

Fighting respiratory disease at the source ^[1]

Access to Healthcare ^[2]

When Guatemalan social worker Eduardo Canuz teaches rural women how to cook their tamales on a gas stove, he is taking on more than a thousand years of history. The Maya people of Guatemala's highlands have been cooking over wood fires and bathing in wood-heated saunas, known as *temazcales*, since the dawn of their civilization. But the smoke is unhealthy and especially dangerous for women and children.

That's where Mr. Canuz comes in, with his supply of gas stoves and tanks of liquid propane. He's the field coordinator for a pilot research program called NACER ("to be born" in Spanish). In San Lorenzo and nearby mountain villages, Mr. Canuz and his team have installed gas stoves in the homes of 50 pregnant women. The goal is to monitor air quality in their homes through the course of their pregnancies, and then to study the health and development of their babies.



A new gas stove attracts a crowd

This is a crucial challenge, one that extends far beyond Guatemala. More than 3 billion people around the world cook and heat their homes with open fires and simple stoves, according to the World Health Organization (WHO). This contributes to respiratory illness, including lung cancer, asthma and chronic obstructive pulmonary disease. The WHO estimates that these diseases kill as many as 2 million people every year.



Smoke from fires used for cooking and heating in Guatemala and much of the developing world contributes to respiratory illness, especially among infants.

Guatemala's Department of Public Health dispatches young doctors to monitor pulmonary disease in rural villages like those around San Lorenzo. They administer common medicines and send more serious cases to hospitals. But they're understaffed and many villagers continue to treat diseases with traditional remedies, including nearly 60 different plants. Studies indicate that some of them have antibacterial powers – but often not enough.

The biggest challenge is cultural

In Guatemalan health clinics, infants account for more than 60% of respiratory cases. However, coaxing their families away from stoves isn't easy. First, there's the challenge of establishing a distribution network for propane canisters so that the women can count on timely refills and at prices that compete with wood. The NACER team also struggles to open up space in small kitchens for the new equipment. And they must remind the women to wear small backpacks equipped with sensors to monitor the air and measure the particulates

floating in it.



Field worker Expedita Ramírez Marroquín fits a woman with a vest to monitor the levels of carbon monoxide she experiences during the day.

But perhaps the biggest challenge is cultural. Most of the people around San Lorenzo speak a Mayan language, Mam, and view the Spanish-speaking researchers as outsiders. And traditionalists – often husbands and mothers-in-law – tend to resist the new and cleaner technology. “It’s hard to convince people over 50,” Mr. Canuz says. “They want to keep burning wood.” To convince these die-hards, NACER gives cooking classes and holds contests where people compete to make gas-cooked delicacies.

Lisa Thompson, coordinator of the doctoral program in global health services at the University of California, San Francisco, in the US, is running the pilot project around San Lorenzo. In the early 2000s, she led a preliminary effort to reduce smoke in villages by replacing open fires with wood-burning stoves called planchas. These stoves had chimneys, which routed some of the smoke out of the homes. Still, San Lorenzo and nearby villages remained polluted, with lots of smoke making its way into homes – and young lungs. So Ms. Thompson turned to gas.

The work, she says, doesn't end when babies are born. Field workers pay home visits to check on the babies' health, and new mothers are taught to look for early symptoms of pneumonia. If their babies are feverish and breathing fast, they're urged to rush to a clinic for treatment.



The hope is that cleaner household air, along with better care, will improve infant health.

In addition to installing stoves, the NACER team is working to discourage pregnant women from bathing in the temazcales. These steamy huts, where water is splashed on heated stones, have sky-high levels of carbon monoxide (CO), which is especially dangerous for

developing fetuses. Pregnant women often take a bath in the evening, right before going to bed. The combination of heat and CO induces sleep, Ms. Thompson says. “It’s a very hard thing to change.”

The San Lorenzo project is tiny, but the health risk of smoke inhalation is global. Ms. Thompson hopes that data from San Lorenzo, as well as lessons learned, will pave the way for a much larger effort featuring 3 200 pregnant women in Ghana, Rwanda, India and Peru.

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