



# WEEKLY EPIDEMIOLOGICAL REPORT

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## Cold Chain Management– (Part 2)

### Temperature Monitoring

Vaccines have different cold storage requirements, which change at different levels of the cold chain. Although all vaccines are heat-sensitive, some are far more sensitive than others.

### Sensitivity to heat

#### Most sensitive

- Live oral polio vaccine (OPV)
- Measles
- Measles and Rubella (MR)
- Measles, Mumps and Rubella (MMR)
- Adsorbed Diphtheria-Pertussis-Tetanus vaccine (DPT)
- BCG (Lyophilized)
- Adsorbed Diphtheria-Tetanus vaccine (DT, Td)
- Tetanus Toxoid (TT)
- Live Japanese Encephalitis (JE)
- Hepatitis B

#### Least sensitive

### Sensitivity to freeze

| Vaccines <b>damaged</b> by freezing | Vaccines <b>unaffected</b> by freezing |
|-------------------------------------|--|
| Hepatitis B                         | BCG                                    |
| HiB                                 | OPV                                    |
| Pentavalent Vaccine                 | Measles                                |
| TT                                  | Mumps                                  |
| aTd                                 | MR                                     |
| DT                                  | MMR                                    |
| DPT                                 | JE (Live)                              |

- BCG and Measles/ Rubella/ MR vaccines must not be frozen after reconstitution
- Diluents for any vaccine must never be frozen.

In addition to being temperature-sensitive, live vaccines are also highly sensitive to strong light, and thus need to be kept in the dark as far as possible. BCG and Measles are those most affected. These vaccines must never be exposed to sunlight, and are given some protection by being supplied in vials of dark brown glass to reduce the penetration of light. This alone will not prevent light damage however, and great care must be taken to protect them during use. As with loss of potency due to heat, freeze and any loss of potency due to light is also permanent

and irreversible. Note that all losses of potency are **CUMULATIVE**, that is, each time a vaccine is exposed to incorrect temperature or strong light its potency will decrease. Since the vaccine may have already been exposed previously, any new exposure, however small, will increase the damage to the vaccine. Ultimately, due to cumulative damage, the vaccine may be completely destroyed, with all its potency lost. Note also that even when stored at the correct temperature vaccines do not retain potency forever. Therefore the **expiry date** marked on a vial or packet of vaccine must be strictly observed even when correct storage temperatures have always been maintained. During immunization sessions, vaccines can be kept cool but should be protected from freezing by standing opened vials in a foam pad above the ice packs in the vaccine carrier.

### “Shake Test”

The shake test is designed to determine whether adsorbed vaccines such as Pentavalent vaccine, DTP, DT, Td, TT or hepatitis B have been frozen. Adsorbed vaccines are manufactured in such a way that one substance attaches to the surface of another material. After freezing, the vaccine is no longer a uniform cloudy liquid, but tends to form flakes that gradually settle to the bottom after the vial has been shaken. Sedimentation occurs faster in a vaccine vial that has been frozen than in a vaccine vial from the same manufacturer that has never been frozen.

Compare the deliberately frozen vial next to the suspect vial

| Deliberately frozen vial | Suspect vials |
|--------------------------|---------------|
|                          |               |
|                          |               |

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To perform the shake test, take a vaccine vial of the same type, manufacturer and batch number as the vaccine vial you want to test. Freeze the vial for at least 10 hours at -10°C until the contents are solid, and then let it thaw. This vial is the “control” sample and should be labeled as “frozen” to avoid its use for vaccination.

Then take a vaccine vial from the batch that you suspect has been frozen. This is the “test” sample. Vigorously shake the control and test samples for 10 seconds, place both vials on a flat surface to rest, and continuously observe them over the following 20 minutes.

View both vials against the light to compare the rate of sedimentation. If the test sample shows a much slower sedimentation rate than the control sample, the test sample has probably not been frozen and may be used.

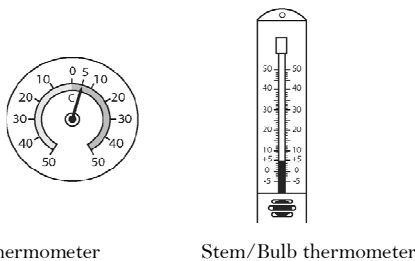
However, if the sedimentation rate is similar and the test sample contains flakes, the test sample has probably been damaged by freezing and should be withdrawn from use. The health worker must notify the supervisor immediately to ensure that any other damaged vials are also identified and withdrawn from use.

**Temperature Monitoring Devices**

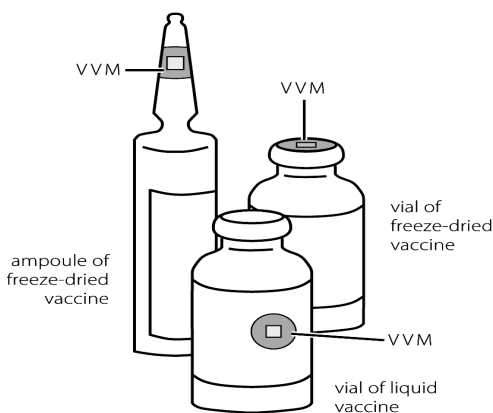
Health workers should record the temperature of their vaccine refrigerator twice a day on a chart. Each refrigerator/freezer must have its own thermometer and temperature record sheet. There are a number of different types of monitoring devices to help you measure, control and record storage temperatures.

**Thermometers**

Thermometers are used to measure the internal temperature of the refrigerator at any given moment. Two types of thermometers are commonly used (Stem/ Bulb thermometer and Dial thermometer). In refrigerators/freezers it is necessary to use a recommended type of thermometer placed in the middle part of the main compartment of the refrigerator or freezer.

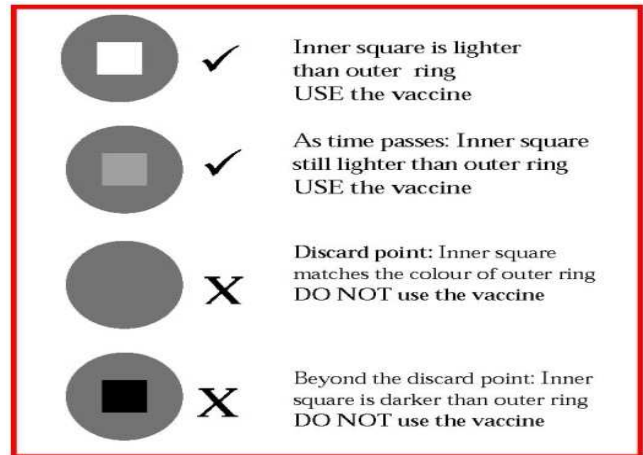


**Vaccine Vial Monitors**



A vaccine vial monitor (VVM) is a small colored disk printed on a vial label or, for freeze-dried vaccines, placed on the vial cap. A square inside the disk darkens irreversibly when exposed to heat over time. By comparing the color of the inner square to that of the outer ring, users can determine the extent to which the vaccine inside has been exposed to heat.

**How to read VVM**



**When health workers use VVMs correctly, they can:**

- Identify heat-damaged vaccine and discard it
- Avoid unnecessarily discarding vaccine because of suspected heat exposure
- Extend accessibility to vaccinations in remote areas beyond the reach of the cold chain
- Monitor the amount of vaccine discarded due to excessive heat exposure
- Identify cold chain problems

**Freeze-tag**

Freeze-tag consists of an electronic temperature measuring circuit with associated LCD-display. If the indicator is exposed to a temperature below 0°C for a specified period of time. The display will change from the “good” status into the “alarm” status. The indicator is used to warn of freezing and is packed with Pentavalent Vaccine, DTP, TT and DT vaccines as well as with hepatitis B.



Vaccines OK



Do shake test

**Electronic Temperature Record Devices**

This device is to measure and log the temperature inside the refrigerator continuously. By using this device it is possible to record the logged temperature by connecting the device to a computer on a graphical mode or tabular mode with the data and time of the logged temperature.

**References :**

- ☑ Immunization Essentials: A Practical Field Guide (2003),USAID [http://www.dec.org/pdf\\_docs/PNACU960.pdf](http://www.dec.org/pdf_docs/PNACU960.pdf)
- ☑ Safe vaccine handling, cold chain and Immunizations (1998), World Health Organization. Geneva

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*The author wishes to thank Dr. Sudath Pieris, (Assistant epidemiologist) Dr. Ananda Amarasingha (Assistant epidemiologist) for the guidance.*

**Table 1: Vaccine-preventable Diseases & AFP**

05<sup>th</sup>-11<sup>th</sup> February 2011(06<sup>th</sup> Week)

| Disease                 | No. of Cases by Province |    |    |    |    |    |    |    |     | Number of cases during current week in 2011 | Number of cases during same week in 2010 | Total number of cases to date in 2011 | Total number of cases to date in 2010 | Difference between the number of cases to date in 2011 & 2010 |
|-------------------------|--------------------------|----|----|----|----|----|----|----|-----|---|--|---------------------------------------|---------------------------------------|---|
|                         | W                        | C  | S  | N  | E  | NW | NC | U  | Sab |   |  |                                       |                                       |   |
| Acute Flaccid Paralysis | 00                       | 00 | 01 | 00 | 00 | 00 | 00 | 00 | 01  | 02  | 02                                       | 12                                    | 09                                    | +33.3 %   |
| Diphtheria              | 00                       | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00  | 00  | 00                                       | 00                                    | 00                                    | -   |
| Measles                 | 00                       | 02 | 00 | 00 | 00 | 00 | 00 | 00 | 00  | 02  | 01                                       | 06                                    | 20                                    | - 70.0 %  |
| Tetanus                 | 00                       | 00 | 00 | 01 | 00 | 00 | 00 | 00 | 00  | 01  | 00                                       | 03                                    | 04                                    | -25.0 %   |
| Whooping Cough          | 00                       | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00  | 00  | 01                                       | 05                                    | 03                                    | + 66.6 %  |
| Tuberculosis            | 66                       | 60 | 02 | 19 | 09 | 02 | 29 | 03 | 35  | 225   | 302                                      | 1057                                  | 1190                                  | - 11.2 %  |

**Table 2: Newly Introduced Notifiable Disease**

05<sup>th</sup>-11<sup>th</sup> February 2011(06<sup>th</sup> Week)

| Disease       | No. of Cases by Province |                    |                    |    |            |                    |                    |    |            | Number of cases during current week in 2011 | Number of cases during same week in 2010 | Total number of cases to date in 2011 | Total number of cases to date in 2010 | Difference between the number of cases to date in 2011 & 2010 |
|---------------|--------------------------|--------------------|--------------------|----|------------|--------------------|--------------------|----|------------|---|--|---------------------------------------|---------------------------------------|---|
|               | W                        | C                  | S                  | N  | E          | NW                 | NC                 | U  | Sab        |   |  |                                       |                                       |   |
| Chickenpox    | 19                       | 17                 | 15                 | 00 | 13         | 15                 | 11                 | 01 | 14         | 105   | 97                                       | 540                                   | 407                                   | + 32.7 %  |
| Meningitis    | 02<br>KL=1<br>GM=1       | 01<br>NE=1         | 03<br>HB=3         | 00 | 02<br>BT=2 | 03<br>KR=2<br>PU=1 | 04<br>PO=2<br>AP=2 | 00 | 02<br>RP=2 | 18  | 22                                       | 121                                   | 235                                   | - 09.7 %  |
| Mumps         | 03                       | 00                 | 40                 | 01 | 03         | 06                 | 02                 | 00 | 11         | 66  | 13                                       | 251                                   | 100                                   | - 151 %   |
| Leishmaniasis | 00                       | 02<br>KD=1<br>ML=1 | 03<br>MT=2<br>HB=1 | 00 | 00         | 00                 | 04<br>AP=2<br>PO=2 | 00 | 01<br>RP=1 | 10  | 05                                       | 61                                    | 46                                    | + 32.6 %  |

**Key to Table 1 & 2**

**Provinces:** W: Western, C: Central, S: Southern, N: North, E: East, NC: North Central, NW: North Western, U: Uva, Sab: Sabaragamuwa.  
**DPDHS Divisions:** CB: Colombo, GM: Gampaha, KL: Kalutara, KD: Kandy, ML: Matale, NE: Nuwara Eliya, GL: Galle, HB: Hambantota, MT: Matara, JF: Jaffna, KN: Killinochchi, MN: Mannar, VA: Vavuniya, MU: Mullaitivu, BT: Batticaloa, AM: Ampara, TR: Trincomalee, KM: Kalmunai, KR: Kurunegala, PU: Puttalam, AP: Anuradhapura, PO: Polonnaruwa, BD: Badulla, MO: Moneragala, RP: Ratnapura, KG: Kegalle.

**Data Sources:**

**Weekly Return of Communicable Diseases:** Diphtheria, Measles, Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps.

**Special Surveillance:** Acute Flaccid Paralysis.

**Dengue Prevention and Control Health Messages**

**Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them free of water collection**

**Table 4: Selected notifiable diseases reported by Medical Officers of Health**  
05<sup>th</sup>-11<sup>th</sup> February 2011(06<sup>th</sup> Week)

| DPDHS Division   | Dengue Fever / DHF* |             | Dysentery |            | Encephalitis |           | Enteric Fever |            | Food Poisoning |           | Leptospirosis |            | Typhus Fever |            | Viral Hepatitis |           | Human Rabies |           | Returns Received |
|------------------|---------------------|-------------|-----------|------------|--------------|-----------|---------------|------------|----------------|-----------|---------------|------------|--------------|------------|-----------------|-----------|--------------|-----------|------------------|
|                  | A                   | B           | A         | B          | A            | B         | A             | B          | A              | B         | A             | B          | A            | B          | A               | B         | A            | B         | %                |
| Colombo          | 82                  | 465         | 4         | 29         | 0            | 2         | 2             | 28         | 2              | 3         | 3             | 37         | 0            | 1          | 0               | 5         | 0            | 1         | 69               |
| Gampaha          | 23                  | 158         | 1         | 14         | 1            | 2         | 1             | 7          | 8              | 8         | 3             | 22         | 0            | 4          | 1               | 12        | 0            | 0         | 53               |
| Kalutara         | 7                   | 70          | 3         | 19         | 0            | 1         | 0             | 12         | 4              | 6         | 3             | 15         | 0            | 0          | 0               | 1         | 0            | 0         | 67               |
| Kandy            | 4                   | 35          | 17        | 71         | 1            | 1         | 2             | 5          | 0              | 2         | 4             | 12         | 3            | 13         | 1               | 6         | 0            | 0         | 70               |
| Matale           | 4                   | 16          | 0         | 14         | 0            | 0         | 0             | 1          | 0              | 3         | 3             | 17         | 0            | 1          | 0               | 0         | 0            | 0         | 83               |
| Nuwara           | 0                   | 7           | 3         | 24         | 0            | 1         | 2             | 6          | 0              | 12        | 0             | 6          | 1            | 16         | 0               | 1         | 0            | 0         | 62               |
| Galle            | 4                   | 15          | 1         | 9          | 0            | 0         | 0             | 1          | 0              | 4         | 1             | 12         | 3            | 9          | 0               | 4         | 0            | 0         | 79               |
| Hambantota       | 2                   | 20          | 1         | 7          | 0            | 2         | 0             | 1          | 0              | 0         | 2             | 8          | 2            | 12         | 0               | 0         | 0            | 0         | 82               |
| Matara           | 4                   | 21          | 0         | 7          | 0            | 0         | 1             | 4          | 0              | 0         | 2             | 14         | 6            | 13         | 0               | 1         | 0            | 0         | 88               |
| Jaffna           | 10                  | 78          | 2         | 13         | 0            | 1         | 6             | 43         | 1              | 2         | 0             | 0          | 4            | 46         | 0               | 8         | 0            | 1         | 82               |
| Kilinochchi      | 3                   | 5           | 0         | 1          | 0            | 0         | 0             | 2          | 0              | 0         | 0             | 0          | 0            | 3          | 0               | 1         | 0            | 0         | 100              |
| Mannar           | 1                   | 11          | 0         | 0          | 0            | 0         | 0             | 5          | 0              | 0         | 0             | 3          | 1            | 20         | 0               | 0         | 0            | 0         | 60               |
| Vavuniya         | 1                   | 15          | 1         | 5          | 0            | 2         | 0             | 4          | 0              | 0         | 3             | 11         | 0            | 1          | 0               | 0         | 0            | 0         | 100              |
| Mullaitivu       | 0                   | 2           | 1         | 3          | 0            | 0         | 1             | 1          | 0              | 0         | 0             | 0          | 0            | 0          | 0               | 0         | 0            | 0         | 25               |
| Batticaloa       | 7                   | 42          | 7         | 68         | 0            | 1         | 0             | 2          | 0              | 0         | 0             | 0          | 0            | 0          | 0               | 0         | 0            | 0         | 71               |
| Ampara           | 2                   | 13          | 3         | 20         | 0            | 0         | 0             | 4          | 0              | 13        | 0             | 11         | 0            | 0          | 0               | 1         | 0            | 0         | 29               |
| Trincomalee      | 0                   | 7           | 6         | 35         | 0            | 0         | 0             | 1          | 3              | 4         | 6             | 17         | 0            | 1          | 0               | 2         | 0            | 0         | 91               |
| Kurunegala       | 11                  | 54          | 9         | 58         | 0            | 2         | 2             | 16         | 0              | 12        | 7             | 31         | 1            | 15         | 1               | 5         | 0            | 0         | 68               |
| Puttalam         | 9                   | 112         | 2         | 30         | 0            | 0         | 0             | 5          | 0              | 1         | 0             | 8          | 0            | 2          | 0               | 1         | 0            | 1         | 67               |
| Anuradhapu       | 0                   | 22          | 1         | 20         | 0            | 1         | 0             | 0          | 0              | 1         | 0             | 27         | 0            | 3          | 0               | 3         | 0            | 0         | 47               |
| Polonnaruw       | 9                   | 29          | 0         | 17         | 0            | 1         | 0             | 1          | 0              | 8         | 8             | 18         | 0            | 0          | 0               | 0         | 0            | 0         | 100              |
| Badulla          | 5                   | 33          | 1         | 19         | 0            | 0         | 0             | 11         | 0              | 0         | 1             | 4          | 0            | 3          | 2               | 4         | 0            | 0         | 67               |
| Monaragala       | 0                   | 20          | 3         | 12         | 0            | 0         | 1             | 4          | 0              | 0         | 0             | 11         | 0            | 7          | 1               | 4         | 0            | 0         | 64               |
| Ratnapura        | 8                   | 59          | 12        | 54         | 1            | 2         | 0             | 4          | 2              | 3         | 2             | 31         | 2            | 9          | 1               | 11        | 0            | 0         | 67               |
| Kegalle          | 6                   | 28          | 2         | 11         | 1            | 2         | 6             | 12         | 0              | 4         | 4             | 18         | 0            | 0          | 3               | 13        | 0            | 0         | 91               |
| Kalmunai         | 0                   | 3           | 6         | 60         | 0            | 0         | 0             | 0          | 0              | 0         | 1             | 2          | 0            | 0          | 0               | 0         | 0            | 0         | 69               |
| <b>SRI LANKA</b> | <b>202</b>          | <b>1340</b> | <b>86</b> | <b>620</b> | <b>04</b>    | <b>21</b> | <b>24</b>     | <b>180</b> | <b>20</b>      | <b>86</b> | <b>53</b>     | <b>335</b> | <b>23</b>    | <b>179</b> | <b>10</b>       | <b>83</b> | <b>00</b>    | <b>03</b> | <b>71</b>        |

Source: Weekly Returns of Communicable Diseases WRCD).

\*Dengue Fever / DHF refers to Dengue Fever / Dengue Haemorrhagic Fever.

\*\*Timely refers to returns received on or before 11<sup>th</sup> February, 2011 Total number of reporting units =320. Number of reporting units data provided for the current week: 226

A = Cases reported during the current week. B = Cumulative cases for the year.

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Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to [chepid@sltnet.lk](mailto:chepid@sltnet.lk).

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