

## Ambient Climate Monitoring in Health Supply Chains

Although an enormous quantity of products moves through global health supply chains on a daily basis, the storage and transportation environment for ambient health products — from international transport through the last mile — is not well understood. Temperature monitoring in central and regional warehouses, along in-country transport, at storage facilities, and during last-mile distribution is scarce, if it occurs at all. This lack of visibility into temperature excursions also exists during international transport of these products. The International Air Transport Association estimates that losses associated with temperature excursions and other logistics challenges in health care amount to \$35 billion annually. Additionally, temperature excursions, if not correctly monitored and mitigated, can negatively impact the quality of health commodities, sometimes rendering them ineffective or even unsafe.



Photo credit: Scott Dubin

While health product manufacturers indicate the temperature and humidity thresholds for their products and the World Health Organization has established good distribution practices for pharmaceutical products that includes checking temperature, routine temperature and humidity data is often not collected within the supply chain. If it is collected, it is through manual tools and then ignored. This increases the likelihood of degradation and prevents opportunities for corrective action. Furthermore, the heterogeneity across countries, within subnational regions, and across climates and seasons warrants the need to collect data routinely to avoid a one-size-fits-all approach. The frequency, duration, extent, and location of temperature excursions in the supply chain need to be better understood to inform the necessary adjustments to the products, their packaging, handling procedures, and the structures and vehicles with which products interact.

### Our Solution

The age of “the internet of things” (IoT) allows the use of smart technology in the form of temperature and humidity monitoring sensors that provide greater visibility into conditions along a supply chain while limiting the need for human intervention. IoT gives stakeholders across the entire supply chain the ability to continuously monitor temperature and humidity using mobile and web applications that instantly visualize and retrieve data. Sensors produce an enormous amount of data that we can aggregate and analyze, and which stakeholders can then use to inform mitigation strategies and best practices.

Since October 2017, Chemonics has been researching, testing, and installing temperature and humidity monitoring sensors in several countries, with new countries continually being added. We piloted our solution with the support of the USAID Global Health Supply Chain Program—Procurement and Supply Management (GHSC-PSM) project, which has procured and delivered more than \$1 billion in products to 58 countries. GHSC-PSM is also supporting in-country supply chain management in more than 30 countries. Chemonics has furthered testing and refinement of the solution with funding from the Bill & Melinda Gates Foundation and the Global Fund to Fight AIDS, Tuberculosis, and Malaria.

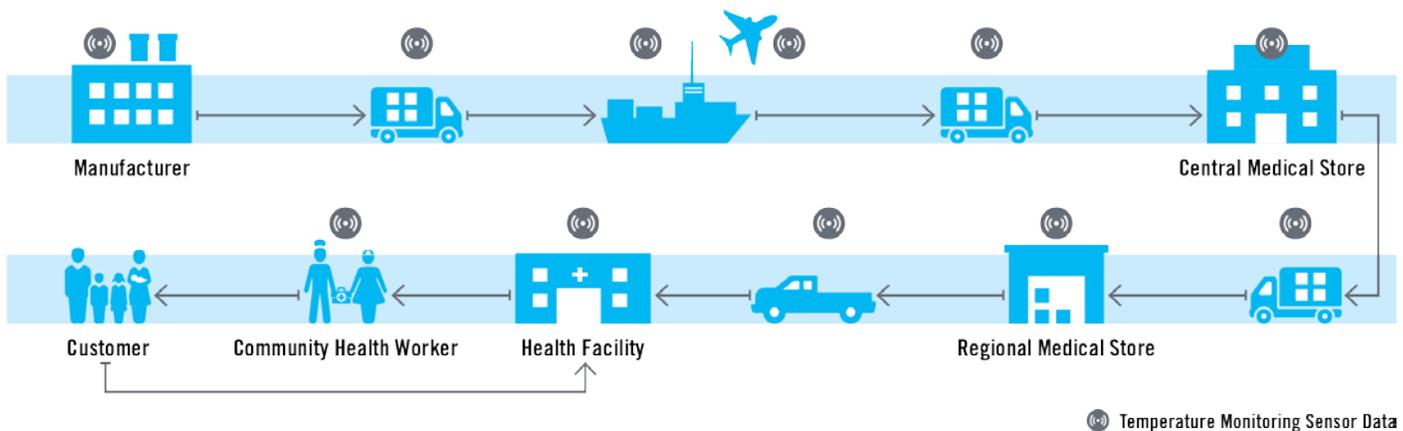
## Sensors in Action

### Installation and piloting

With support from a number of donors, Chemonics has installed temperature and humidity sensors in central, provincial, and district warehouses, as well as in clinics, hospital storerooms, pharmacies, and trucks. In Mozambique, we installed sensors at the central, regional, provincial, district, and health center levels, as well as in trucks at the central and regional levels. These sensors are also capturing data in stock stored and carried by community health workers. In Mauritania, we placed sensors at regional storehouses in every region; in Haiti, sensors were placed at the central storehouse.

### Data collection and analysis

Leveraging its global presence, partners, and networks, Chemonics has invested in implementing and expanding data collection for temperature and humidity of health products during international shipments and within in-country supply chains. Our goal is to quantify the environmental conditions throughout the supply chain by collecting routine and accurate measurements from manufacturer to patient. Data collection across our existing pilots began in April 2018. Furthermore, with the support of the Bill & Melinda Gates Foundation, Chemonics is working on a 12-month activity in Mozambique and Burkina Faso to collect data from sensors placed on international shipments that monitor temperature and humidity from the time a product leaves the manufacturer until it arrives at the receiving port. In-country, sensors will also be placed within structures and vehicles through which products move from the national level to the service delivery point (see below). The data collected through this activity and others is being analyzed to provide recommendations for reducing or eliminating temperature excursions through interventions that focus on packaging, storage, and transportation. The aggregated data and recommendations will be shared with stakeholders, industry leaders, and the public to enable better decision-making, mitigate financial losses, and keep medicines safe for the end user.



***Interested in working with us or looking for more information? Please contact Scott Dubin at [solve@chemonics.com](mailto:solve@chemonics.com).***