

Software for National-Level Vaccine Cold Chain Equipment Management

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The Vaccine Cold Chain

With support from the Global Alliance for Vaccines and Immunizations, pneumococcal and rotavirus vaccines will be introduced in over 40 countries in the next 5 years, potentially preventing 650,000 deaths from pneumonia and 450,000 deaths from diarrhea each year. It is essential that national immunization programs (NIPs) plan and manage the refrigeration equipment needed to ensure that these life-saving vaccines are kept at safe temperatures in a continuous “cold chain” from manufacturer to child.



Vaccine refrigerator and cold box.

Richard Anderson

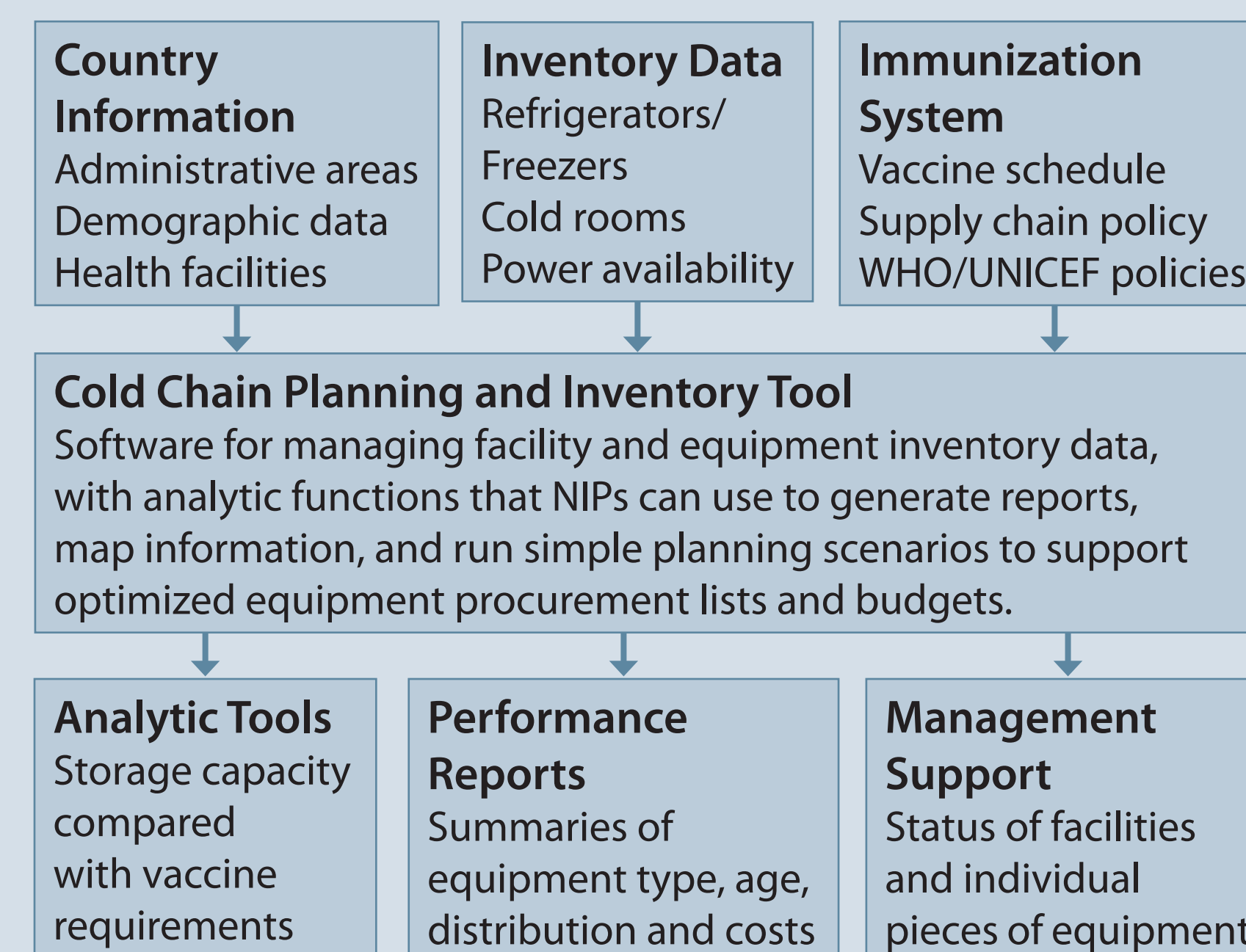


Vaccine cold rooms.

Optimized cold chain planning is possible with access to up-to-date data on equipment types, ages, working status, and storage capacity. This project demonstrates the role of software and analytic tools to support evidence-based planning of the vaccine cold chain.

Cold Chain Equipment Manager (CCEM)

CCEM is a Microsoft Access-based cold chain inventory and planning tool developed by PATH with support from USAID, WHO, and UNICEF. Report generation, geographic visualization, and system modeling by the software adhere to national immunization policies and WHO/UNICEF cold chain planning algorithms and reference data.



To help plan for new vaccine introduction, CCEM was deployed by NIPs in four countries in 2011. Staff from PATH, WHO, UNICEF, and CHAI actively collaborated with the NIPs teams to support inventory data collection and analysis. The cold chain inventories provided detailed information on the refrigeration, energy sources, and demographics of over 10,000 health facilities. In-country workshops were convened to support data analysis and train NIPs staff on the use of the software.

Cold Chain Equipment Manager (continued)

Results from the four implementation countries demonstrate the importance of inventory-based analysis of the capacity and quality of the cold chain at the national, district, and facility levels. For each country, areas of the cold chain that need investment

to accommodate the introduction of new vaccines were identified and the modeling capability of CCEM produced estimates of new equipment required to meet capacity shortages.

Equipment needs and costs to address cold chain equipment deficiencies in four countries

Country ¹	Base Schedule With Pneumococcal Vaccine				Base Schedule With Pneumococcal and Rotavirus Vaccines			
	Ice-lined refrigerator units	Gas/Kerosene units	Cold rooms	Cost USD in 000's	Ice-lined refrigerator units	Gas/Kerosene units	Cold rooms	Cost USD in 000's
Country A ²	219	258	0	745	558	405	7	1,825
Country B ³	47	56	4	242	100	67	8	675
Country C ⁴	94	413	13	1,604	210	846	25	3,481
Country D ⁵	55	35	0	97	65	38	11	540

Notes

- Equipment assignment to meet all shortages at government health facilities and storage sites. A medium-sized presentation of Rotavirus vaccine is assumed. Equipment assignments follow country preferences. Inventory data from some countries is preliminary. There is a high variability in costs for cold rooms due to construction and site setup.
- Country A's analysis assumes three-month supply intervals to district vaccine stores.
- Country B has cold rooms on order or waiting installation. A quantity of new refrigeration equipment is available for allocation and not reflected in the analysis.
- Country C has 11 regional vaccine stores in the planning phase. The inventory did not account for new equipment on hand awaiting allocation.
- Country D's analysis does not consider replacement of out-of-date equipment.

The cost per annual birth of required equipment for introduction of Pneumococcal and Rotavirus vaccines (Total cost / annual births) is \$1.32 for Country A, \$0.87 for Country B, \$2.11 for Country C, and \$1.40 for Country D.

Software Adoption

The key lesson from the introduction of CCEM was that it addressed the needs of two separate groups of stakeholders: planners and managers. The planners at the national and global level are interested in the tool to answer system-wide questions, while the managers focus on individual facilities and updates to the inventory. The introduction of CCEM depends upon support from the planners, while sustained use and inventory updates depend upon the managers.

Sustainable equipment inventory and planning model

