Increasing Caloric Intake to Improve Hours Worked, Earnings, and Physical and Cognitive Abilities in India

Sector(s): Health, Labor Markets

Fieldwork: IFMR LEAD

Target group: Adults Informal workers

Outcome of interest: Earnings and income Employment Health outcomes Health Labor

Intervention type: Incentives Monetary incentives Non-monetary incentives

Partner organization(s): IFMR LEAD

Low-income populations throughout the world often consume very few calories. At the time of this intervention in 2013, over 800 million people globally consumed fewer calories than were recommended to maintain a healthy weight. However, the impact of low caloric intake on economic productivity is not well researched. Researchers conducted a five-week randomized evaluation to test the impact of increased caloric intake on hours worked, earnings, and physical and cognitive ability for cycle-rickshaw drivers in Chennai, India. Drivers who consumed daily snacks worked and earned more and performed better on cognitive and physical tasks relative to drivers that received an equivalent value of cash. Supplemental survey data suggests that inaccurate beliefs and knowledge about the returns to calories and the caloric content of food may drive lower than recommended calorie consumption.

Policy issue

Low-income populations throughout the world often consume very few calories. At the time of this evaluation in 2013, over 800 million people globally consumed fewer calories than were recommended to maintain a healthy weight. In 2020, between 720 and 811 million people were undernourished, and the United Nations estimates that 660 million people will still face hunger in 2030. Notably, insufficient caloric intake is unlikely due to lack of funds, as food expenditures rarely exceed 40 to 70 percent of expenditures for low-income households.

There is extensive evidence that low caloric intake is associated declines in physical performance. There is little empirical evidence, however, showing that low caloric intake impacts economic productivity among adult populations given the difficulties tracking caloric intake and measuring productivity.

Does increasing daily caloric intake improve productivity, hours worked, earnings, and physical and cognitive performance? What factors limit individuals from consuming enough calories to sustain their productivity?

Context of the evaluation

One-third of India's population was underweight and their already low caloric intake was declining at the time of this study in 2013. Chennai, the state of Tamil Nadu's largest city and where this study takes place, has approximately 4.7 million residents; in all of Tamil Nadu, 29.1 percent of the population was undernourished in 2007 according to the India State Hunger Index.

The intervention targeted men whose primary occupation is driving cycle-rickshaws, three wheeled vehicles that transport passengers, luggage, or goods. To be eligible, drivers had to be at least 18 years old, have lived in Chennai for at least two months,

and to have a BMI less than or equal to 20. Two-thirds of rickshaw drivers in Chennai had a body mass index (BMI) under 20 at the time of the intervention; the World Health Organization describes a BMI under 18.5 as underweight. Participants weighed 46 kilograms, or 101 pounds, on average. Drivers had, on average, operated a cycle rickshaw for 20 years and earned 165 Rupees (US$3.67 at the time of the intervention) per day, occupying lower-income brackets. Over 90 percent came from historically lower castes, and 70 percent had ration cards to subsidize food and cooking gas.

The researchers targeted rickshaw drivers because they choose when and how many hours to work, retain control of over their earnings so they fully benefit from working more, and typically have low caloric intake. In addition, rickshaw drivers are mobile, which enabled data collection at a central study office.



A rickshaw driver poses outside of his vehicle.

Photo credit: Shutterstock.com

Details of the intervention

Researchers conducted a five-week randomized evaluation to test the impact of increased caloric intake on hours worked, earnings, and physical and cognitive ability for cycle-rickshaw drivers in Chennai, India.

Researchers randomly selected 211 cycle-rickshaw drivers out of the population of drivers throughout the city center of Chennai. The 109 drivers randomly assigned to the received a combination of cash and a 700 calorie snack, while the 102 drivers in the comparison group received cash equal to the total value as the food and cash provided to the intervention group (75 rupees, or nearly half a day's earnings). All cycle-rickshaw drivers visited the study office every day except Sunday for five weeks to receive either cash or cash and a snack, and to report their energy level, number of meals consumed, and previous day's hours and

earnings.

To test how increased caloric intake impacted cognitive and physical abilities, all participants also partook in two physical and cognitive based tasks, one at the beginning and the one at the end of the intervention, and earned compensation based on their performance. Physical tasks included cycling on a stationary bike and cognitive tasks included assessing skills such as persistence, motivation, and planning.

The researchers supplemented the results of the randomized evaluation with a survey of 222 people, both men and women, in both rural and urban areas throughout India to evaluate factors that contribute to low caloric intake despite the potential benefits of consuming additional calories.

Results and policy lessons

Consistent increased caloric intake positively impacted hours worked, earnings, and cognitive and physical abilities.

Over the second half of the five weeks, drivers given snacks to increase their caloric intake worked one addition hour per day, a 15 percent increase relative to the comparison group who averaged 6.81 hours a day. Researchers note that this increase is substantial given the baseline work week of nearly 50 hours and the physical demands of the occupation. Earnings also increased in the second half of the study by approximately 20 Rupees (US$0.44 at the time of the evaluation) per day from a base of 179.78 Rupees (US$3.995) per day (an 11 percent increase). Both hours and earnings increased more towards the end of the five weeks relative to the start, which researchers suggest reflects the fact that caloric deficits take time to recover from.

In addition, drivers who consumed daily snacks performed better on the physical and cognitive tests completed at the end of the study, as measured through their compensation for these tasks. Increases in caloric intake led to a 9 percent, or 24.95 Rupees (US$0.55), increase in earnings relative to the comparison group average of 278.6 Rupees (US$6.19). Cognitive performance improved immediately and at endline, while physical performance showed improvements only at the end of the study for those in the intervention group. Altogether, using driver earnings and food costs for rice and wheat, researchers estimate a six-month return of 75 percent through increasing consumption by 700 calories.

To understand whether these impacts would generalize to other populations, researchers used non-experimental data to analyze how agricultural productivity changes during Ramadan in India, when observing Muslims consume about 700 calories less per day. These results showed declines in labor productivity (20 to 40 percent) as well as agricultural output per hectare (2 to 4 percent). Researchers also estimated a one-month return of 225 percent to increasing calories, providing additional evidence that reduced caloric intake negatively impacts productivity.

Based on the results of the accompanying survey, researchers hypothesize that inaccurate beliefs and incorrect knowledge about the returns to calories and the caloric content of food may play an important role in the low caloric consumption among many Indian adults. For example, over three-quarters of the respondents believed that increasing caloric intake by the equivalent of one meal per day would either weakly decrease labor supply and earnings, or have no prior about the consequences of increasing caloric intake. These findings have important implications for food policy and expenditures, including government food subsidies, in India and other low- to middle-income countries, but more research is needed to explore the consequences and impacts of incorrect beliefs and consumption.