CANDASA Project Summary

Using new price indexes to measure food system change in Africa and South Asia

The problem

Existing indicators cannot measure the affordability of nutritious diets, because standard price indexes count foods consumed based on their monetary value only, without reference to nutritional quality. Global measures such as the FAO's *Food Price Index* reflect quantities traded on world markets, while a *Consumer Price Index* reflects the cost of foods currently consumed by a specific population, and neither reflects the healthy diets promoted by many policies and programs.

New indicators are needed to measure differences in access to nutritious foods, and thereby guide systemic change and other interventions to bring healthy diets more closely within reach for people at risk of malnutrition. Market-level price indexes allow us to test what interventions most effectively improve affordability of healthy diets and assess its role in nutrition outcomes.

This project

Changing Access to Nutritious Diets in Africa and South Asia (CANDASA) is an $800,000 investment over 2.5 years (December 2017 - June 2020), jointly funded by the UK Department for International Development and the Bill & Melinda Gates Foundation, implemented by the Friedman School of Nutrition at Tufts University Friedman School of Nutrition with the International Food Policy Research Institute (IFPRI) and other research partners in India, Bangladesh, Ethiopia, Ghana and Tanzania and other countries such as Malawi.

The project's objective is to answer the following questions:

1. How do prices and availability of nutritious foods vary over time and space, relative to wages and other earnings among those most at risk of malnutrition?
2. When and where does investment in rural infrastructure and electrification, interacting with local agroecology and farming systems, improve and stabilize access to healthy diets?
3. Does the variation we see in price and availability of nutrient-rich foods have significant associations with nutrition outcomes, particularly stunting and women's nutrition?

CANDASA is the first large, multi-country study of spatial and temporal variation in the affordability of nutritious foods and its relationship to nutrition outcomes. Our results will directly inform policies and programs in our target countries, and also provide generalizable results to guide nutrition-smart investments elsewhere. The work builds directly on a Tufts-led project called *Indicators of Affordability of Nutritious Diets in Africa* (IANDA) funded by the UK Department for International Development from 2015 to 2017, and *Advancing Research in Agriculture-Nutrition Actions* (ARENA) at IFPRI funded by the Bill & Melinda Gates Foundation from 2014 to 2017 with a second phase through 2020.

Our methods

CANDASA measures changes in the food environment using local market prices, adding up the economic cost of meeting international nutrition standards at each time and place. We start with the cost of individual nutrients, complemented by newer criteria such as dietary diversity across food groups, dietary guidelines that recommend specific quantities of food in each category, and nutritional profiling that scores the value of specific food items. We scale up and demonstrate the use of four new price indexes to measure whether reaching these nutritional standards has become more (un)affordable over time and across locations. Actual diets often fall short of nutritional standards, perhaps because of costs as measured by CANDASA, but potentially also due to other factors such as habit, taste and convenience. The new price indexes will allow

measurement of what drives (un)affordability of healthy diets, and how costs interact with other factors affecting nutrition outcomes.

To measure access to a nutritious diet in each market area, we add up local prices of different food prices in ways that reflect specific nutritional standards. To measure affordability, we then compare that total cost to average incomes or wages at that time and place. Each index formula combines prices with health-science data in ways that can be updated regularly using standard software. For example, the cost of nutrient adequacy (CoNA) is defined as the least expensive way of meeting daily requirements of essential macro- and micro-nutrients, requiring data on the nutrient composition of each food and a person's estimated average requirements (EAR) for each nutrient. Similarly, the cost of diet diversity (CoDD) is the least expensive way of including a threshold number of distinct food groups, requiring knowledge of which foods are in which group and how many groups should be consumed each day. The cost of a recommended diet (CoRD) is the least-cost way of meeting dietary guidelines, for which the parameters are each day's quantity of foods in each category. We also use a nutritional consumer price index (NCPI) which weights each food by the value of its nutrient profile, such as the five-point Nutri-Score scale, so as to take account of the health advantages and disadvantages of each food in addition to its monetary cost.

Data sources
The price data used in CANDASA research is collected for other purposes, primarily to monitor inflation and living standards at the retail level as in Consumer Price Index (CPI), and to monitor wholesale prices as in a Market Information System (MIS). CPI data are typically collected by national statistical agencies tied to ministries of finance or central banks, while MIS data are often collected by agricultural ministries and development agencies. We use both sources, for complementary reasons: CPI data usually cover more different foods, often 40-100 distinct items, while MIS data usually include fewer items but a wider range of market locations and more frequent data collection, revealing seasonal patterns among a dozen or more foods in remote rural locations.

Timeline of results
CANDASA's initial output is dissemination of price indexes and preliminary results from Ghana and Tanzania in 2018, followed by publication and extension to determinants and consequences of changes in the cost of a nutritious diet. Our ambition is for these new metrics to become part of the standard toolkit for program design and policy analysis, guiding interventions to make healthy diets more affordable at times and places where nutritious foods are now out of reach.

Personnel and institutions
CANDASA is led at Tufts University by William A. Masters, a professor in the Friedman School of Nutrition and the Department of Economics, working with two doctoral students: Yan Bai, who graduated from Peking University and holds master's degrees from both the Department of Economics and the Fletcher School at Tufts, and Kate Schneider who holds an MPA from the University of Washington and has extensive experience in program design and management. Administrative support is provided by Jen Zahradnick and Zachary Gersten.

The project is implemented jointly with the International Food Policy Research Institute (IFPRI) through Derek Headey, a Senior Research Fellow in the Poverty, Health and Nutrition Division, working with IFPRI field offices in India, Bangladesh and Ethiopia. CANDASA also has academic partners in Africa through Daniel Sarpong at the University of Ghana, Fulgence Mishili at the Sokoine University of Agriculture in Tanzania, and Stevier Kaiyatsa in the Ministry of Finance, Economic Planning and Development in Malawi. The project's nutrition lead is Anna Herforth.

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