

The Vaccine Cold Chain



Maintaining Cool Links

Cold chain system

- *Immunization programs are widely recognized as one of the most effective types of health interventions.*
- *However, for many countries, the delivery of safe injection practices and quality vaccines is a significant challenge.*
- *The cold chain system, when implemented properly, can help overcome this challenge.*



Cold chain system

- *The cold chain system can enhance the on-going :*

Quality, Safety, and Efficacy

of an immunization program.

The cold chain system

- *Vaccines are sensitive biological substances that, with time, lose their potency, especially when exposed to **heat, sunlight or fluorescent light** and, in some cases, when cold (DTP, Hepatitis B vaccine).*
- *Once potency has been lost, it can't be restored.*
- *To provide protection against disease, vaccines need to be **distributed, stored and administered** at recommended temperatures*

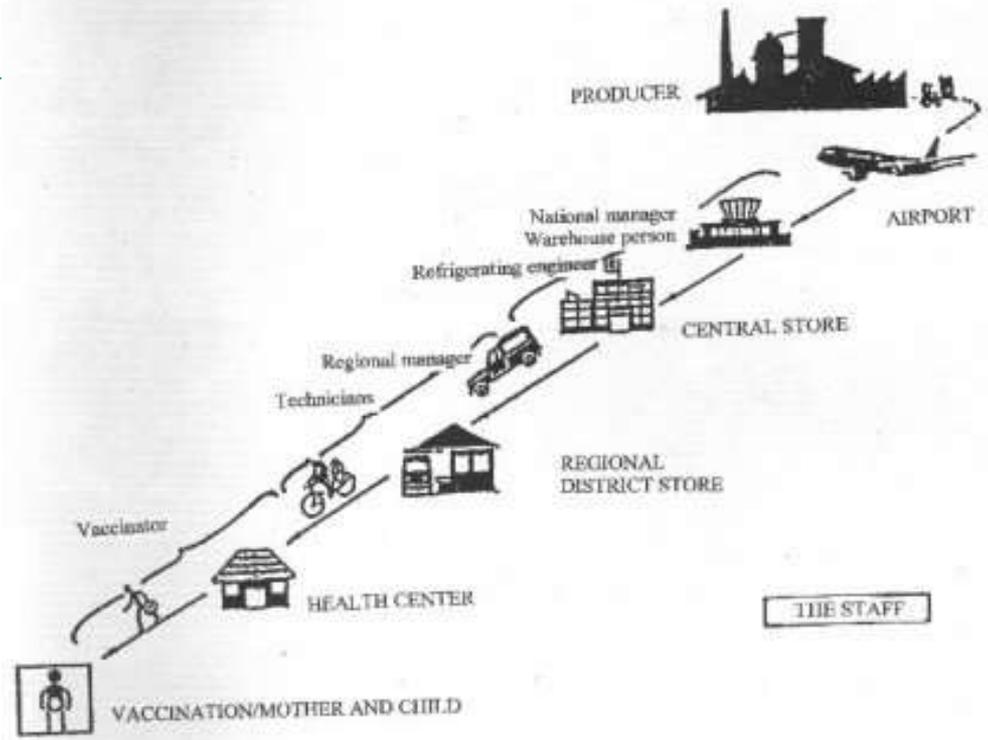
The cold chain system

• The cold chain system is means of delivering **effective vaccinations in children**.

• The common elements of all cold chain systems are **a series of storage and transport links through a network of:**

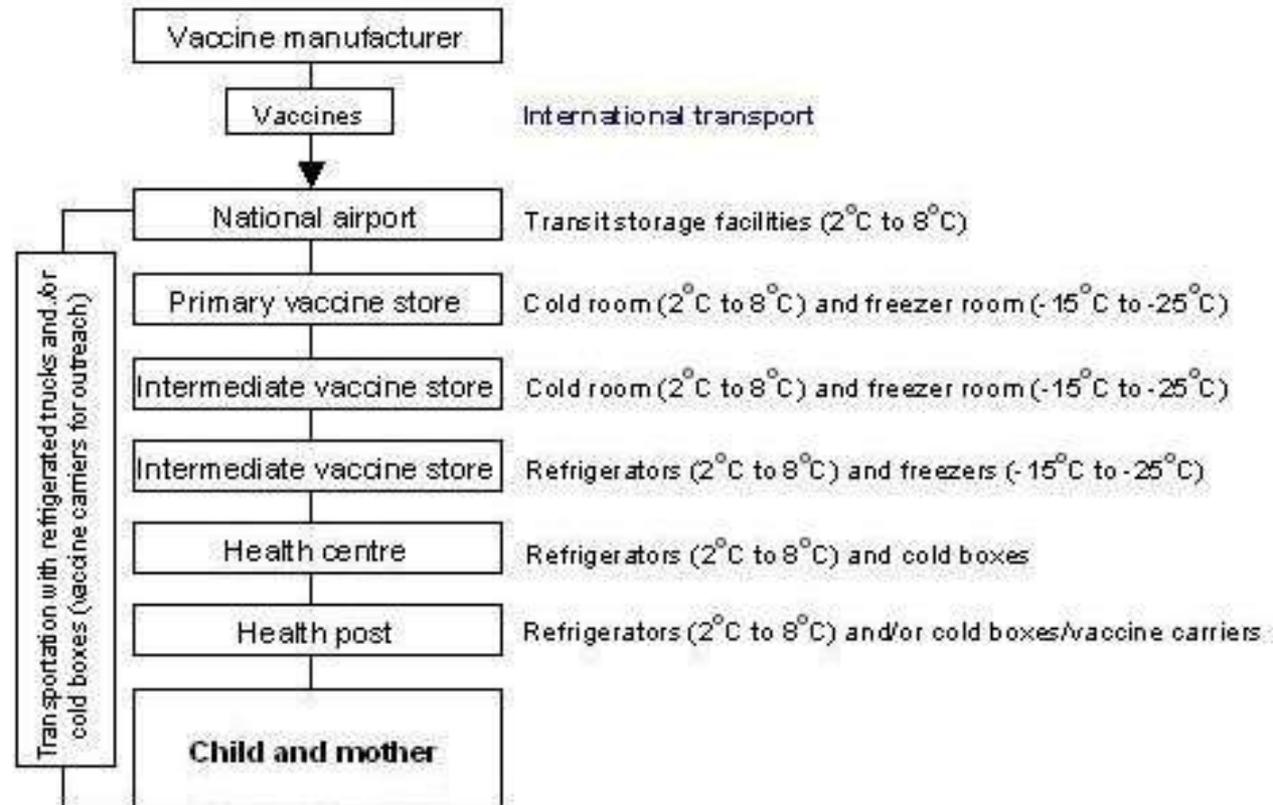
- fridges,
- freezers and
- cold boxes

that keep vaccines at a **safe temperature** throughout their journey.



Typical cold chain system

As shown in the diagram, a typical cold chain system begins when vaccine is manufactured and ends with the child being immunized.



Storage conditions for vaccines and diluents

- *All vaccines are sensitive to heat; however, some are more sensitive than others.*
- *WHO, EPI recommends the safe temperature range*
+2° C to +8° C
for storing most EPI vaccines.
- *OPV is the most heat-sensitive vaccine and must be kept between -15° C and -25° C.*

Storage conditions for vaccines and diluents

- ❑ The WHO no longer recommends that freeze-dried vaccines such as BCG, measles and Yellow fever be kept frozen at -20°C .
- ❑ Storing them at this temperature is not harmful to the vaccines but takes up unnecessary deep-freeze storage space.
- ❑ Instead, they should be stored between $+2^{\circ}\text{C}$ to $+8^{\circ}\text{C}$.
- ❑ All freeze-dried vaccines become more heat-sensitive after they have been reconstituted

Storage conditions for vaccines and diluents

- ❑ *BCG, measles, MR, MMR and rubella vaccines are **not only sensitive to heat but also to light.***
- ❑ *Normally, these vaccines are supplied in **dark brown glass vials** to protect them against light damage.*
- ❑ *Nevertheless, they should always be covered and protected from strong light.*
- ❑ *Hepatitis B, Hib (liquid), DTP, DT, Td and TT vaccines **are sensitive to both heat and freezing** (i.e., below 0° C), and should be protected accordingly*

Storage conditions for vaccines and diluents

- ❑ *Freeze-dried vaccines and their diluents should always be distributed together (BCG, Measles).*
- ❑ *Each type of freeze-dried vaccine requires a specific diluent.*
- ❑ *A diluent made by one manufacturer should not be reconstituted with a vaccine produced by another manufacturer.*
- ❑ *Reconstituted vaccines should not contain preservatives and thus become an ideal environment for growing dangerous organisms.*
- ❑ *Reconstituted vials should therefore be used in one immunization session, or within 6 hours of reconstitution*

Cold Chain Equipment

All cold chain equipment has to comply with a set of performance standards defined by the WHO EPI program and United Nations Children's Fund (UNICEF), or national policy.

❑ *The recommended equipment typically used for vaccine storage are :*

- 1. cold rooms,*
- 2. refrigerators and*
- 3. freezers.*

❑ *For transporting vaccines equipment such as*

- 1. cold boxes,*
- 2. vaccine carriers and international containers are commonly used.*

Cold chain equipment

“for transporting vaccine”



Cold box



Vaccine carrier



Ice bags

Cold chain equipment

“For vaccine storage”



refrigerators



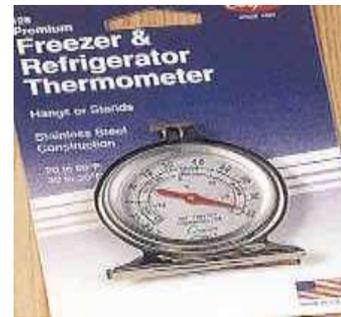
Freezer



Cold room

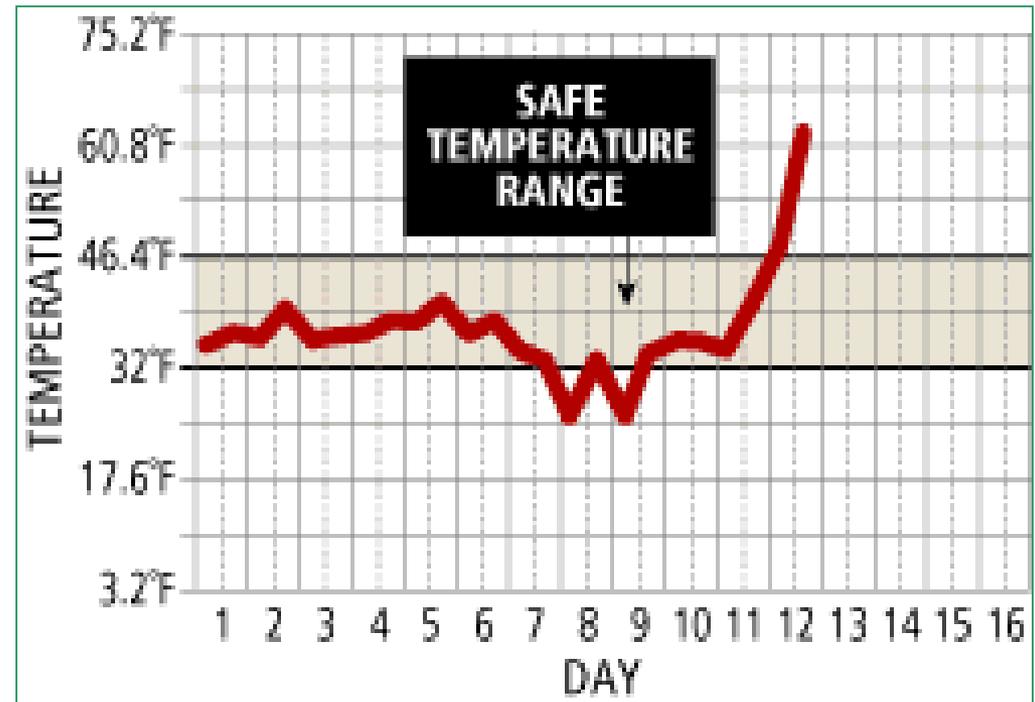
Controlling and monitoring temperatures

- There are different types of monitoring devices for measuring, controlling and recording storage temperature of vaccines.
- Refrigerators, freezers and cold boxes normally have thermometers that measure the internal temperature.
- Most refrigerators and freezers are fitted with an adjustable thermostat to control and correct storage temperature.



Controlling and monitoring temperatures

- *A designated person in charge of cold chain equipment should read and record storage temperature on a record sheet at least twice daily or according to policy*



Controlling and monitoring temperatures

A Cold Chain Monitor card (CCM)

- *Approved by the WHO is always packaged with each consignment of vaccine supplied by UNICEF.*
- *All CCMs have temperature-sensitive indicators that monitor heat exposure throughout the entire journey of vaccine, from manufacturer to health facility.*
- **This indicator changes irreversibly from white to blue if exposed to temperatures higher than +10 and +34°C to monitor conditions in transit and in storage.**

COLD CHAIN MONITOR CARD

The image shows a 'COLD CHAIN MONITOR CARD' (CCM) form. At the top, it says 'Vaccine Cold Chain Monitor'. Below this is a table with columns for 'Date in', 'Batch', 'Location', 'Date out', and 'Notes'. The 'Date in' column contains '3-19' and the 'Location' column contains 'Rome, Italy'. Below the table is a 'MonitorMark' strip with four indicators labeled A, B, C, and D. Indicator D is blue, while A, B, and C are white. Below the strip is a table with columns for 'Date in', 'Date out', 'Date in', and 'Date out'. The 'Date in' column contains '3-19' and the 'Date out' column contains '3-19'. Below this table is a section for 'Supplier' and 'Fournisseur'. The 'Supplier' column contains 'FOURNISSEUR'.

Date in	Batch	Location	Date out	Notes
3-19		Rome, Italy		

MonitorMark
Date in: 3-19
Date out: 3-19
A B C D

Date in	Date out	Date in	Date out
3-19	3-19		

TEST VACCINE BEFORE USE

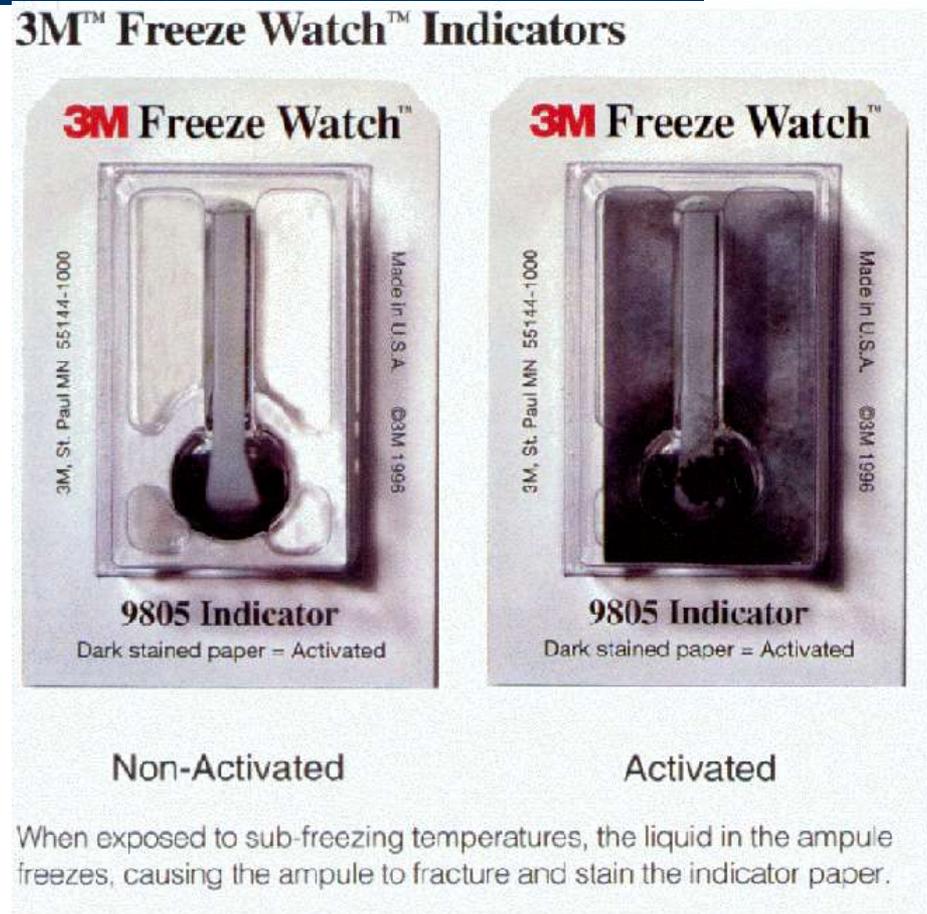
Supplier: FOURNISSEUR

Every carton of perishable vaccines is packed with a temperature-sensitive card that is checked and marked at different points during shipment.

● Areas on label turn blue to indicate spoilage.

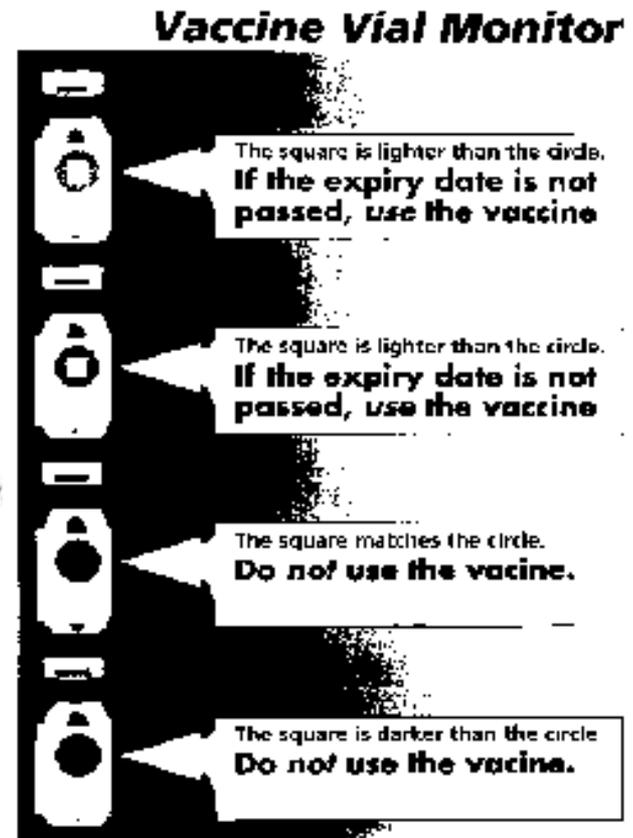
Controlling and monitoring temperatures

- **Freeze Watch** indicators are CCMs used to monitor storage conditions of **cold-sensitive vaccines**.
- *Stop! Watches* comprise of CCM and Freeze Watch devices to monitor high and low storage temperatures in a refrigerator.



Controlling and monitoring temperatures

- A Vaccine Vial Monitor (VVM) is a label on a vaccine vial that is marked by a circle with a small square inside.
- A heat-sensitive material on the label registers cumulative heat exposure of each individual vaccine vial over time.
- When the inner square matches or is darker than the outer circle, it indicates that the vaccine has lost its potency and must be discarded.
- VVMs are **NOT** substitutes for expiry dates.
- Vaccines must never be used after their expiry dates.



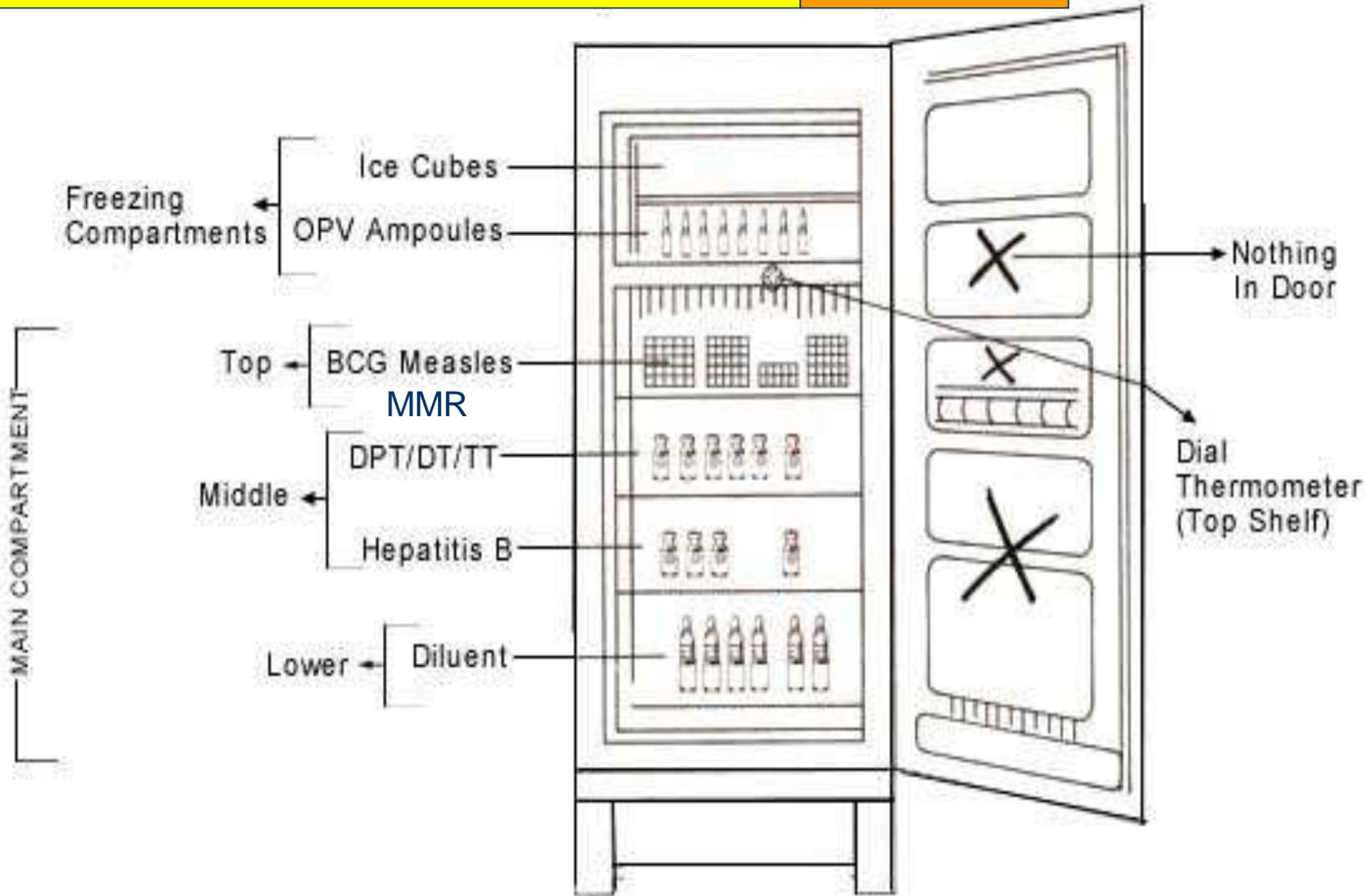
Keeping vaccines in the domestic refrigerator at health center



- 1. The refrigerator must be placed in the coolest place away from direct sunlight with adequate air circulation around it (12 – 15 inches away from the wall)*
- 2. It must be kept locked and opened only when necessary*
- 3. It must be defrosted regularly*
- 4. Its temperature must be recorded twice daily*
- 5. Both monitor and thermometer are placed in the refrigerator, while temperature chart is stuck on the outer-surface of the refrigerator door*



Arrangement of vaccines in the refrigerator



Shake test

DPT, DT, dT, TT
These vaccines are damaged
by freezing

- *Shake test should be performed on a sample of vaccine vial in question and on the sample of the same batch/manufacture which is known to have been frozen.*
- *The two vials should be shaken vigorously for few minutes, and observed for the rate of sedimentation*

