



Encouraging Healthy Habits to Decrease the Burden of Diabetes

Based on a study undertaken in Coimbatore, Tamil Nadu, India between 2015 and 2017 by Shilpa Aggarwal, assistant professor, Indian School of Business; Rebecca Dizon-Ross, assistant professor, UChicago's Booth School of Business; and Ariel Zucker, postdoctoral scholar, University of California, Berkeley

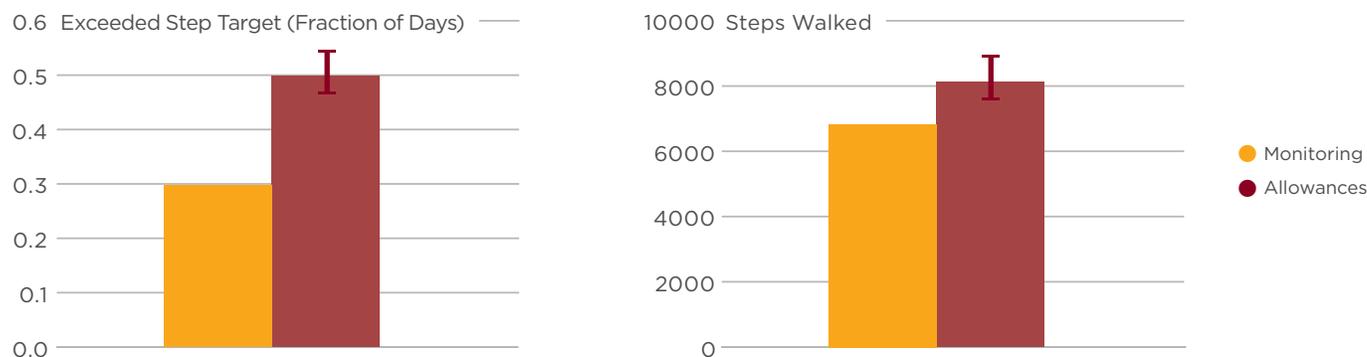
KEY TAKEAWAYS

- 1. Diseases such as diabetes and hypertension are exploding in India*
- 2. In the state of Tamil Nadu, 10.4 percent of adults are diabetic or pre-diabetic, and 27 percent have hypertension, and those numbers are rising*
- 3. The most efficient way to reduce the health care burden of these diseases is through lifestyle changes, especially through increased exercise*
- 4. New research reveals that monitoring and allowances (incentives) can play a key role in changing behavior, including over the long run*

The rate of diabetes and hypertension among adults in India has grown at alarming rates in recent years, with diabetes increasing ten-fold rate over the preceding three decades. In particular, 10.4 percent of adults in the state of Tamil Nadu are diabetic or pre-diabetic, and 27 percent have hypertension, according to 2014 estimates (Anjana 2011, Must et al. 2014). These disease rates not only place a heavy burden on patients and families, but their growing incidence also adds tremendous costs for health care providers and the government.

The most efficient method to address such non-communicable diseases (NCDs) is for patients to engage in lifestyle changes that can improve their health and prolong their lives. However, the challenge is that the most effective lifestyle changes are exercise and a healthy diet, and most people are disinclined to engage in short-term activities that only pay dividends in the long run.

Allowances Increase Walking Relative to Monitoring Only



Note: Assuming 1,000 steps = 10 min, then ATE is approx 14 min. of daily brisk walking. In general, walking associated with long-run health benefits over and above what's captured by short-run health measures.

This impatience insight is key to understanding how to design effective incentive programs that encourage exercise among those with NCDs, according to a recent study conducted by Shilpa Aggarwal, assistant professor, Indian School of Business; Rebecca Dizon-Ross, assistant professor, UChicago's Booth School of Business; and Ariel Zucker, postdoctoral scholar, University of California, Berkeley.

The study authors analyze several approaches that, through various allowances (or incentives), encourage participants to incorporate exercise into their regular routines with the aim of changing their lifestyles over the long run. The authors find that allowances matter, and offer a number of policy suggestions based on their extensive field work and analysis. If even a subset of those with NCDs modify their lifestyles, there are potentially huge cost-savings for private and public insurers, not to mention the benefits that would accrue to patients and their families.

Designing Interventions

The authors served as principal investigators in a study executed by J-PAL South Asia¹, in collaboration with the state of Tamil Nadu (Health and Family Welfare department) under a large policy research partnership, and was financed jointly by the Government of Tamil Nadu; the University of Chicago's Tata Center for Development, Booth School of Business, and India Trusts; Indian School of Business; and J-PAL's Urban Services Initiative. This study involved over 3,000 adults in Coimbatore, a major Tamil Nadu city. All participants had a

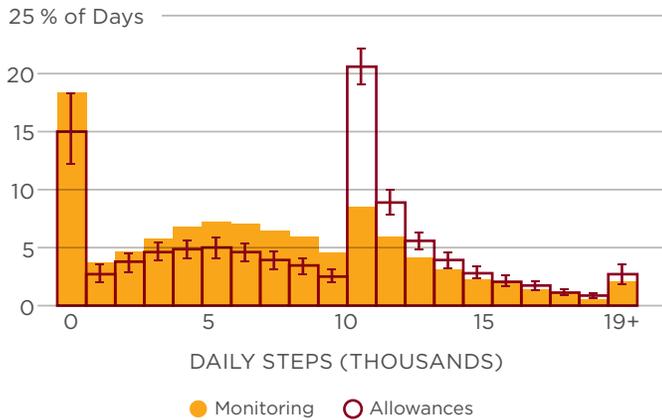
pre-existing (but potentially undiagnosed) condition of diabetes or pre-diabetes.

Dizon-Ross and her colleagues conducted a randomized controlled trial to evaluate the effectiveness of three promising 12-week-long interventions in reducing the burden of diabetes, with an emphasis on exercise and with a goal of changing long-run habits:

- **Monitoring and Allowances.** Designed to address people's reluctance to engage in short-run effort for long-run effects, this intervention combined incentives and monitoring to encourage daily walking. Participants were given a step target (10,000 steps) and a pedometer, asked to report their steps daily (monitoring), and given incentives in the form of mobile phone recharges (allowances) for each day they met their target.
- **Monitoring Only.** Participants reported their pedometer counts but received no allowances.
- **SMS Reminders.** Based on research that people respond to reminders even when they already know their task, participants received a text or similar phone message that it was time to exercise.

Of the three, *Monitoring and Allowances* had the greatest impact on behavior: the percentage of days that participants met daily step targets increased from 30 percent to 50 percent and the number of steps increased by 1,200 steps.

Increases in Walking Come From Across the Distribution



The result was a measurable impact on the participants' health. Importantly, these effects persisted throughout the 12-week intervention period, with some of the impact lingering beyond the intervention period.

Monitoring Only had modest impacts on exercise and no detectable impacts on health, while SMS Reminders did not have detectable effects on exercise or health, but the effects were somewhat precise; given that the approach is also very inexpensive, it is worth further study.

While all three interventions have promise, *Monitoring and Allowances* and *SMS Reminders* reveal the most potential as cost-effective plans, saving money for participants as well as health providers. Potential savings are significant. Currently, much of the cost for diabetes care is born by Tamil Nadu's public health system. In 2004, for example, the state subsidized diabetic care at more than INR (Indian rupees) 20 billion, roughly INR 130 per patient interaction (Barik and Arokiasamy, 2016). According to the researchers, the cost of a Monitoring and Allowances-type intervention is just 10 percent of existing costs of care and SMS is less than 1 percent.

Policy Insights

The authors offer a number of policy recommendations summarized below and described in greater detail in their paper and the full study report; these recommendations

relate to gains from increased physical activity, but their lessons apply to other behaviors that can improve participant health:

HOW TO STRUCTURE FEEDBACK AND ALLOWANCE DELIVERY

Frequent feedback was delivered to participants in each of the interventions, which seemed to reinforce participants' dedication to their goals.

As a result, they did not need to be paid their allowances on such a frequent basis. Going forward, the researchers recommend that programs use frequent feedback; however, they don't need to pay participants more frequently than every month, which can ultimately reduce program costs.

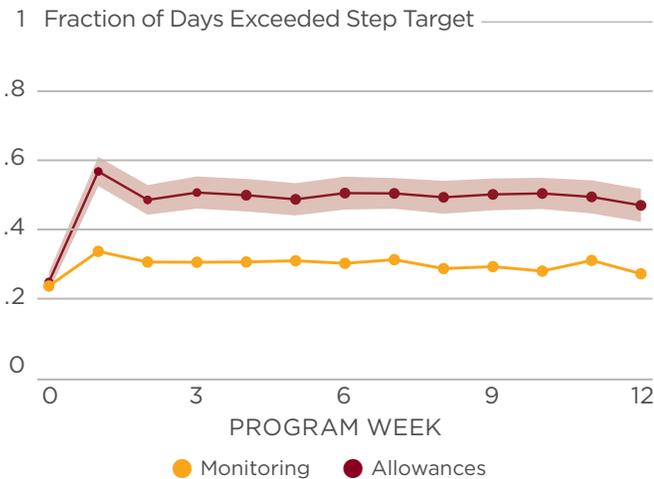
To improve the cost-effectiveness of allowances, programs can use minimum payment thresholds. For example, a participant would only earn an allowance if she met her step target on a certain number of days per week. This is more effective than, say, awarding an allowance every time the participant met her step target. However, minimum payment thresholds only work well for some people; for others, they cause them to walk less overall. When deciding whether to use thresholds, policymakers must trade off the benefits in terms of improved cost-effectiveness, with the cost of concentrating the exercise benefits among fewer people.

Another key finding is that while allowances matter, the size doesn't matter as much. Participants responded well to an allowance, say, of INR 10, but if that amount were doubled to INR 20, the corresponding increase in participation was relatively small. Thus, very small allowance amounts can have large impacts. While the results indicate that scaling up with just an INR 10 payment could be the most cost-effective solution, the authors do not formally make this recommendation as they did not test the INR 10 payment with enough people to test for health impacts. Still, their initial finding is instructive and holds promise.

LOGISTICAL DETAILS

While the researchers did not use automatically transmitted data from pedometers due to prohibitive costs for a relatively small population, they recommend that planners use such an approach at scale, perhaps through a phone-based pedometer application.

The Effect of Allowances Persisted Throughout the 12 Week intervention Period



One way to ensure cheaper costs at larger scale is to link these intervention plans into the existing health infrastructure of a city or region, which can benefit from the involvement of on-site medical staff. To ensure that local providers take ownership of the program, policy makers could also consider decentralizing the decision about whether to offer incentives to the local (e.g., Primary Health Center) level.

Relatedly, since those with symptoms must be diagnosed to realize the benefits of intervention, the authors recommend using existing medical infrastructure for screening while new screening facilities are added to expand reach. Integrating incentives with systematic population-level screenings will open scope to make an immediate big push (e.g., through incentives) with the newly diagnosed to adopt lifestyle change.

One important logistical detail is the type of allowance to deliver. As described, the researchers used mobile phone recharges for their study; however, such an allowance may be impractical as phone use varies greatly among consumers, and many women—as opposed to men—do not have a mobile phone. A more effective method would efficiently deliver allowances to all possible participants. Such a method might be digital payment systems that allow direct payments to consumer accounts.

The authors also suggest promoting awareness through SMS-based follow-up and intervention but only over and above other approaches to promote lifestyle change: SMS alone will likely not cause big shift.

ASSURING THE LONG-TERM EFFECTIVENESS OF INTERVENTIONS

Participants in this study responded positively to interventions meant to change their lifestyle habits, and the *Monitoring and Allowances* program was particularly efficient. But what happens when the formal intervention ends and participants are left on their own?

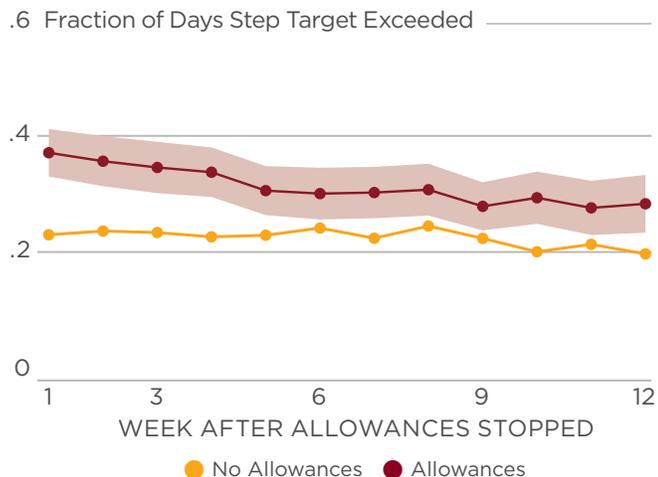
Will those changes in lifestyle habits persist over time? Can health care providers be assured that cost savings will extend across a lifetime?

To address these questions, the researchers tracked whether participants continued their healthy habits after the intervention officially ended and allowances were no longer paid. The researchers tracked participation for 12 additional weeks and found that 35 to 50 percent of the allowance effect on exercise persisted for those three months.

Of course, regular exercise like walking has benefits that extend beyond the focus of this study—diabetes and hypertension. People who exercise regularly, for example, can affect the incidence of certain cancers and osteoporosis, Alzheimer's and dementia, and cardiovascular mortality. While these benefits are not directly measured in the evaluation of these programs, their benefits should be considered when weighing the overall value of such efforts.

The key is for patients to engage in lifestyle changes that can improve their health and prolong their lives. However, the challenge is that one of the most effective lifestyle changes is exercise, and most people are disinclined to engage in short-term activities that pay dividends in the long run.

The Effect of Allowances Persisted Even After the Allowances Stopped



Note: Percentages conditional on whether participants wore their pedometers in the week following the end of the program.

Finally, the researchers recommend a measured pace when introducing and expanding such a program. Start slow and test the results to determine the most effective and efficient methodology for a given population, then expand the program using the preferred tool while continuing to measure results along the way.

ENSURING PROPER DIAGNOSES

Finally, these efforts can only work if participants are identified and included in interventions. To that end, the researchers conducted a separate population survey and found high prevalence² of NCDs in both urban and rural settings. In urban areas, 31 percent of those surveyed were symptomatic of diabetes³ and 42 percent exhibited hypertension⁴, while in rural areas those numbers were 24 percent and 44 percent. Of particular concern is that the rates of under-diagnosis were high: 43 percent of urban patients and 53 percent of rural patients exhibiting very-high⁵ symptoms of diabetes had not been diagnosed. Among those with Stage 3 hypertension⁶, those rates were 63 percent and 71 percent, respectively.

Surprisingly, though, many of those surveyed reported that they had been previously screened for these conditions but were not diagnosed. Likewise, the researchers recommend universal annual screenings for all at-risk age groups, including post-screening to confirm diagnoses, treatment, and disease management.

Conclusion

The incidence of such non-communicable diseases

as diabetes and hypertension is exploding in India, threatening the health and lifespans of millions of Indian citizens and putting increasing pressure on private and public healthcare systems. One particular challenge to addressing these diseases is that the most efficient response—lifestyle changes—depends on the willing participation of those affected. People are often impatient for results and find such behavioral changes, like exercise, as too time-consuming and challenging, thus limiting long-run benefits.

As the intervention study by J-PAL and the state of Tamil Nadu reveals, the answer to such a policy challenge is to design programs that encourage participation through monitoring and allowances. Participants in these studies started and continued exercise regimens while accruing measurable health benefits, and there is evidence to suggest that such results will hold after the formal intervention ends. These plans, which use simple techniques like pedometers for monitoring exercise, and could incorporate cost-effective methods of allowance delivery like direct deposit to bank accounts, operate at a fraction of the cost that these diseases otherwise impose on society.

Further research is needed to refine these initial results, especially on how best to ensure long-term changes in lifestyle and to determine the best methods to manage such programs. However, the initial results of these intervention studies suggest that the Indian government, at a national and state level, would benefit from the measured application of interventions that address people's short-term impatience with long-term effects. And the time to start is now.

Closing Takeaway

Policymakers must design programs that encourage participation through monitoring and allowances. Participants in these studies started and continued exercise regimens while accruing measurable health benefits, and there is evidence to suggest that such results can be attained long after the formal intervention program ends.

References and Footnotes

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¹ This Research Brief is also based on the February 2018 J-Pal report: "Inculcating Healthy Habits to Decrease the Burden of Non-Communicable Diseases." J-Pal is a global research center which aims to inform policy through rigorous evidence from the research undertaken by its network of affiliates.

² The researchers set up public camps across Coimbatore, for individuals to walk in and get their blood sugar levels and BP levels checked for free. They measured random blood sugar (RBS) using a glucometer and blood-pressure levels using a portable BP Monitor. The researchers followed the classification criteria used in the National Family Health Survey-4 (NFHS-4) to classify diabetes and hypertension prevalence in the sample.

³ RBS > 140 mg/dl is a symptom of diabetes as per RBS classification used in NFHS-4

⁴ Systolic \geq 140 mmHg or Diastolic \geq 90 mmHg (i.e., Hypertension Stage 1 or above) as per BP classification used in NFHS-4.

⁵ RBS > 160 mg/dl is considered very high RBS as per RBS classification used in NFHS-4.

⁶ Stage 3 Hypertension means a Systolic \geq 180 mmHg or Diastolic \geq 110 mmHg as per BP classification used in NFHS-4.

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