

## Cold Chain Technologies

### Health need

Effective vaccine distribution and storage are critical to achieving immunization coverage and impact. As new vaccines become available, greater cold chain capacity is needed to accommodate their arrival and rollout. As many of these newer vaccines are ten- to twenty-fold more expensive than traditional routine vaccines, greater financial risks are associated with losses in vaccine potency caused by heat or freeze damage. Innovative cold chain technologies can help to improve the reliability of vaccine distribution, reduce unnecessary wastage of valuable commodities, and strengthen the overall immunization system.

### Technology solution

PATH is working with manufacturers and country collaborators to advance passive cold chain equipment and refrigerators that keep vaccines cold without freezing, and solar refrigerators without batteries that help to facilitate immunization services in remote low-resource settings. We have also developed cold chain equipment inventory assessment tools and inventory management software to enable program managers to more effectively manage their immunization supply chain.

### Current status and results

PATH continues to advance and support policies that help countries to adopt new technologies and practices that protect vaccine supplies in the cold chain. We are collaborating with vaccine manufacturers and global regulatory authorities to study the potential short-term transport and storage of relatively heat-stable vaccines in a controlled temperature chain environment that does not require ice packs or refrigeration. We are also assisting the World Health Organization (WHO) in the development of new specifications for refrigerators and cold chain monitoring equipment, among other technologies, that will encourage manufacturers to create innovative products that fit developing-country needs. Recent achievements include:

- The commissioned development of a tool to determine how many days of solar autonomy are needed to overcome low radiant (cloudy) conditions. Leveraging long-term (at least 5 years) data collected from over 85 geographic locations, countries can use the tool to assess the solar autonomy required to operate a solar refrigerator. Data generated by the tool have been incorporated into current WHO Performance, Quality, and Safety (PQS) standards for solar refrigerators.
- Building on previous software innovations advanced by PATH and the United Nations Children's Fund, we helped to implement a cold chain equipment inventory of products in more than eight countries that will soon be available as a web-based platform.
- Recent testing of prototype passive vaccine carriers with freeze-prevention features demonstrated a longer holdover time than cool water packs, potential compatibility with existing vaccine carriers, a reduced training burden, and cost savings compared to other freeze-prevention options for vaccine carriers. We continue to refine design specifications in collaboration with several vaccine carrier manufacturers.



PATH/Carib Nelson

**Appropriate and innovative technologies for vaccine cold chains.**

**“Vaccines are sensitive to heat and freezing and must be kept at the correct temperature from the time they are manufactured until they are used.”**

*Immunization in Practice. A Practical Resource Guide for Health Workers. Geneva: WHO; 2004.*

### Availability

For more information, regarding these projects, contact Tina Lorenson at [klorenson@path.org](mailto:klorenson@path.org).

### Donor support

Funding for this work has been provided by the **United States Agency for International Development** under PATH's HealthTech program and from the **Bill & Melinda Gates Foundation**.