk individuals	43	105	92	73	97
Diagnoses					
# of people screened & newly diagnosed	25	63	49	40	60
# of people at-risk screened & newly diagnosed	20	53	33	32	48
<b>Panel B: Realized cost breakdown (USD)</b>					
Blood tests	340	630	625	505	675
Incentives paid	0	620	410	600	400
Total cost	340	1250	1035	1105	1075
<b>Panel C: Expected cost breakdown (USD)</b>					
Blood tests	340	630	625	505	675
Incentives paid	0	620	410	455	395
Total cost	340	1250	1035	960	1070

Notes: Individuals who are more at risk of developing CVD are defined as those who have either (i) a self-reported diagnosed risk factor at baseline; (ii) an observed risk factor at baseline (obesity, hypertension, or smoking), or (iii) a medium to high 10-year CVD mortality risk. Individuals with new diagnosis are those who went to the clinic and report to have a new diagnosis of high cholesterol, hypertension, diabetes, or obesity. Panel B presents the realized cost breakdown of the experiments while Panel C presents the cost breakdown based on the expected pay-outs from the lotteries based on the proportion of groups where all members completed the check-up, the expected number of lottery winners drawn and average group sizes.



Figure A1. Examples of vouchers given to participants

 <p>Cupón DESSAP válido para un <b>control cardiovascular gratis</b> que incluye <b>1 examen de sangre* + 1 consulta médica</b></p>			
<p>Después de pasar consulta, <b>recibirá \$5.00</b> en la clínica ASEI</p>		<p>Cupón válido hasta _____</p> <p><small>*El examen de sangre incluye: colesterol (total + 'malo') y glucosa</small></p>	
<p><b>Paso 1:</b> ir al laboratorio</p> <p>Ir <b>EN AYUNAS</b>. No necesita hacer cita antes.</p>	<p><b>Paso 2:</b> ir a la clínica ASEI</p> <p>Hacer la cita con la clínica antes (tel. 7693-6746)</p>		


(a) Individual reward voucher

 <p>Cupón DESSAP válido para un <b>control cardiovascular gratis</b> que incluye <b>1 examen de sangre* + 1 consulta médica</b></p>			
<p>Participará en una lotería con otros ~400 clientes. <b>20 ganadores</b> serán seleccionados; cada <b>ganador</b> recibirá <b>\$100</b> si ha pasado consulta.</p>		<p>Cupón válido hasta _____</p> <p><small>*El examen de sangre incluye: colesterol (total + 'malo') y glucosa</small></p>	
<p><b>Paso 1:</b> ir al laboratorio</p> <p>Ir <b>EN AYUNAS</b>. No necesita hacer cita antes.</p>	<p><b>Paso 2:</b> ir a la clínica ASEI</p> <p>Hacer la cita con la clínica antes (tel. 7693-6746)</p>		



(b) Individual lottery voucher

 <p>Cupón DESSAP válido para un <b>control cardiovascular gratis</b> que incluye <b>1 examen de sangre* + 1 consulta médica</b></p>			
<p>Su <b>grupo</b> recibirá \$ ____ .00 si todos los miembros pasan consulta.</p>		<p>Cupón válido hasta _____</p> <p><small>*El examen de sangre incluye: colesterol (total + 'malo') y glucosa</small></p>	
<p><b>Paso 1:</b> ir al laboratorio</p> <p>Ir <b>EN AYUNAS</b>. No necesita hacer cita antes.</p>	<p><b>Paso 2:</b> ir a la clínica ASEI</p> <p>Hacer la cita con la clínica antes (tel. 7693-6746)</p>		

(c) Group reward voucher

 <p>Cupón DESSAP válido para un <b>control cardiovascular gratis</b> que incluye <b>1 examen de sangre* + 1 consulta médica</b></p>			
<p>Su grupo participará en una <b>lotería</b> con 80 otros grupos. Si su grupo es uno de los 4 seleccionados, <b>recibirán \$ ____</b> si <b>todos los miembros</b> <b>han pasado consulta.</b></p>		<p>Cupón válido hasta _____</p> <p><small>*El examen de sangre incluye: colesterol (total + 'malo') y glucosa</small></p>	
<p><b>Paso 1:</b> ir al laboratorio</p> <p>Ir <b>EN AYUNAS</b>. No necesita hacer cita antes.</p>	<p><b>Paso 2:</b> ir a la clínica ASEI</p> <p>Hacer la cita con la clínica antes (tel. 7693-6746)</p>		

(d) Group lottery voucher

 <p>Cupón DESSAP válido para un <b>control cardiovascular gratis</b> que incluye <b>1 examen de sangre* + 1 consulta médica</b></p>			
<p><b>¡Es totalmente gratis!</b></p>		<p>Cupón válido hasta _____</p> <p><small>*El examen de sangre incluye: colesterol (total + 'malo') y glucosa</small></p>	
<p><b>Paso 1:</b> ir al laboratorio</p> <p>Ir <b>EN AYUNAS</b>. No necesita hacer cita antes.</p>	<p><b>Paso 2:</b> ir a la clínica ASEI</p> <p>Hacer la cita con la clínica antes (tel. 7693-6746)</p>		

(e) Control group voucher

		<p><b>1 El día que vaya al laboratorio debe:</b></p> <ul style="list-style-type: none"> <li>Llevar este cupón y su DUI</li> <li>Ir en ayunas (no haber comido las 10 horas antes)</li> </ul> <p><b>2 El día de la consulta debe:</b></p> <ul style="list-style-type: none"> <li>Llevar este cupón y su DUI</li> <li>Asistir a la hora programada</li> </ul> <p>Número del cupón: 1003</p>	
<p>Cupón intransferible a nombre de: _____</p>			
			 <p>Laboratorio: escanee y guarde este cupón</p>

(f) Voucher back (standard)

Figure A2. Experimental Design

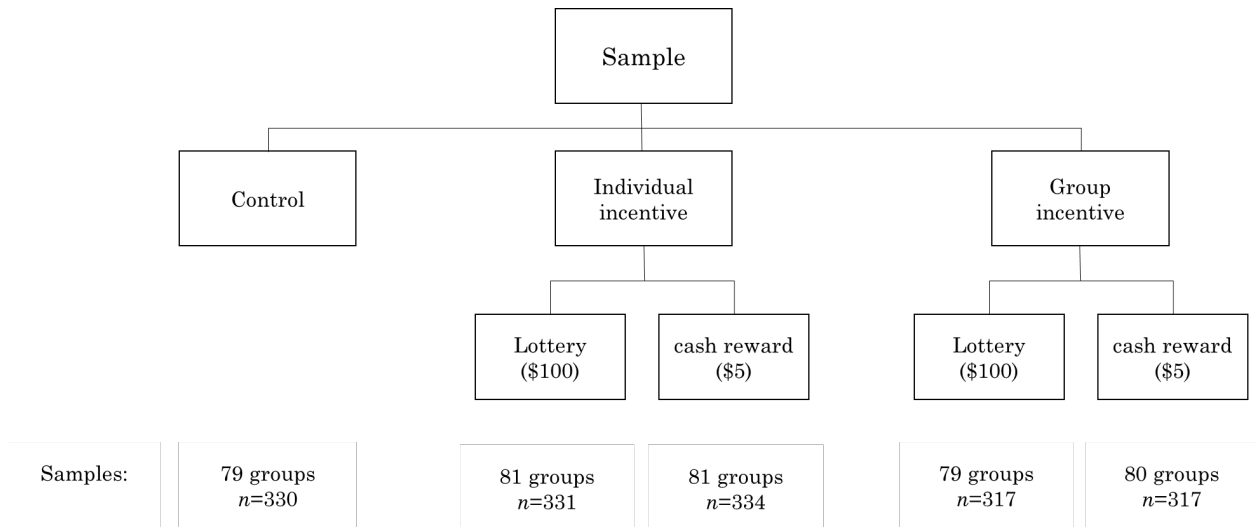


Figure A3. Within-group share of members who did the preventive check-up

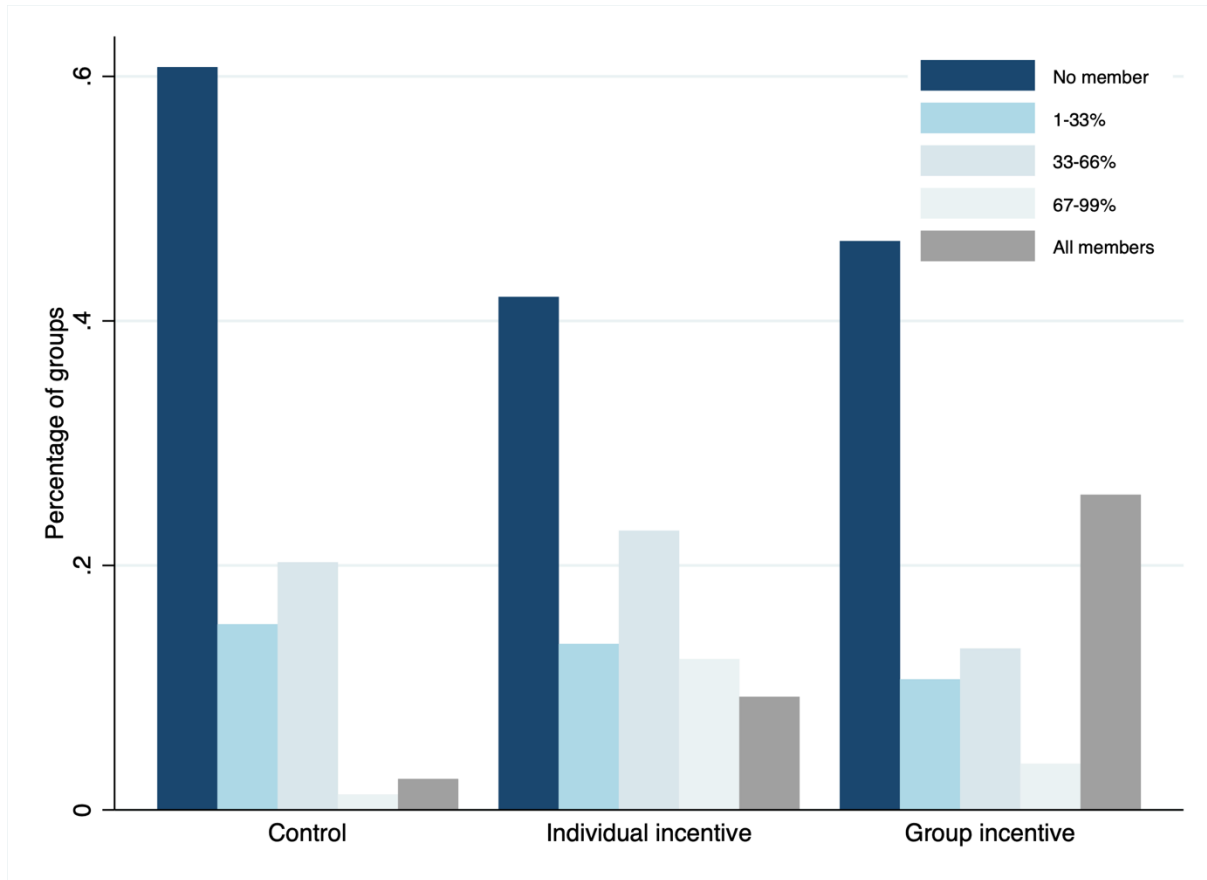
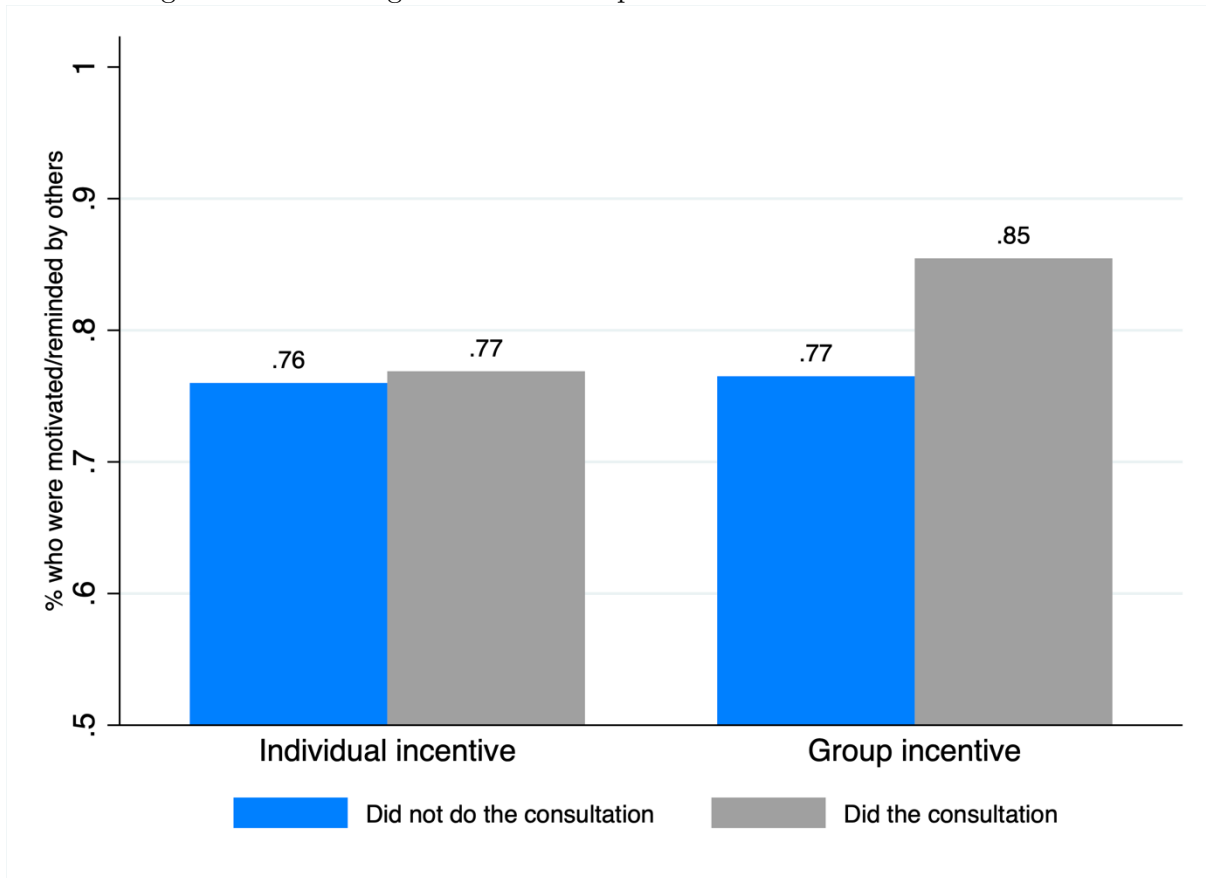
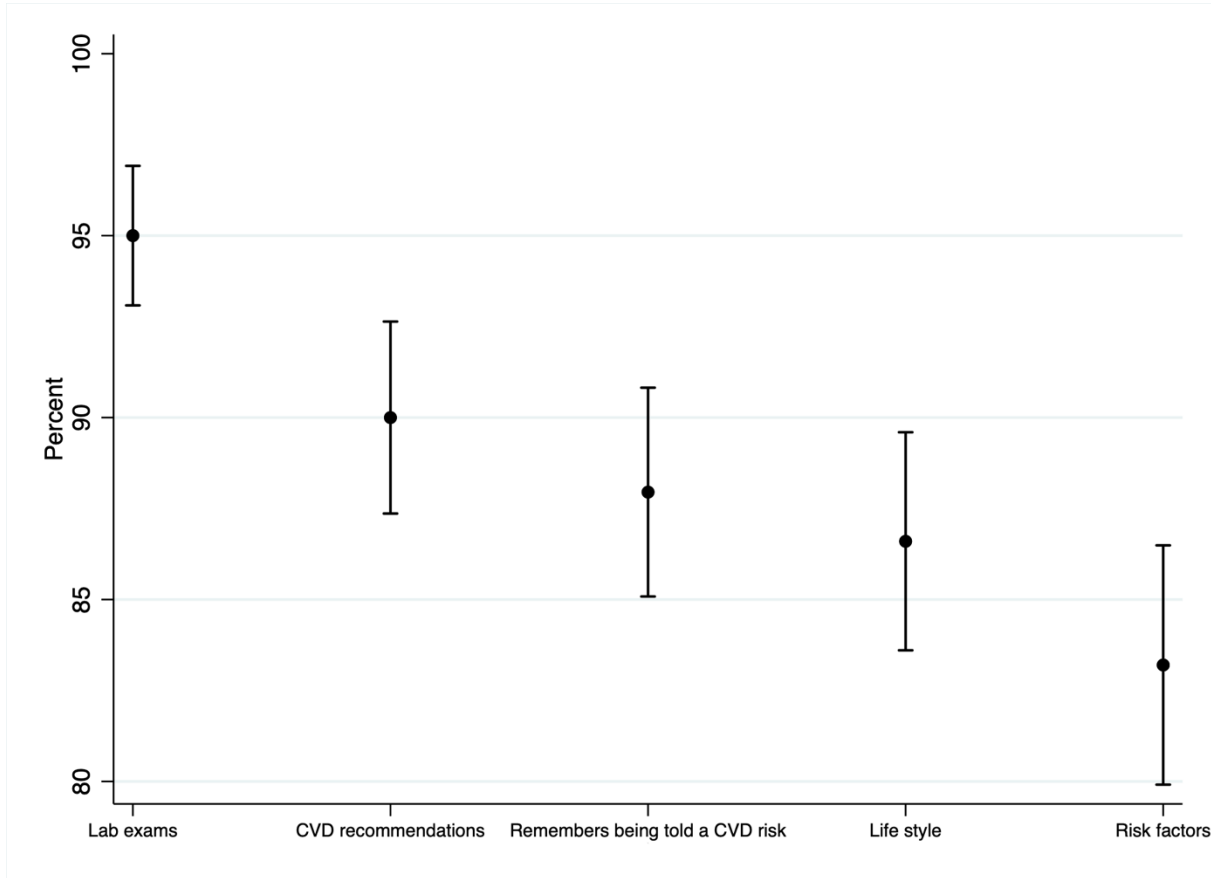


Figure A4. Encouragement to do the preventive visit received from others



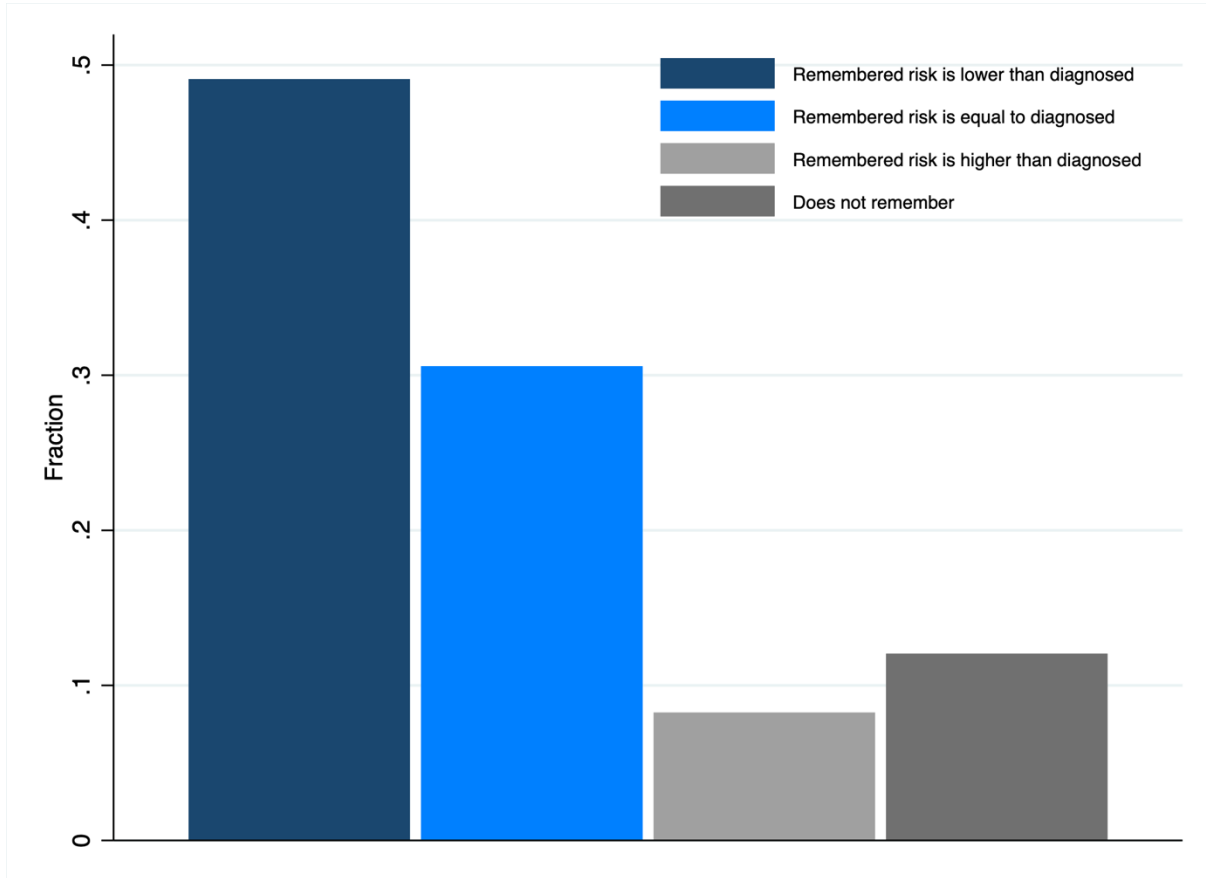
Note: The histogram plots, for each category, the proportion of individuals who were reminded or motivated by others to use the voucher. For example, amongst those randomised to individual incentives and who did not do the consultation, 76% report at endline that they were reminded by others to use the voucher.

Figure A5. Topics covered during the medical consultation



Note: the figure reports the proportion and confidence intervals of respondents who confirmed that the topics mentioned on the x-axis were discussed during the medical consultation with the doctor

Figure A6. Perceived vs. actual CVD risk



Note: Data from the sample of individuals who did the medical consultation. The figure summarises the discrepancies between individuals' actual CVD risk (based on blood test results and communicated to the individual during the consultation) and what they remember at endline.



## **Appendix B: Details of the randomization procedure**

Prior to the start of the fieldwork, we used web-based random sequence generator (Sealed Envelope Ltd. 2022) to obtain three randomization lists, one for each of our three strata: BC, small GS of 3-4 members, large GS of 5-7 members. To minimize the risk of having unbalanced number of groups across the five treatment arms, each list generated blocks of random sequence of 15 allocations.

The supervisor of enumerators was responsible for the randomization. First, they had to determine whether the group was a GS, a small BC or a large BC. Next, they assigned the group to the treatment arm indicated by the corresponding list. The supervisor was trained to follow the order of the sequence: the first group recruited on the first day was assigned to the treatment arm indicated in the first row of the randomization sequence; the second group was allocated to the treatment indicated in the second row, and so on. If eight groups (of the same strata) were recruited on the first day, the first group recruited the next day would be assigned to the group indicated on the ninth row of the sequence, and so on.

### Appendix C: Effect of incentives on time to screening

We can explore whether the financial incentives influenced the timing at which participants. Figures C1 and C2 below shows the cumulative proportion of individuals who completed the full screening before the expiry of the voucher. The results indicate that financial incentives encouraged people to complete the CVD screening earlier. For example, it took less than 15 days to get 10% of participants in both incentive groups to get screened, against nearly 40 days in the control group.

Figure C1: Pooled cumulative proportion of preventive consultation uptake over time

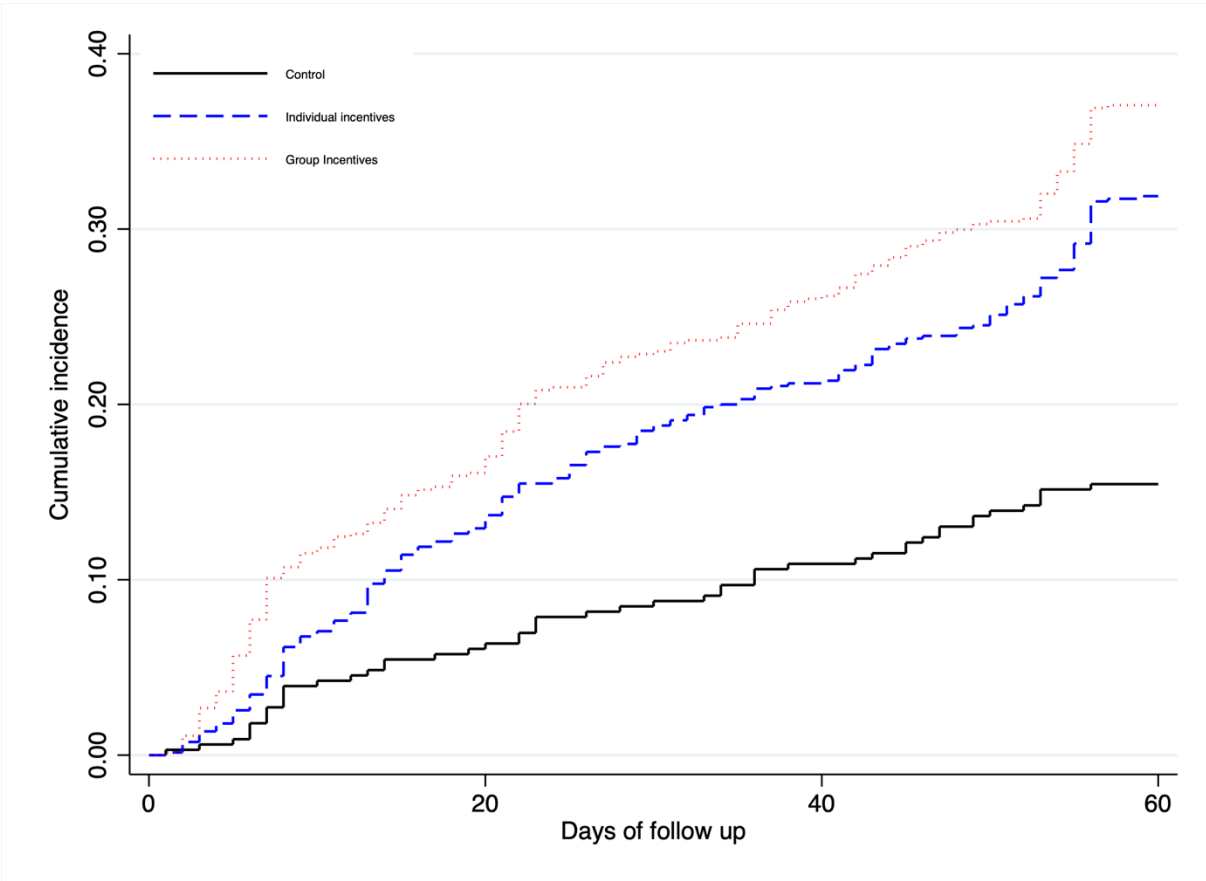
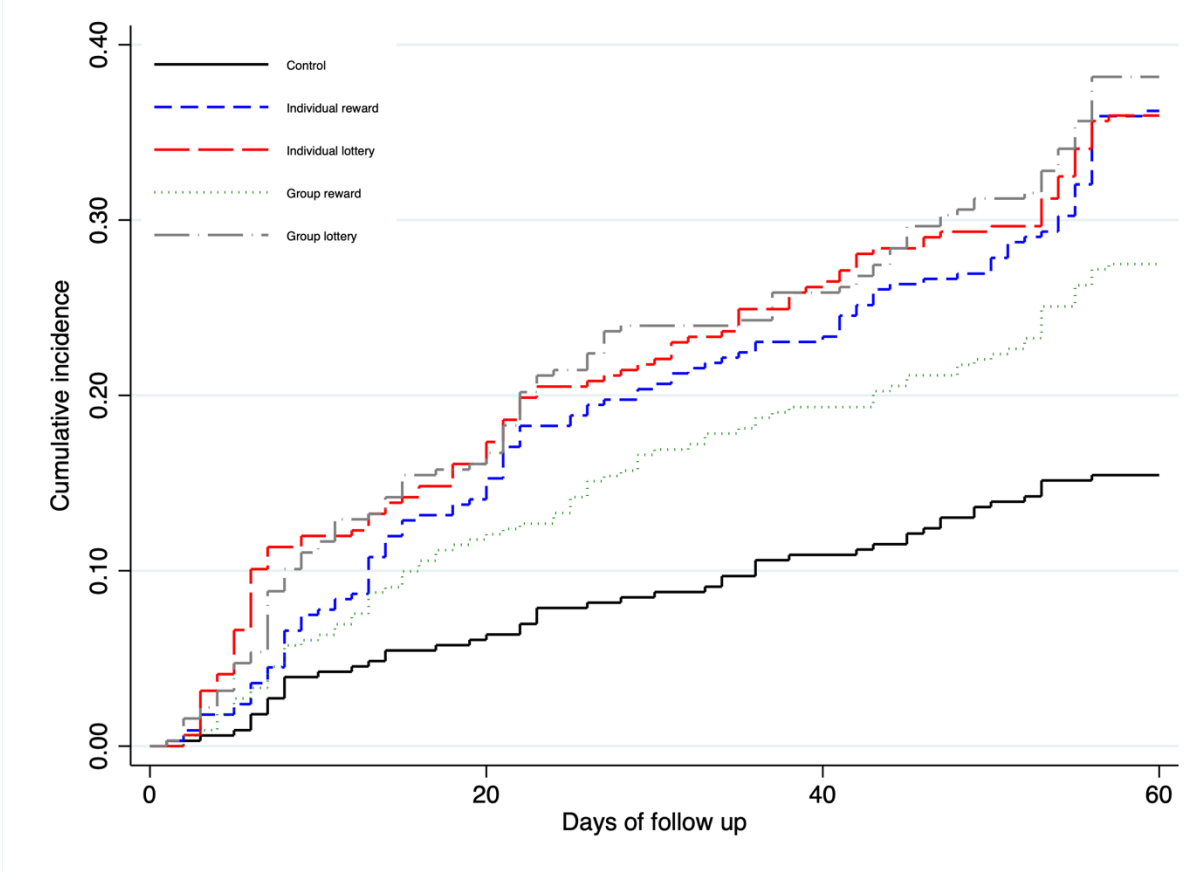


Figure C2: Disaggregated cumulative proportion of preventive consultation uptake over time



To estimate formally the effect of the different treatment arms on the timing to completion of the check-up we use an exponential survival analysis based on the following model in the pooled:

$$m_{itg} = \lambda_0 e^{\alpha + \beta_{1j} \times group_{ig} + \beta_{2j} \times individual_{ig} + X_i' \gamma + Z_g' \zeta + \varepsilon_i}$$

where  $m_{itg}$  is a dummy variable indicating if individual  $i$  from group  $g$  completed the full check-up (blood test and consultation) at time  $t$ ;  $\lambda_0$  represents the baseline hazard which in an exponential survival analysis is assumed to be constant over time;  $group_{ig}$  and  $individual_{ig}$  are, respectively, indicators for being in a group or individual incentive arm, and  $X_i$  and  $Z_g$  are (pre-specified) vectors of individual and group controls.

The results will provide the hazard rates which can be interpreted as the proportional reduction/increase from the baseline hazard of accessing the full check-up. For the detailed results we estimate the following survival analysis model:

$$m_{itg} = \lambda_0 e^{\alpha + \beta_{1j} \times group_{ig}^j + \beta_{2j} \times individual_{ig}^j + X_i' \gamma + Z_g' \zeta + \varepsilon_i}$$

where  $group_{ig}^j$  is an indicator for whether individual  $i$  is enrolled in group incentive arm  $j \in$  (reward, lottery), and  $individual_{ig}^j$  is an indicator for whether individual  $i$  is enrolled in an individual incentive arm  $j \in$  (reward, lottery).

The results from the survival analysis presented in Table C1 below. They show that group and individual incentives increase the hazard of going to the screening by 196% and 251% perspective respectively. The 25<sup>th</sup> percentile of survival time in the control group is 56 days, while for the group and individual incentives it is respectively 49 and 46 days. However, we find no difference that group incentives increased the speed at which individuals completed the full screening ( $p=0.278$ ).

Table C1. Impact of incentives on the timing of check-up completion

Hazard ration of completed medical check-up	
<b>Panel A: Pooled incentive designs</b>	
Individual incentive	2.498*** (0.504)
Group incentive	2.944*** (0.613)
P-value for group vs. individual incentives	0.287
<b>Panel B: Disaggregated incentive treatments</b>	
Individual Reward	2.868*** (0.625)
Individual Lottery	2.889*** (0.715)
Group Reward	2.117** (0.497)
Group Lottery	2.978*** (0.688)
P-value for group vs. individual reward	0.973
P-value for group vs. individual lottery	0.119
Fixed effects	Yes
Pre-specified controls	Yes
# of individuals	1629
# of observations	81228

Notes: Table presents hazard rate estimates from an exponential survival function with standard errors clustered at the group level in parenthesis. The failure event is defined as the preventive consultation. Fixed effects include group type (Banco Comunal, Small Grupo Solidario, or Large Grupo Solidario) and interview week fixed effects. A pre-specified set of controls is used in the models presented in columns 1, 3, and 5 which include whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## Appendix D: Individual preferences and heterogeneous effects

### Risk preferences

Given that the expected utility of a lottery depends on individuals' risk preferences or attitude towards monetary, and following the findings of Björkman Nyqvist, Corno et al. (2018) in the context of risky sexual behaviours, one might expect take-up with the lottery design to be higher for at-risk people, if the risk-seeking attitude that fuels their risk factors (smoking, poor diet, and sedentary lifestyle) also makes lotteries more attractive.

At baseline, we elicited individuals' risk preferences by using a series of hypothetical decisions following a multiple price list design (Andersen, Harrison et al. 2008). The multiple price list design presents individuals with a question containing 15 decisions. In each decision, the respondents are asked to choose between a lottery with a 50% probability of earning a prize of \$500 USD (i.e. expected value of \$250) or a fixed amount of money- starting from \$0 USD with \$25 USD increases until reaching \$350. Using the responses, we construct two measures that characterize an individuals' preference from risk following the approach from Andersen, Harrison et al. (2008) and Björkman Nyqvist, Corno et al. (2018). The first measure is a standardized index score of the mid-point between the bounds of risk preference where an individual switches from the risk to the safe option. The second measure is a dummy variable ("risk lover") which takes the value of one if the individual preferred the lottery when its expected value was lower than the proposed amount. Lastly, to explore the influence of risk-lover individuals on group behaviour, we define the group itself as risk-lover if at least half of the group members are risk-lovers.

When we include an interaction with each of these two measures, we find no meaningful interaction effects – see Table D1 below. This discrepancy with the results from Björkman Nyqvist, Corno et al. (2018) may be explained by the fact that people may not be as aware of the risks involved in unhealthy lifestyle choices leading to CVDs as they are for sexual behaviours. This lack of self-awareness is reflected by the fact that 50% of respondents report being in (very) good health despite high levels of morbidity in the sample. There is also no clear association between measures of CVD risk and risk preferences (Figure D1).

## **Time preferences**

Next, we test whether impatient people (i.e. those with a greater propensity to discount future gains) are more motivated by incentives offering an immediate reward. In our setting, three contracts present a delayed payment (the two lotteries and the group reward), and one offers an immediate reward after the medical consultation: the individual reward. One might expect the impact of this incentive to be particularly effective with impatient individuals. In the baseline survey, we used the staircase patience instrument developed by Falk et al. (2018). We use respondent's choices to compute one measure of time preference: a standardised patience score index calculated as an individual Z-score. In the standardized patience score, lower values represent less patience and therefore more biased towards the present.

When we include interaction terms with this measure of impatience, we find no meaningful interaction effects – see Table D1 below. This null finding echoes recent results studying the effect of incentives in diabetic individuals in India (Aggarwal, Dizon-Ross et al. 2020). As argued in that study, we cannot rule out that the series of hypothetical questions used to construct the impatience measure did not perfectly reflect respondents' actual impatience for real payments.

Table D1. Individual preferences and heterogeneous effects

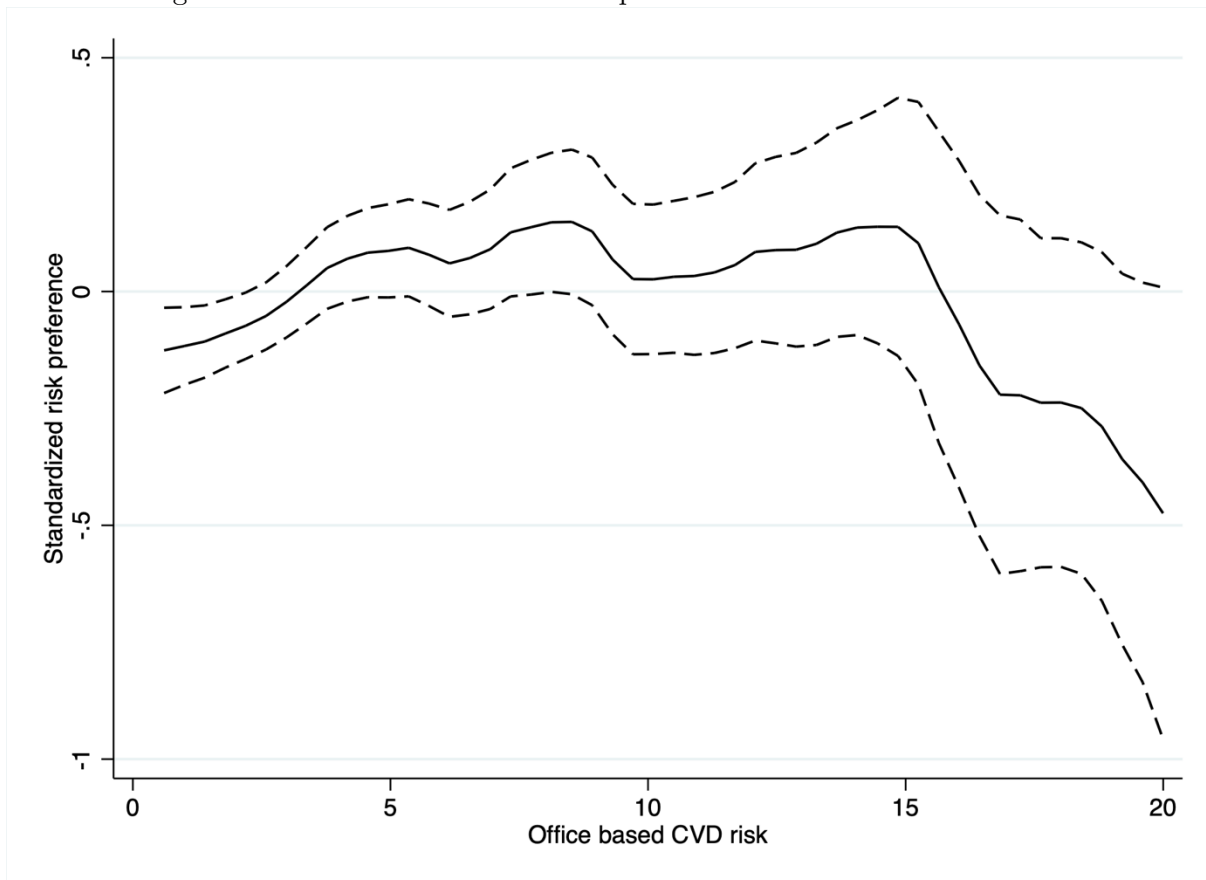
	Interacted variable (individual characteristics)			Interacted variable (group characteristic)
	Risk preference index	Risk lover	Patience index	Risk loving group
<b>Panel A: Pooled incentive designs</b>				
II: Individual incentives	0.184*** (0.036)	0.158*** (0.041)	0.184*** (0.036)	0.159*** (0.042)
GI: Group incentives	0.220*** (0.041)	0.212*** (0.045)	0.223*** (0.041)	0.208*** (0.047)
Interacted variable	0.001 (0.019)	-0.012 (0.043)	0.032 (0.021)	0.028 (0.059)
II × Interacted variable	0.028 (0.026)	0.075 (0.057)	-0.011 (0.028)	0.071 (0.079)
GI × Interacted variable	0.005 (0.026)	0.027 (0.057)	-0.003 (0.029)	0.055 (0.095)
<b>Panel B: Disaggregated incentive designs</b>				
IR: Individual Reward	0.110 (0.064)	0.197*** (0.043)	0.362*** (0.099)	0.185*** (0.054)
GR: Group Reward	0.054 (0.065)	0.117** (0.044)	0.343*** (0.090)	0.141** (0.054)
IL: Individual Lottery	0.149 (0.078)	0.206*** (0.057)	0.353*** (0.098)	0.213*** (0.059)
GL: Group Lottery	0.195* (0.077)	0.223*** (0.052)	0.353*** (0.091)	0.205*** (0.060)
Interacted variable	0.059 (0.037)	-0.123** (0.038)	0.027 (0.035)	0.218 (0.142)
IR × Interacted variable	0.085* (0.038)	0.185* (0.081)	-0.074 (0.043)	0.094 (0.089)
GR × Interacted variable	0.062 (0.036)	0.142 (0.077)	-0.113** (0.043)	-0.007 (0.091)
IL × Interacted variable	0.044 (0.037)	0.064 (0.088)	-0.075 (0.043)	0.022 (0.128)
GL × Interacted variable	0.019 (0.040)	-0.010 (0.092)	-0.069 (0.041)	0.060 (0.108)
Control group mean	0.155		0.155	0.155
LASSO	Yes		Yes	Yes
# of groups	400		400	400
# of observations	1629		1629	1,601

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Column 1-4 report heterogeneous results using: (1) standardized risk preference measure following Björkman Nyqvist, Corno et al. (2018); (2) whether the respondent is more risk lover than the average person in the sample; (3) a patience index based on Falk et al. (2018); and (4) whether the individual belongs to a group where more than half of members are risk loving. Controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The pre-specified set of controls include fixed effects (group type and week fixed effects) and individual controls such as whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



Figure D1. Correlation between risk preferences and CVD risk measures



Note: Figure uses a local polynomial smoothing fit to show the average standardized risk preference score and 95% confidence intervals for different levels of Globorisk office based 10-year CVD fatal risk.

## **Appendix E: Social network characteristics and heterogeneous effects**

To obtain measures of social group strengths, the baseline questionnaire asked each participant to define the relationships they had with other participating members of their loan groups: (i) whether they are friends, (ii) whether they see the person at least once a week (iii) whether they would follow their advice about health issues, and (iv) whether they would lend money to that person. We then construct two measures of friendships, leading to two different measures of social network strength. First, we define a (directed) friendship intensity score, comprised between 0 and 4, summing the number of times an individual responds positively to the four questions about another member. Using these individual scores, we compute an index of social network strength equal to the standardised average of all individual intensity scores (the higher the score the closer the network). Second, we define a dummy variable of undirected friendship between two individuals if the two individuals answer “yes” to all four questions, hence capturing only close friendships. We then use these friendship links to compute each individual’s clustering coefficient (i.e., the proportion of one’s friends who are friends with each other). Finally, we average these coefficients across all members to compute the group clustering coefficient. Clustering is thought to be a good measure to capture the extent to which a particular behaviour can get diffused in a group (Jackson 2008).

Table E1. Heterogeneous effects of the impact of incentives

	Social network strength (1)	Group clustering (2)
<b>Panel A: Pooled incentives</b>		
Individual incentive	0.178*** (0.039)	0.151* (0.072)
Team incentive	0.205*** (0.043)	0.285*** (0.086)
Interacted variable	0.034 (0.042)	0.066 (0.102)
Ind. incentive*Interacted variable	-0.022 (0.053)	0.059 (0.130)
Team incentive*Interacted variable	-0.069 (0.063)	-0.130 (0.148)
<b>Panel B: Disaggregated incentives</b>		
Individual Reward	0.209*** (0.047)	0.211* (0.089)
Individual Lottery.	0.142** (0.047)	0.086 (0.090)
Team Reward	0.194*** (0.056)	0.269** (0.102)
Team Lottery	0.212*** (0.052)	0.310** (0.114)
Interacted variable	0.033 (0.043)	0.066 (0.103)
Ind. reward*Interacted variable	-0.072 (0.065)	0.022 (0.161)
Team reward*Interacted variable	0.031 (0.060)	0.098 (0.159)
Ind. Lottery*Interacted variable	-0.075 (0.076)	-0.114 (0.174)
Team Lottery*Interacted variable	-0.059 (0.082)	-0.164 (0.197)
Control group mean	0.155	0.155
LASSO	Yes	Yes
# of groups	400	400
# of observations	1629	1629

Notes: Table presents OLS estimates with standard errors clustered at the group level in parenthesis. The dependent variable is a binary indicator whether an individual completed the full CVD preventive check-up (blood exam and medical consultation). Columns 1 and 2 report heterogeneous results using: social network is a measure of bidirectional friendship links within the group and (2) uses a measure of network strength based on the reciprocity in the friendship links. Controls are selected with a double LASSO algorithm amongst the set of pre-specified controls. The pre-specified set of controls include fixed effects (group type and week fixed effects) and individual controls such as whether the individual is over the age of 50, male, has basic education or higher, their 10-year CVD mortality risk at baseline, BMI at baseline, self-reported average daily earnings, and self-reported opportunity cost of travelling to the clinic.

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

## Appendix F: Cost-effectiveness

To estimate the number of averted DALYs, we first compute, for each treatment group  $t$ , the number of individuals newly diagnosed with a CVD risk factor who will manage it effectively, as follows:

$$\mathcal{N}_t = \widehat{Diag}_t \times N_t \times M_{ft}$$

where  $\widehat{Diag}_t$  is the estimated effect of the intervention on the probability of diagnosing a new risk factor presented in Table 6 column 4,  $N_t$  is the number of individuals in treatment arm  $t$  and  $M_{ft}$  is the probability that an individual with a newly diagnosed risk factor  $f$  who will be able to manage that risk factor.

The value of the management probability  $M_{ft}$  varies with (1) the risk factor diagnosed  $f$  and (2) the risk profile of individuals coming for a preventive check-up. We can retrieve from the medical literature,  $M_{diabetes}=0.523$  (Geldsetzer, Manne-Goehler et al. 2019) ;  $M_{cholesterol} = 0.433$  (Marcus, Ebert et al. 2021) and  $M_{hypertension} = 0.32$  (Flood, Seigle et al. 2021).. if the majority of individuals are diagnosed with hypertension, their management probability. To account for the influence of this risk profile, we compute four scenarios:

- **Extreme pessimistic:** all individuals doing the check-up find out they have hypertension and  $M_{ft} = 0.32$
- **Extreme optimistic:** all individuals doing the check-up find out they have diabetes, hence  $M_{ft} = 0.523$
- **Average by group:** we compute an average management probability for each group reflecting the actual risk profile of the group in the data:  $\bar{M}_t = 1/N_t \sum_i Diag_{itf} \times M_f$  where  $Diag_{itf}$  takes the value 1 if individual  $i$  from treatment arm  $t$  was diagnosed with new risk factor  $f \in$  (cholesterol, diabetes, hypertension). Note that in practice, a few individuals were diagnosed with more than one risk factor. In those cases, we only retain the risk factor with the lowest management probability. The values of  $\bar{M}_t$  are indicated in Table F1 below.

Table F1. Average management probability, by treatment

	Control ( $\bar{M}_{control}$ )	Individual reward ( $\bar{M}_{IR}$ )	Group reward ( $\bar{M}_{GR}$ )	Individual lottery ( $\bar{M}_{IL}$ )	Group lottery ( $\bar{M}_{GL}$ )
Average management probability	0.439	0.421	0.429	0.426	0.422

Next, we assume that when an individual's risk factor is well managed, she will not develop a CVD – i.e. this will be an averted CVD-related death. Following Kremer, Leino et al. (2011), we assume that this reduction in cases of CVDs translates into a proportional reduction in DALYs for treatment group  $t$ :

$$DALY_t = W_{CVD} \times \mathcal{N}_t$$

where  $W_{CVD}=0.1024$  is the ratio of DALYs to CVD incidence for El Salvador in 2019, according to the Global Burden of Disease Collaborative Network (Global Burden of Disease Collaborative Network 2020).

Figure F1. Incremental cost per DALY averted, by type of incentive conditionality

