The Vaccine Problem: Solved

According to the World Health Organization, 1.5 million children die each year from common vaccine-preventable diseases. It’s not because there aren’t enough vaccines to go around. The problem lies in keeping the lifesaving antigens cool enough—between two and eight degrees Celsius—to remain viable, an especially difficult task in parts of the world where electricity can be hard to come by. Up to 40 percent of vaccines spoil due to improper storage.

Five years ago, Penn medicine and microbiology professor Harvey Rubin realized the answer to this gargantuan global health-care problem was actually quite simple: Use power from off-grid cell-phone towers, which are ubiquitous the world over and largely immune to power outages, to run refrigerators that store vaccines.

Through his nonprofit organization, Energize the Chain, Rubin has partnered with local wireless service providers and established 111 vaccine-storage sites in Zimbabwe—with another 150 in development—and is laying the groundwork for sites in Ghana and India. The results: more than 250,000 kids successfully vaccinated since 2013.

Here’s an inside look at a vaccine’s new and improved journey from lab to faraway patient:

1. Vaccine leaves the manufacturer in a temperature-controlled truck or container headed to the airport. It is shipped overseas in a cooler.

2. Vaccine arrives at its destination country, where it is stored in a major city, trucked out to central districts, then shipped to remote health centers.

3. A local health-care partner transports the vaccine to an energy-efficient refrigerator that’s hardened to an off-grid cell-phone tower. The tower is fueled by a diesel generator or solar panels, from which the fridge siphons power.

4. When a clinic needs vaccines, the health-care partner retrieves them from the refrigerator and delivers them in a cooler.

5. The patient receives a healthy, viable vaccine.

*The fridge’s sensors detect temperature fluctuations. If things get too hot, the solar panel flashes the door open—a text and email goes automatically to the health-care partner, who can address the problem on-site.*