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The EVM assistant user guide

Version v3

Sep 2010

EVM—*setting a standard for the vaccine supply chain*

Contents

Technical terms and acronyms

The following technical terms and acronyms are used in the tool:

EEFO	Earliest Expiry date First Out
EVM	Effective Vaccine Management.
FIC	Fully Immunized Child
FOB	Free On Board (Incoterm). A standard way of expressing price information, used in the equipment data tables.
Primary store	A store which receives some or all of its vaccine directly from a national or international vaccine manufacturer. Example: a national vaccine store.
Lowest delivery level store	A store which receives vaccine from a higher level store (primary or sub-national) and supplies one or more service delivery points. Example: a district store supplying one or more health facilities.
MaxiStock	The maximum volume of a product or mix of products that will be held in stock or transported based on a defined delivery frequency. Includes 25% safety stock.
Maximum storage volume	As MaxiStock.
Net storage volume	For a freezer, refrigerator or cold box: the actual volume available for the storage of vaccine.
Passive container	A cold box, vaccine carrier or other device which is used to transport vaccine at the correct temperature without use of a power source.
Population	The total population of a country.
Pre-qualified	Cold chain equipment which has been pre-qualified by WHO for purchase by UN agencies.
Recipient	An individual member of the target group for a specific vaccine.
Service delivery level	A health facility or health post where vaccine is administered.
Sub-national store	A store which receives vaccine from a primary store or a higher level sub-national store and supplies one or more lower level sub-national store and/or one or more lowest delivery level stores. For example, a provincial store supplying one or more district stores.
Target group	Subset of the population who are the target for receiving one or more of the vaccines in the immunization schedule. Expressed as a percentage of the total population.
Wastage factor	1/wastage rate.
Wastage rate	Expected percentage of a vaccine vial that is wasted. In this application it includes both unopened and opened vial wastage.

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Introduction

The scoring of several of the EVM indicators involves collecting and processing numerical data. This needs to be done in a standardized way to ensure that assessors achieve consistent results.

The Excel-based EVM Assistant tool described in this document is a component of the EVM package. The tool can be downloaded from the EVM website.

This document tells you how to use the tool to answer the relevant EVM indicators. The indicator references relate to the first release of the EVM offline application tool.

The document also describes how to do simple manual calculations for those numerical indicators for which the EVM Assistant does not provide direct assistance.

1. Numerical indicators

Several of the EVM indicators require the assessor to perform calculations and to enter the calculated values in the EVM assessment tool. This section lists these indicators. It identifies which ones are supported by the EVM Assistant, which ones use field data on its own, and which ones require a combination of both field data and the use of the Assistant.

1.1 Indicators requiring the EVM Assistant and/or field data collection

The tables below list all the EVM indicators that require numerical data and describe where to look for this information.

Indicators in Tables 1 and 2, highlighted in pink, are supported by a calculation using the EVM Assistant

The 'field data' listed in Tables 1 and 2 are established either by simple calculation using a paper-based data collection form, or from a lookup table – for example a table showing the capacity of commonly used vaccine refrigerators. These field data calculation and lookup methods are described in more detail in Section 6.

Table 1: Criterion E3 – Cold storage, dry storage and transport capacity

Question no.	*EVM Question*	*Use*
E3:01a A	Measure the net storage capacity of the +2°C to + 8°C store(s) in litres or m³	Field data & EVM Assistant
E3:01a B	Enter maximum estimated vaccine volume in litres or m³, plus 10%.	EVM Assistant
E3:02a B	Measure the net storage capacity of the -20°C store(s) in litres or m³	Field data & EVM Assistant
E3:02a C	Enter maximum estimated vaccine volume in litres or m³, plus 10%.	EVM Assistant
E3:03a A	Measure the net storage capacity of the dry store in litres or m³	Field data & EVM Assistant
E3:03a B	Enter maximum estimated diluents, syringe and safety box volumes litres or m³, plus 10%.	EVM Assistant
E3:05a A	Supplementary vaccines - Measure the net storage capacity of the +2°C to + 8°C store(s) in litres or m³	Field data & EVM Assistant
E3:05a B	Supplementary vaccines - Enter maximum estimated vaccine volume for +2°C to + 8°C in litres or m³, plus 10%.	Field data (1)
E3:06a B	Supplementary vaccines - Measure the net storage capacity of the -20°C store(s) in litres or m³	Field data & EVM Assistant
E3:06a C	Supplementary vaccines - Enter maximum estimated vaccine volume for -20°C store(s) in litres or m³, plus 10%.	Field data (1)
E3:07a A	Supplementary vaccines - Measure the net storage capacity of the dry store in litres or m³	Field data & EVM Assistant
E3:07a B	Supplementary vaccines - Enter maximum estimated diluents, syringe and safety box volumes litres or m³, plus 10%	Field data (1)
E3:08a A	Measure the net storage capacity of the delivery vehicle(s) in litres or m³	Field data (2)
E3:08a B	Enter peak delivery volume in litres or m³, plus 10%.	EVM Assistant

Question no.	*EVM Question*	*Use*
E3:09a A	Is there sufficient freezing or cooling capacity to meet maximum demand? [Y, N]	EVM Assistant & field data
E3:09a B	Is there sufficient storage capacity for icepacks/chilled water packs storage to meet peak demand?	Field data & EVM Assistant
E3:10a B	Are there sufficient passive containers? [Y, N]	EVM Assistant & field data

Notes:
(1) Supplementary immunization activities in most countries are irregular. The amount of temporary storage and transport capacity required for these activities will be difficult to assess at the time of visit. These indicators should be discussed with the store staff and checked objectively by manual calculation. If supplementary vaccines are kept together with routine vaccines, the evaluation will take into consideration during analysis of adequacy of storage capacity for all vaccines kept in the store. This case is valid for diluents, syringes and safety boxes.

(2) Transport capacity is also difficult to assess precisely at time of visit. First identify the type of transport used and the way how vaccines are packed for transportation. Vaccines may be transported using cold boxes, big containers, pallets or in a refrigerated truck. Again, this indicator should be discussed with the store staff and checked objectively by manual calculation.

(3) In order to accommodate fluctuations in supply and demand, EVM expects storage and transport capacities to be at least 10% greater than the estimated volumes.

Table 2: Criterion E6 – Stock management system

Question No.	*EVM Question*	*Source*
E6:Q20a D	During the review period, did the stock of each and every vaccine remain within its EVM recommended maximum? [Y, N]	Field data(1) & EVM Assistant
E6:Q21a E	During the review period, did the stock of each and every vaccine remain within its EVM recommended minimum? [Y, N].	Field data(1) & EVM Assistant

Notes:
(1) In order to accommodate fluctuations in supply and demand, EVM expects maximum and minimum stock levels to fluctuate by up to 10% above or below established maximum and minimum stock levels. Fluctuations outside these ranges indicate poor stock management practice.

2. Calculation methods

Several of the EVM indicators require the assessor to calculate available net storage and transport capacity in a store and to compare this with the actual quantity of vaccines and other supplies passing through the store. These indicators are shown above in Table 1.

The EVM Assistant approaches this problem as a four step process:

1. STEP 1 – Establish vaccine and commodity volumes: Before the field assessments start, the team leader will collect data on the immunization schedule, vaccine presentations, delivery intervals, etc and the range of target populations served by each type of facility to be visited. These data are then entered into the EVM Assistant to generate a series of nomograms which can be printed out and taken to the field. An alternative tabular format is also provided.
2. STEP 2 – Establish available storage capacity at each facility: Lookup tables and paper-based calculation forms are provided in the tool so that the assessor can calculate available net storage volumes based on field measurement and/or observation. For example, after identifying and recording the number and type of vaccine refrigerator in a store, the assessor will use the refrigerator and freezer lookup table provided to establish available net storage capacity. Similarly, the cold room data recording form (Worksheet A) will be used to record key measurements and then to calculate the net storage capacity of each room in a consistent way.
3. STEP 3 – compare vaccine and commodity volumes with available capacity: Discussions at local level will help to establish the actual target population served by each of the visited facilities. By using these locally-sourced data, the nomograms in the EVM Assistant can be used for a rapid paper-based assessment of the maximum vaccine and commodity volumes passing through each store. Alternatively the tabular format can be used.
4. STEP 4 – complete the EVM assessment tool: Enter the calculated net storage capacity and maximum vaccine and injection equipment volumes in the EVM assessment tool to obtain the final score against the relevant indicators.

By using these simple methods, field assessors can do on-the-spot calculations which can also be shared and discussed with storekeeping staff at the time of the assessment.

The remainder of this section describes the basic data needed to generate the nomograms and how the data are collected at national level. Section 7 shows how the nomograms are used.

2.1 Collecting basic data

The data required to generate the nomograms should generally be available at national level. This section lists the data that has to be collected.

2.1.1 Immunization schedule data

Table 3 shows the data needed to generate the net maximum storage volumes required per recipient for vaccines, diluents, syringes and safety boxes.

Table 3: Immunization schedule data for the net storage volume estimates

Name	Description
Vaccine type	List of all vaccines in the current immunization schedule. If the assessment is also going to review the introduction of new vaccine(s), list the new vaccine(s) and identify which, if any, of the existing vaccines will be replaced.
Vaccine presentation	Number of doses per vial, Uniject™, pre-filled syringe, etc.
Packed volume per dose based on national figure	Optional: Indicate the packed volumes as per national figures if exist. If left blank, the Maxi packed volume will be generated automatically using figures from the database in the EVM Assistant.
Vaccine wastage rate	Optional: Indicate the national expected vaccine wastage rates. This will override the WHO/GAVI indicative figure. If no national figure is available, leave blank; the WHO/GAVI indicative figure will be generated automatically from the database in the EVM Assistant.
Target groups	Expressed either as annual births or as percentage of the total population. (e.g. % that are children from 0-11 months; % that are eligible for HPV, TT, etc.). If the selection is annual birth there is no need of enter the % eligible. If the selection is % of the total population, the % for each vaccine is required.
Number of doses per recipient	As set out in the immunization schedule.
MaxiStock established for primary level	The MaxiStock that is established for each vaccine received at national level. This figure is expressed in months of supply.

Table 4: Example of an immunization schedule data table

Vaccine type	Presentation (doses/vial or pre-filled)	Packed volume per dose/cm ^{3}	Wastage rate (%)	Recipient group (% of population)	Doses per target group	MaxiStock at national level in months
Existing schedule						
BCG	20	database	50	4.0	1	9
OPV	10	database	25	3.7	4	9
DTP	10	database	25	3.7	3	9
HepB	10	database	25	3.7	3	9
Measles	10	database	40	3.7	1	9
TT	10	database	25	4.2	2	9
YF	5	database	10	3.7	1	9
New schedule						
BCG	20	database	50	4.0	1	9
OPV	10	database	25	3.7	4	9
Measles	10	database	40	3.7	1	9
HepB (2)	Uniject	database	5	4.0	1	6
DTP-HepB-Hib (3)	Pre-filled (1)	25.0	5	3.7	3	6
TT	10	database	25	4.2	2	4
YF	5	database	10	3.7	1	4
Rota (3)	Pre-filled	database	5	3.7	1	4

(1) This gives an example of a vaccine that is not recorded in the database.
(2) Existing vaccine in new presentation for birth dose.
(3) New vaccine added to the schedule

2.1.2 Stock management data

The stock management data listed in Table 5 are also required to generate the nomograms that will be used by field assessors at each of the four different store types – primary, sub-national, lowest delivery level and service delivery level.

Table 5: Stock management data for the net storage volume estimates

Name	Description
Type of immunization schedule used	The EVM Assistant uses either the current or the future immunization schedule option, depending on the purpose of the analysis. EVM Criteria 1-9 do require the current immunization schedule. Use the future immunization schedule if you want to assess whether existing storage capacity can accommodate the addition of planned new vaccines.
Type of population used for analysis	The tool uses either the annual birth or a target group percentage for each vaccine. This approach gives the flexibility needed for newer vaccines, such as HPV, where the eligible target group covers a wide age range, or is limited to one sex.
A. Storage level - Polio is kept at -20°C and all other vaccines are kept at +5°C (1)	
Minimum population size 1	Establish the size of the target population served by the store that has the smallest catchment population (generally a sub-national store). This figure is used to set the minimum value of the X-axis on the nomogram.
Maximum population size 1	Establish the size of the target population served by the store that has the largest catchment population (generally a primary store). This figure is used to set the maximum value of the X-axis on the nomogram.
Maximum stock: option 1	At primary level use the 'per individual vaccine' option. Otherwise, list up to four possible maximum stock level options, in months – for example 3, 4, 6 and 9 months. A graph will be generated for each of these choices.
B. Storage and service delivery levels - All vaccines are kept at +5°C (1)	
Minimum population size 2	Establish the size of the target population served by the store that has the smallest catchment population (generally a health facility). This figure is used to set the minimum value of the X-axis on the nomogram
Maximum population size 2	Establish the size of the target population served by the store that has the largest catchment population (generally a lowest delivery level store). This figure is used to set the maximum value of the X-axis on the nomogram.
Maximum stock: option 2	List up to four possible maximum stock level options, in months – for example 1, 1.5, 2 and 3 months. A graph will be generated for each of these choices.
C. Dry storage capacity for diluents, syringes and safety boxes (1)	
Storage options	Select the option that matches the facility based on how supplies are stored: (a) Diluents are stored separately; (b) Syringes and safety boxes only are stored together or (c) All are stored together.
Minimum population size 3	Establish the size of the target population served by the store that has the smallest catchment population. This figure is used to set the minimum value of the X-axis on the dry store nomogram.
Maximum population size 3	Establish the size of the target population served by the store that has the largest catchment population (generally a primary store). This figure is used to set the maximum value of the X-axis on the dry store nomogram.
Maximum stock: options 3	List up to four possible maximum stock level options, in months – for example 1, 2, 3 and 4 months. A graph will be generated for each of these choices.
D. Delivery of vaccines, diluents, syringes and safety boxes (1)	
Delivery options	Select the option that matches the delivery system used: (a) vaccines and diluents are distributed separately from syringes and safety boxes; (b) vaccine and diluents and distributed together with syringes and safety boxes. Enter up to four possible shipment frequencies per year for vaccine-

Name	Description
	diluents and syringes-safety boxes. A graph will be generated for each of these choices.
Cold Box(CB) Vaccine Carrier (VC) category	Select the CB or VC category that meet the delivery. (a) CB large; (b) CB small; (c) VC large; and (d) VC small.
Icepack type used	Select Icepack type used: (a) 0,3; (b) 0.4; (c) o,6 ; (d) Average
Minimum population size 4	Establish the size of the target population served by the store that has the smallest catchment population (generally a lowest delivery level store). This figure is used to set the minimum value of the X-axis on the transport nomogram.
Maximum population size 4	Establish the size of the target population served by the store that has the largest catchment population (generally a primary store). This figure is used to set the maximum value of the X-axis on the transport nomogram.
Frequency of shipments	List up to four possible shipment frequencies per year – for example, 4, 6 and 12. A graph will be generated for each of these choices.

(1) Sample is all the sites selected for EVM assessment.

Table 6: Example of a stock management data table

Data type	Unit of measurement	Value
Immunization schedule	Text	Select *current* or *new*
Type of population used for analysis	Text	Percentage of population in the target group.
A. National and sub-national storage where polio is kept at -20°C		
Minimum population size 1	Number	50,000
Maximum population size 1	Number	100,000
Maximum stock options 1	Months	'per individual vaccine', 3, 4, 6 months
B. Lowest delivery and service delivery level storage – all vaccines are kept at +5°C		
Minimum population size 2	Number	500
Maximum population size 2	Number	20,000
Maximum stock options 2	Months	1.5, 2, 4 months
C. Dry storage capacity for diluents, syringes and safety boxes		
Minimum population size 3	Number	50,000
Maximum population size 3	Number	100,000
Maximum stock options 3	Months	4, 6, 9, 12 months
D. Delivery of vaccines, diluents, syringes and safety boxes		
Minimum population size 4	Number	50,000
Maximum population size 4	Number	100,000
Frequency of shipments	Months	1, 3, 6, 12 months

N.B. Use tables 3-5 for description and tips where to find the data. This form will be used to collect secondary data for the EVM Assistant

3. Organization of the EVM Assistant

This section outlines the components of the EVM Assistant. The tool is an Excel workbook divided into 22 worksheets[1].

The ***Index*** worksheet provides basic instructions and includes a hyperlinked index to the individual worksheets. These worksheets are divided into three categories:

1. Data input sheets: Data entry is only required on the four worksheets named ***Cover, Vaccine_select, Nomo_data*** and ***Facility_table.*** Cells that require mandatory data entry are coloured white and cells that allow optional data entry are coloured pale yellow. All other cells are protected. Protected cells containing formulae are coloured pale green or grey.
2. Output data sheets: These make use of the input data to generate country-specific lookup material for use by field assessors during the EVM assessment. These data are presented as two tables; one sheet of bar charts and seven Nomogram graphs; how these are used in the field is explained below.
3. Reference data sheets: The tool uses these worksheets for lookup purposes; they also provide the field assessors with essential equipment specification data.
4. Data collection worksheets: There are two of these: ***Worksheet_A*** and ***Worksheet_B.*** These can be printed out, copied and taken to the field as a means for collecting specific data in a systematic way. Calculations can either be carried out manually or the data can be brought back from the field and entered into the electronic version of the worksheet.

In addition to the guidance on the **summary** worksheet the *input data* sheets include step-by-step notes to guide users through the data entry process.

Worksheets tags are colour-coded by type: The index sheet tag is coloured dark grey; data entry sheets are coloured pale yellow; information sheets are coloured indigo; nomograms are coloured dark green and database sheets are coloured dark blue.

Sample screen shots, graphs and charts are shown in the following sections to explain the use of the tool and how its output should be used during an EVM field assessment.

[1] There are two further hidden worksheets for translation and country data.

4. User instructions

The EVM Assistant tool is designed to help assessors answer the EVM questions listed above in section 2.

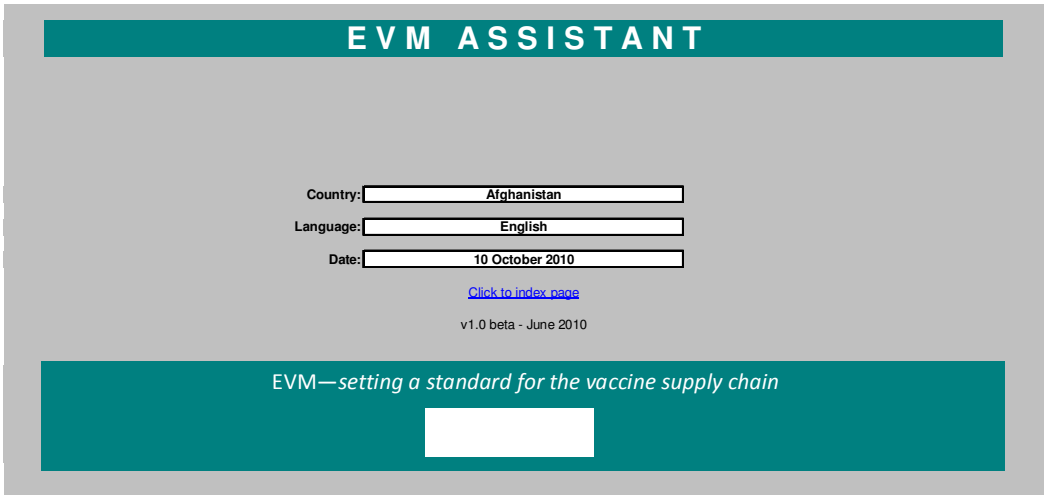
The lead assessor must collect the primary and secondary data listed in section 3 before the field assessment exercise begins. These data are entered into the tool to generate a set of country-specific nomograms; these charts are then printed out and photocopied so that each of the field assessment teams has a complete set before they travel. It is not necessary that the assessment teams should take an electronic copy of the EVM Assistant with them, although they may do so if they wish.

Correct use of the nomograms, the equipment data lookup sheets and other standard data collection forms will help ensure that the numerical questions in the EVM tool are answered in a systematic and standardized manner.

4.1 How to start the tool

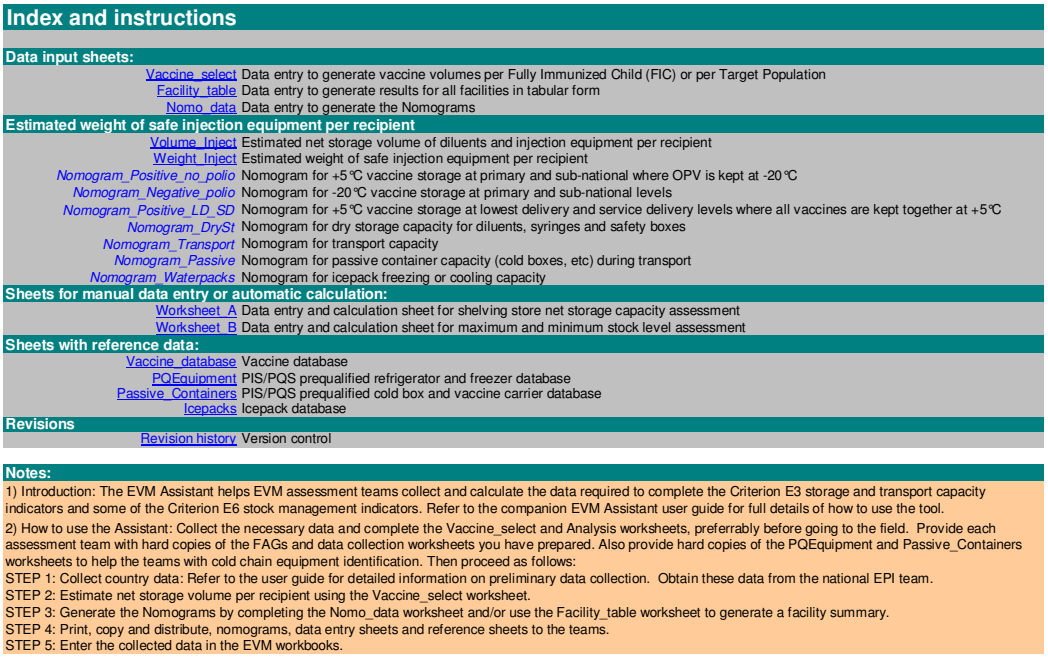
Open theEVM Assitant tool and save it with the country name – for example: EVM_Assistant_V1_Tunisia_2010. Click on the **Cover** tag. Enter the country name, language choice and date. Currently the tool is available in English and French; other language versions will be developed in the future. Note that there are some elements of the tool which are not translated – for example the titles on the nomograms.

Figure 1: Cover worksheet



Next click on the **Index** tag; use this worksheet to familiarize yourself with the contents of the workbook and to navigate to the individual worksheets via the hyperlinks provided. Note that there are no hyperlinks to the nomograms. See Figure 2.

Figure 2: Index worksheet.



Index and instructions

Data input sheets:	
Vaccine_select	Data entry to generate vaccine volumes per Fully Immunized Child (FIC) or per Target Population
Facility_table	Data entry to generate results for all facilities in tabular form
Nomo_data	Data entry to generate the Nomograms
Estimated weight of safe injection equipment per recipient	
Volume_Inject	Estimated net storage volume of diluents and injection equipment per recipient
Weight_Inject	Estimated weight of safe injection equipment per recipient
Nomogram_Positive_no_polio	Nomogram for +5°C vaccine storage at primary and sub-national where OPV is kept at -20°C
Nomogram_Negative_polio	Nomogram for -20°C vaccine storage at primary and sub-national levels
Nomogram_Positive_LD_SD	Nomogram for +5°C vaccine storage at lowest delivery and service delivery levels where all vaccines are kept together at +5°C
Nomogram_DrySt	Nomogram for dry storage capacity for diluents, syringes and safety boxes
Nomogram_Transport	Nomogram for transport capacity
Nomogram_Passive	Nomogram for passive container capacity (cold boxes, etc) during transport
Nomogram_Waterpacks	Nomogram for icepack freezing or cooling capacity
Sheets for manual data entry or automatic calculation:	
Worksheet_A	Data entry and calculation sheet for shelving store net storage capacity assessment
Worksheet_B	Data entry and calculation sheet for maximum and minimum stock level assessment
Sheets with reference data:	
Vaccine_database	Vaccine database
PQEquipment	PIS/PQS prequalified refrigerator and freezer database
Passive_Containers	PIS/PQS prequalified cold box and vaccine carrier database
Icepacks	Icepack database
Revisions	
Revision history	Version control

Notes:

1) Introduction: The EVM Assistant helps EVM assessment teams collect and calculate the data required to complete the Criterion E3 storage and transport capacity indicators and some of the Criterion E6 stock management indicators. Refer to the companion EVM Assistant user guide for full details of how to use the tool.

2) How to use the Assistant: Collect the necessary data and complete the Vaccine_select and Analysis worksheets, preferrably before going to the field. Provide each assessment team with hard copies of the FAGs and data collection worksheets you have prepared. Also provide hard copies of the PQEquipment and Passive_Containers worksheets to help the teams with cold chain equipment identification. Then proceed as follows:

STEP 1: Collect country data: Refer to the user guide for detailed information on preliminary data collection. Obtain these data from the national EPI team.
STEP 2: Estimate net storage volume per recipient using the Vaccine_select worksheet.
STEP 3: Generate the Nomograms by completing the Nomo_data worksheet and/or use the Facility_table worksheet to generate a facility summary.
STEP 4: Print, copy and distribute, nomograms, data entry sheets and reference sheets to the teams.
STEP 5: Enter the collected data in the EVM workbooks.

4.2 How to generate the nomograms

The next two sections describe how to generate the nomograms.

4.2.1 Vaccine_select worksheet

Click on the **Vaccine_select** worksheet. Take the immunization schedule data you have already collected (Tables 3 and 4) and proceed as follows – see Figure 3:

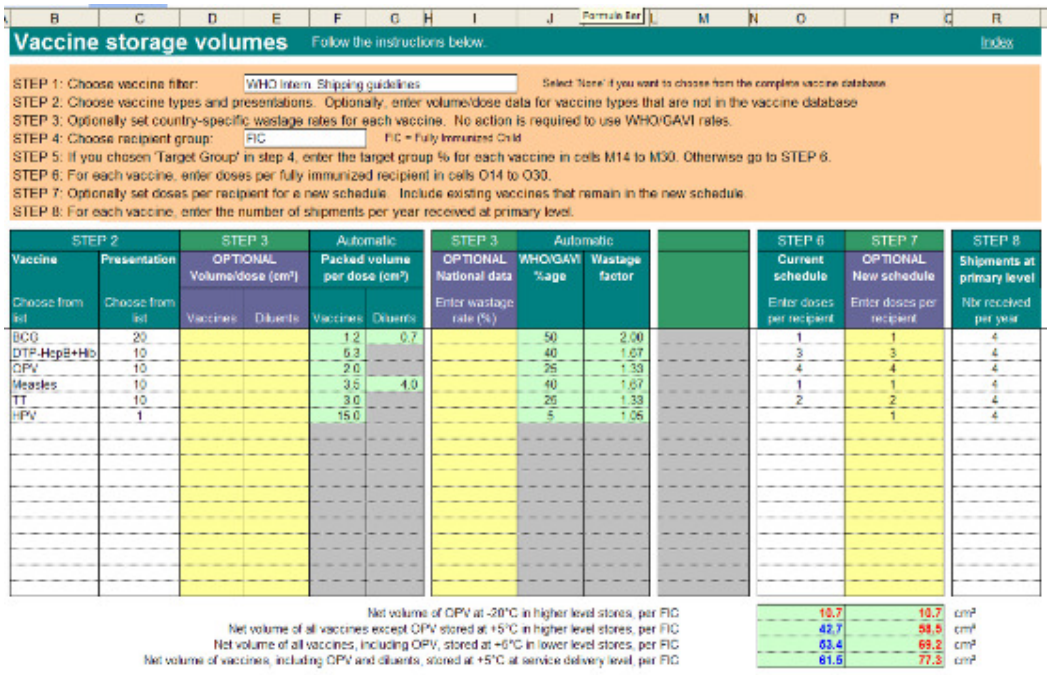
1. Select the vaccine database filter you want to use in cell E4. You can either choose 'None', or 'WHO Intern. Shipping guidelines'. The first choice gives you access to the complete vaccine database. The second choice only offers data on generic vaccines of each type. If vaccines are supplied to the country by UNICEF, the second choice is preferable because UNICEF does not guarantee that its WHO-pre-qualified vaccines will be supplied by a specific manufacturer.
2. Select the type of recipient group used in cell E7 for estimating vaccine demand by following national policy. There are two options: 'FIC' (fully immunized child) which refers to the annual birth cohort, or 'Target Group', expressed as a percentage of the total population. Choosing 'Target Group' opens up the cells in column M for data entry. IF 'FIC' is chosen, this column is blanked out.
3. Use the drop-down lists in the column B data entry cells to enter each of the vaccines in the current schedule. Optionally, you may also enter any additional vaccines that will be present in a new vaccine schedule. You may want to do this if you are investigating the effect on storage capacity of adding or subtracting vaccines from the existing schedule.
4. Use the drop-down lists in column C to specify the vaccine presentations.
5. Optionally, you can use the cells in column D and E to enter packed volume-per-dose data for vaccines or diluents using actual national figures[2]. This will override the maximum packed volume data from the database. If left blank, the maximum packed volume for each vaccine will be extracted from the database.

[2] This option may be used for locally produced vaccines and for other vaccines which are not included in the EVM Assistant database. Alternatively, you can add the figures to the database and then use the drop-down list.

6. Optionally use the cells in column I to enter vaccine wastage rate as per national figures if exist. This will override the WHO/GAVI indicative figures from the data base. If the cells in column I are left blank, the WHO/GAVI indicative figures will be extracted from the database.
7. If the choice in cell M10 is 'Target Group', enter data for each vaccine in column M. The target group for each vaccine is expressed as a percentage of the total population – for example, 10%.
8. In column O, enter the number of doses per FIC or Target Group for each of the vaccines in the current schedule.
9. Optionally, in column P, enter the number of doses per FIC or Target Group for each of the vaccines in the new schedule. Note that you *must* repeat the column O figures for any existing vaccines that are retained in this new schedule. *Do not* enter a figure if one or more of the existing vaccines is being replaced by the new vaccine. For example if DTP-HepB-Hib is replacing DTP and HepB, only enter doses per recipient for the new pentavalent vaccine, *not* for DTP and HepB.
10. In column R, enter the MaxStock level established at primary level in months for each vaccine.

The calculated volumes are accumulated in cells O34-37 for current immunization schedule and in cells P34-37 for the new immunization schedule (if any). These figures are used in the **Nomo_data** worksheet to produce nomograms based on one or more standardized delivery intervals. They are also used in the **Facility_table** worksheet if the user wishes to use this method of volume assessment.

Figure 3: Vaccine_select worksheet



Vaccine storage volumes — Follow the instructions below. — Index

STEP 1: Choose vaccine filter: WHO Interm. Shipping guidelines — Select 'None' if you want to choose from the complete vaccine database
STEP 2: Choose vaccine types and presentations. Optionally, enter volume/dose data for vaccine types that are not in the vaccine database
STEP 3: Optionally set country-specific wastage rates for each vaccine. No action is required to use WHO/GAVI rates.
STEP 4: Choose recipient group: FIC — FIC = Fully Immunized Child
STEP 5: If you chosen 'Target Group' in step 4, enter the target group % for each vaccine in cells M14 to M30. Otherwise go to STEP 6.
STEP 6: For each vaccine, enter doses per fully immunized recipient in cells O14 to O30.
STEP 7: Optionally set doses per recipient for a new schedule. Include existing vaccines that remain in the new schedule.
STEP 8: For each vaccine, enter the number of shipments per year received at primary level.

STEP 2		STEP 3		Automatic		STEP 3	Automatic			STEP 6	STEP 7	STEP 8
Vaccine	Presentation	OPTIONAL Volume/dose (cm³)		Packed volume per dose (cm³)		OPTIONAL National data	WHO/GAVI %age	Wastage factor		Current schedule	OPTIONAL New schedule	Shipments at primary level
Choose from list	Choose from list	Vaccines	Diluents	Vaccines	Diluents	Enter wastage rate (%)				Enter doses per recipient	Enter doses per recipient	Nbr received per year
BCG	20			1.2	0.7		50	2.00		1	1	4
DTP-HepB+Hib	10			5.3			40	1.67		3	3	4
OPV	10			2.0			25	1.33		4	4	4
Measles	10			3.5	4.0		40	1.67		1	1	4
TT	10			3.0			25	1.33		2	2	4
HPV	1			15.0			5	1.05			1	4

Net volume of OPV at -20°C in higher level stores, per FIC	10.7	10.7	cm³
Net volume of all vaccines except OPV stored at +5°C in higher level stores, per FIC	42.7	58.5	cm³
Net volume of all vaccines, including OPV, stored at +5°C in lower level stores, per FIC	53.4	69.2	cm³
Net volume of vaccines, including OPV and diluents, stored at +5°C at service delivery level, per FIC	61.5	77.3	cm³

4.2.2 Nomo_data worksheet

Click on the **Nomo_data** worksheet to enter the remaining data that are needed to generate the nomograms. You will find instruction how to use this on the worksheet itself. Use the stock management data you have already collected (Tables 5 and 6) and proceed as follows:

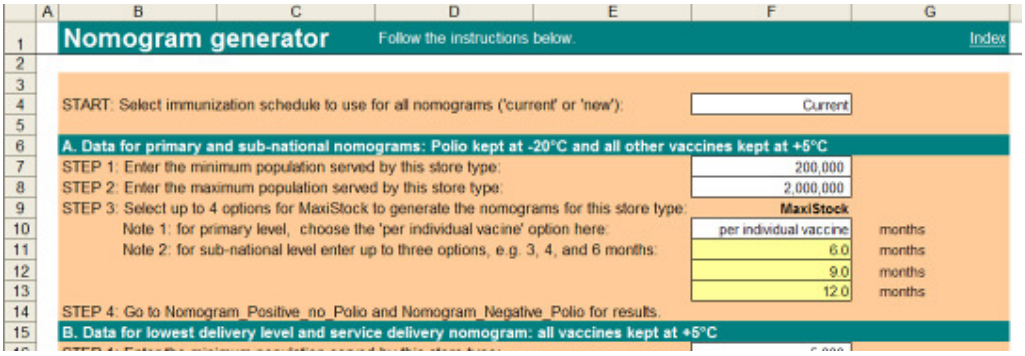
See Figure 4. In cell F4, select the immunization schedule you want to use ('Current' or 'New '). This choice applies throughout the worksheet and the nomograms that it generates.

A. Polio kept at -20°C and all other vaccines kept at +5°C

See Figure 4.

1. In cell F7, select the store type for which you want to generate nomograms ('Primary' or Sub-national').
2. In cells F8 and F9, enter the minimum and maximum population figures for the stores where are included in the assessment (Tables 5 and 6 – Minimum population size 1 and Maximum population size 1). This establishes the x-axis range for the nomograms on the two worksheets: *Nomogram_Positive_no_Polio* and *Nomogram_Negative_Polio*.
3. If you are assessing primary stores, you should select 'per individual vaccine' in cell F11. Primary stores receive vaccine direct from the vaccine manufacturer and the supply interval may vary from vaccine to vaccine. The tool takes account of this. For the sub-national stores, enter up to three additional figures for MaxiStock[3]. Each choice will generate a line on the relevant nomogram. You may need to enter more than one option for the sub-national stores because some of these stores might receive vaccine at different intervals from other ones. For example you might have two levels of sub-national store – say regional and provincial. If the regional store receives vaccine from the primary store every three months, enter '3' in one of the cells. If the provincial stores receive vaccine every six weeks from the regional stores, type '1.5' in one of the other cells[4].

Figure 4: Nomo_data worksheet – Section A



Taking the example above, the two nomograms generated by section A will now show a 'per individual vaccine' line which you can use for your primary store(s), a 3-month line for your regional stores and a 1.5-month line for your provincial stores.

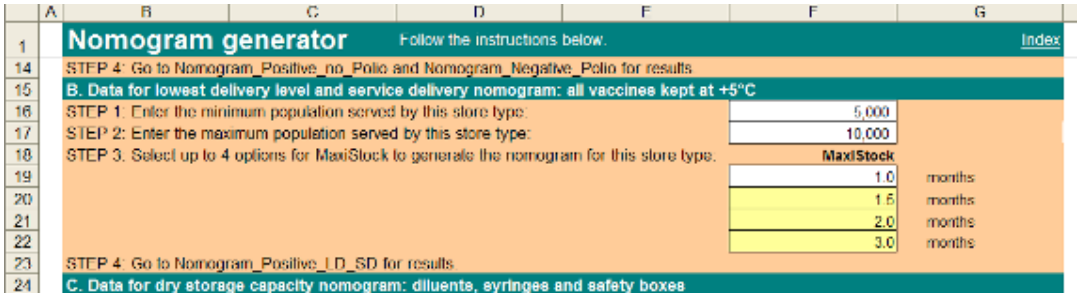
[3] MaxiStock represents the maximum stock volume which is held in the store you are assessing, including a 25% allowance for safety stock.

[4] Fractional months are not shown on the drop-down list, but you can type in a figure. You will receive an advisory warning.

B. All vaccines kept at +5°C

See Figure 5. Repeat steps 2-3 for the storage or service delivery where all vaccines are kept at +5°C. The 'per individual vaccine' option is not offered in the MaxiStock cells. These data generate the nomogram on worksheet *Nomogram_Positive_LD_SD*.

Figure 5: Nomo_data worksheet – Section B



	A	B	C	D	F	F	G
1		**Nomogram generator**		Follow the instructions below.			Index
14		STEP 4: Go to Nomogram_Positive_no_Polio and Nomogram_Negative_Polio for results					
15		**B. Data for lowest delivery level and service delivery nomogram: all vaccines kept at +5°C**					
16		STEP 1: Enter the minimum population served by this store type:				5,000	
17		STEP 2: Enter the maximum population served by this store type:				10,000	
18		STEP 3: Select up to 4 options for MaxiStock to generate the nomogram for this store type.				**MaxiStock**	
19						1.0	months
20						1.5	months
21						2.0	months
22						3.0	months
23		STEP 4: Go to Nomogram_Positive_LD_SD for results					
24		**C. Data for dry storage capacity nomogram: diluents, syringes and safety boxes**					

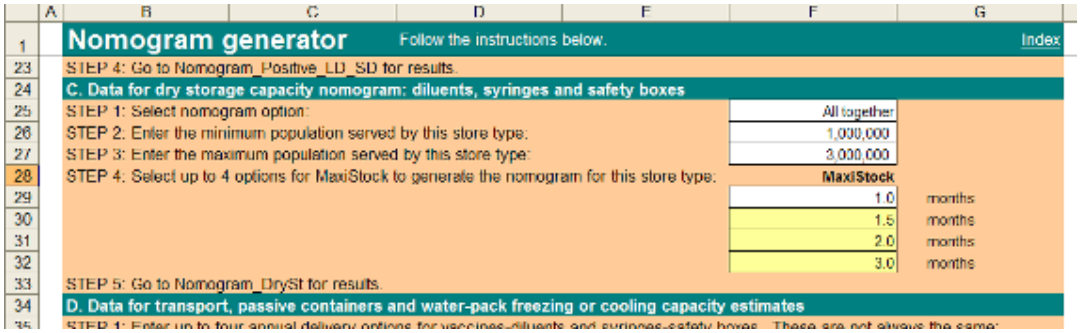
C. Dry storage capacity for diluents, syringes and safety boxes

See Figure 6 and proceed as follows:

1. In cell F25, select the products you want to include in the nomogram calculation. Choose 'All together' if the dry store keeps diluents, syringes and safety boxes in the same location. Otherwise choose 'diluents' or 'syringes and 'safety boxes'. Typically diluents are kept separately in the ambient area of the vaccine store. In this situation you should generate one nomogram for the diluents and another one for the syringes and safety boxes.
2. Enter population and MaxiStock data as previously described.

Typically diluents are kept separately in the ambient area of the vaccine store. In this situation you should generate one nomogram for the diluents and another one for the syringes and safety boxes.

Figure 6: Dry storage capacity for diluents, syringes and safety boxes.



	A	B	C	D	F	F	G
1		**Nomogram generator**		Follow the instructions below.			Index
23		STEP 4: Go to Nomogram_Positive_LD_SD for results.					
24		**C. Data for dry storage capacity nomogram: diluents, syringes and safety boxes**					
25		STEP 1: Select nomogram option:				All together	
26		STEP 2: Enter the minimum population served by this store type:				1,000,000	
27		STEP 3: Enter the maximum population served by this store type:				3,000,000	
28		STEP 4: Select up to 4 options for MaxiStock to generate the nomogram for this store type.				**MaxiStock**	
29						1.0	months
30						1.5	months
31						2.0	months
32						3.0	months
33		STEP 5: Go to Nomogram_DrySt for results.					
34		**D. Data for transport, passive containers and water-pack freezing or cooling capacity estimates**					
35		STEP 1: Enter up to four annual delivery options for vaccines-diluents and syringes-safety boxes. These are not always the same:					

D. Transport, passive containers and water-packs

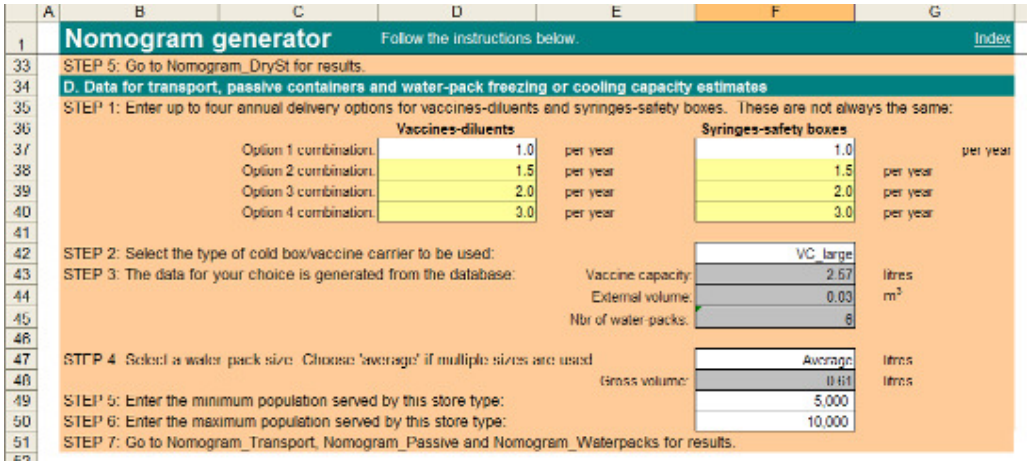
See Figure 7 and proceed as follows:

1. There are two delivery options. Cells D37-D40, cover vaccines and diluents. Cells F37-F40 cover syringes and safety boxes. In both groups of cells , select up to four options for the number of deliveries per year. If vaccine and diluents are delivered at the same time as the syringes and safety boxes simply enter the same number of deliveries per year in all options. Otherwise, you can simulate possible scenarios that represent your actual

delivery schedule. Each of the combined options you choose will generate a line on the respective nomogram.

2. In cell F42, select the type of passive container used for delivery (cold box or vaccine carrier). Four options are offered: 'CB_ large', 'CB_small', 'VC_large', 'VC_small'.
3. In cell F47, select the type of water-packs use for the delivery. Four options are offered based on nominal capacity in litres: (0.3, 0.5, 0.6 or average). Choose 'average' if you expect a mix of icepacks to be used.
4. Enter minimum and maximum population in cells F49 and F50 as previously described.
5. These data generate the passive container requirement, the volume to be delivered, and the water-pack freezing or cooling capacity needed. The following nomograms are generated: *Nomogram_Transport; Nomogram Passive and Nomogram_waterpacks.*

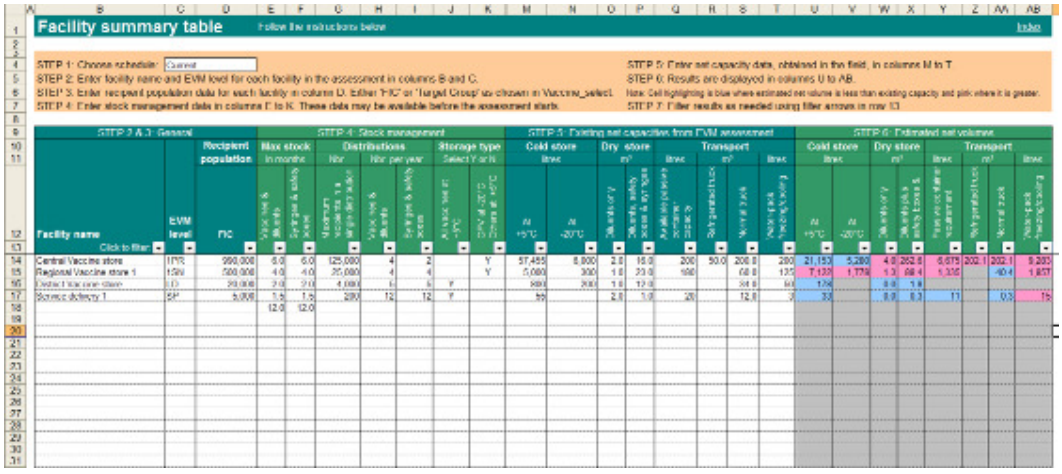
Figure 7: Transport, passive containers and water-packs



4.2.3 Facility_table worksheet

The **Facility_table** worksheet performs the same calculations as the **nomo_data** worksheet, but presents the results in tabular form. Each line in the table represents a single storage facility, so the entire assessment can be carried out on one worksheet. Up to 100 facilities can be entered.

Figure 8: Facility_table worksheet



Calculations take place in the grey cells on the right hand side of the sheet, based on data entered in the white cells. If existing capacity does not meet calculated volumes, the cells are highlighted in pink. Otherwise they are highlighted in blue. This enables the analyst to see at a glance where there are areas of concern.

4.2.4 Reference data worksheets

In addition to the 'active' worksheets, there are four further worksheets which contain database information; these data are either used dynamically in the tool or by the user in the field to identify equipment.

A. Vaccine_database sheet:

This sheet provides all necessary information on the vaccines currently available from WHO pre-qualified manufacturers. The table include type; presentation; trade name; mode of administration; packed volume per dose; availability of VVM, source of data, etc. Users can update the database to include vaccines from other manufacturers, including locally produced vaccines that may be used in individual countries.

B. PQEquipment sheet:

This sheet provides up-to-date information on refrigerators and freezers currently available from all WHO pre-qualified manufacturers. The worksheet can be printed out and used as a look-up table by EVM assessors to establish the available net storage capacity of equipment observed in the field.

C. Passive_Containers sheet:

This sheet provides data on WHO pre-qualified cold boxes and vaccine carriers available from all WHO pre-qualified manufacturers. This worksheet is used as a look-up table to establish the net vaccine storage capacity, icepack size and icepack numbers that are needed to complete the transport capacity table in the **Nomo_data** worksheet. It can also be printed out for field identification purposes.

D. Waterpacks sheet

This sheet provides data on WHO pre-qualified water-packs.

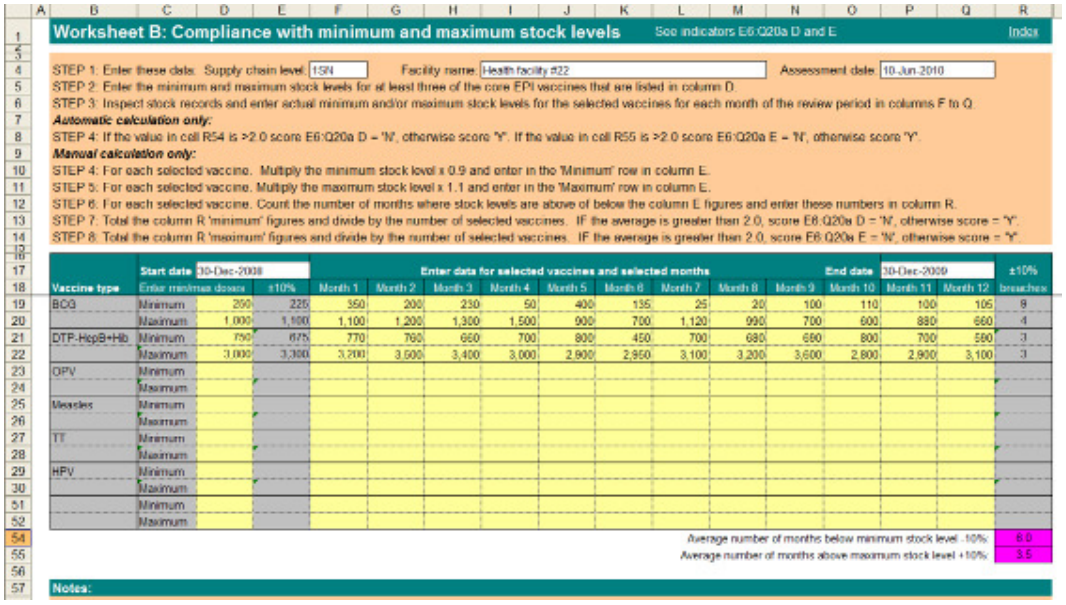
E. Worksheet_A

This worksheet can be printed out and used by field assessors to collect dimensional data for cold rooms, freezer rooms and dry stores where vaccines and other products are stored on shelves. The worksheet contains formulae so it can also be used to calculate results automatically – see Figure 8 in the next section.

F. Worksheet_B

This worksheet can be used to collect data on maximum and minimum stock levels. As with Worksheet A, it also contains formulae so that data can be entered and results calculated automatically. Alternatively, instructions are provided on the sheet to help with manual calculations.

Figure 9: Worksheet B



Worksheet B: Compliance with minimum and maximum stock levels

See indicators E6:Q20a D and E — Index

STEP 1: Enter these data: Supply chain level: HSN — Facility name: Health facility #22 — Assessment date: 10-Jun-2010

STEP 2: Enter the minimum and maximum stock levels for at least three of the core EPI vaccines that are listed in column D.

STEP 3: Inspect stock records and enter actual minimum and/or maximum stock levels for the selected vaccines for each month of the review period in columns F to Q.

Automatic calculation only:

STEP 4: If the value in cell R54 is >2.0 score E6:Q20a D = 'N', otherwise score 'Y'. If the value in cell R55 is >2.0 score E6:Q20a E = 'N', otherwise score 'Y'.

Manual calculation only:

STEP 4: For each selected vaccine. Multiply the minimum stock level x 0.9 and enter in the 'Minimum' row in column E.

STEP 5: For each selected vaccine. Multiply the maximum stock level x 1.1 and enter in the 'Maximum' row in column E.

STEP 6: For each selected vaccine. Count the number of months where stock levels are above of below the column E figures and enter these numbers in column R.

STEP 7: Total the column R 'minimum' figures and divide by the number of selected vaccines. IF the average is greater than 2.0, score E6:Q20a D = 'N', otherwise score = 'Y'.

STEP 8: Total the column R 'maximum' figures and divide by the number of selected vaccines. IF the average is greater than 2.0, score E6:Q20a E = 'N', otherwise score = 'Y'.

		Start date: 30-Dec-2008		Enter data for selected vaccines and selected months								End date: 30-Dec-2009		±10%
Vaccine type	Enter min/max doses		±10%	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	breaches
BCG	Minimum	250	225	350	200	230	50	400	135	25	20	100	110	100	105	8
	Maximum	1,000	1,100	1,100	1,200	1,300	1,500	900	700	1,120	990	700	600	880	660	4
DTP-HepB+Hib	Minimum	750	675	770	790	660	700	800	450	700	680	660	800	700	590	3
	Maximum	3,000	3,300	3,200	3,500	3,400	3,000	2,900	2,950	3,100	3,200	3,600	2,800	2,900	3,100	3
OPV	Minimum															
	Maximum															
Measles	Minimum															
	Maximum															
TT	Minimum															
	Maximum															
HPV	Minimum															
	Maximum															
	Minimum															
	Maximum															

Average number of months below minimum stock level -10%: 6.0

Average number of months above maximum stock level +10%: 3.5

Notes:

5. Field measurements and manual calculations

This section describes the field measurements and other data you need to collect, and the calculations you need to make, in order to establish available storage capacity.

5.1 Measuring net storage capacity

Several EVM indicators require the assessor to calculate net storage capacity as part of the overall assessment. Table 7 lists the relevant indicators.

Table 7: Criterion E3 – storage capacity indicators

Question no.		EVM Question	Source
E3:01a	A	Measure the net storage capacity of the +2°C to + 8°C store(s) in litres or m³	Field data & EVM Assistant
E3:02a	B	Measure the net storage capacity of the -20°C store(s) in litres or m³	Field data & EVM Assistant
E3:03a	A	Measure the net storage capacity of the dry store in litres or m³	Field data & EVM Assistant
E3:05a	A	Supplementary vaccines- Measure the net storage capacity of the +2°C to + 8°C store(s) in litres or m³	Field data & EVM Assistant
E3:06a	B	Supplementary vaccines- Measure the net storage capacity of the -20°C store(s) in litres or m³	Field data & EVM Assistant
E3:07a	A	Supplementary vaccines- Measure the net storage capacity of the dry store in litres or m³	Field data & EVM Assistant

Net storage capacity is defined as the maximum volume of goods that can be accommodated in a store in the locations specifically allocated for storage. In a shelving store this means the shelf units; in a pallet store it means the designated pallet bays.

No storage location can ever be fully used – there will always be some wasted space because boxes and other containers never fully fill a shelf unit or a pallet bay. After you have calculated the available storage capacity it is necessary to apply a 'utilization factor'[5] to allow for this.

5.1.1 Calculation method for cold stores and dry stores with shelving

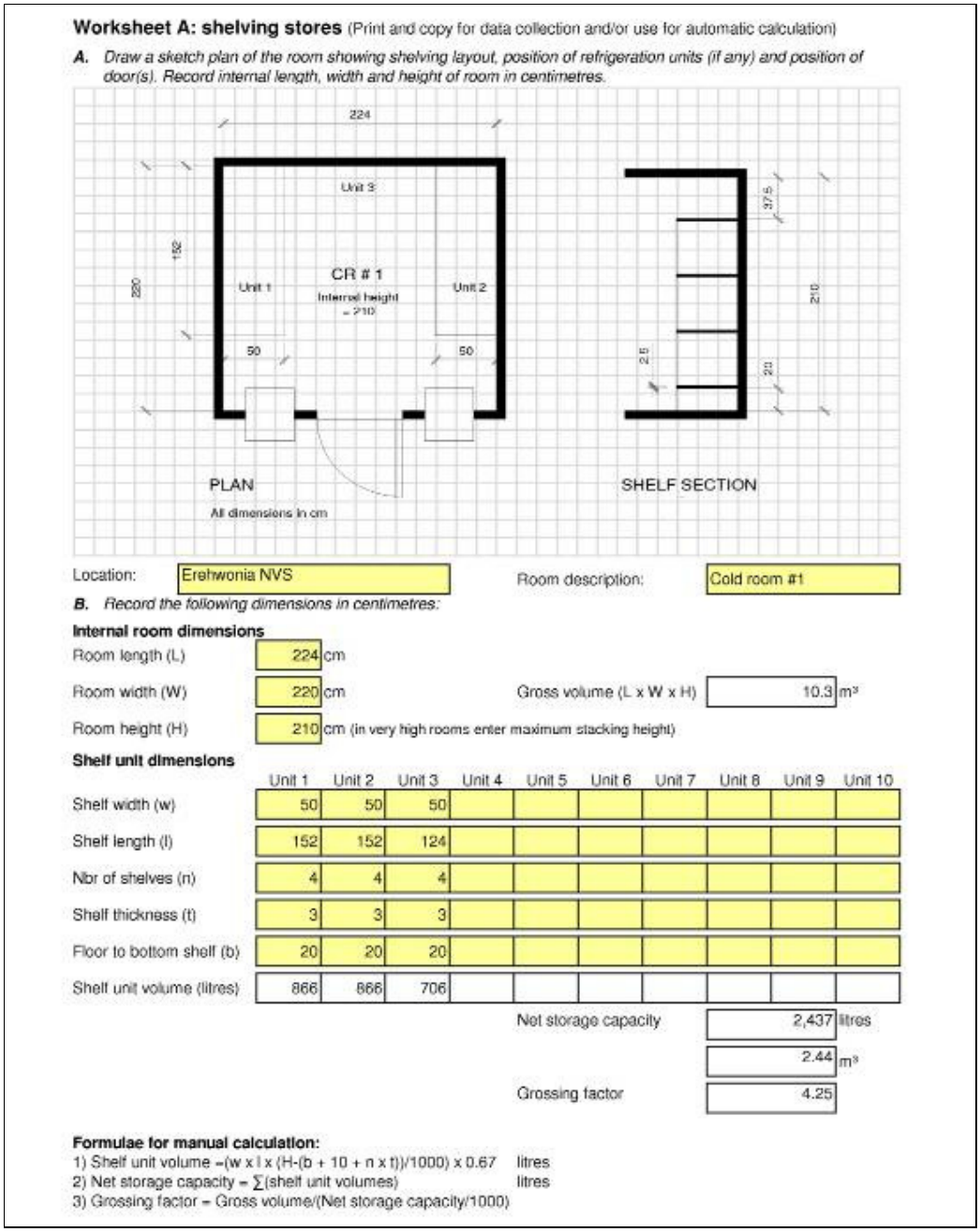
The method described below can be used for any cold room, freezer room or dry store where products are stored on shelves. It can be difficult to establish whether the capacity of a dry store is adequate, because these spaces are often used to store multiple products. If this is the case, you should ask the storekeeper to describe the shelving units that s/he has specifically assigned for diluents or for syringes and safety boxes.

Print out Worksheet A and use it to record the layout of the store and to carry out the net volume calculation. Use one sheet for each room. Make sure you draw a plan and also a section through the shelving units. You can use the formulae at the bottom of the form to calculate the net storage capacity. Alternatively, just record the

[5] See WHO/V&B/02.34. A value of 0.67 is used as standard in all EVM shelving store calculations. Higher or lower figures may be appropriate in specific circumstances. For example, if a limited range of carton sizes is stored – for example syringes – a higher figure may be acceptable because shelving can be optimized for that particular product. On the other hand, a dry storage area containing spare parts may require a lower figure because the range of product shapes and sizes stored is so varied.

dimensions and give the sheet to the team leader. S/he can use the electronic version of the worksheet to calculate the results. You will sometimes have to use your judgement when calculating. For example, if there are shelf units running below one of the refrigeration units, the standard 'shelf unit volume' formula will not give a correct result. In such cases you will have to do the calculation manually. Similarly if you are measuring a dry store with a 4 metre high ceiling, but with shelf units only 2 metres high, you will get incorrect results because you cannot stack cartons on the top shelf up to ceiling level. In such a situation, the maximum stacking height is probably around 2.5 metres so you can get a correct result by using 2.5 metres as the ceiling height.

Figure 10: Worksheet A example



Worksheet A: shelving stores (Print and copy for data collection and/or use for automatic calculation)

A. Draw a sketch plan of the room showing shelving layout, position of refrigeration units (if any) and position of door(s). Record internal length, width and height of room in centimetres.

Location: Erehwonia NVS

Room description: Cold room #1

B. Record the following dimensions in centimetres:

Internal room dimensions

Room length (L)	224 cm	
Room width (W)	220 cm	Gross volume (L x W x H) 10.3 m³
Room height (H)	210 cm (in very high rooms enter maximum stacking height)	

Shelf unit dimensions

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10
Shelf width (w)	50	50	50							
Shelf length (l)	152	152	124							
Nbr of shelves (n)	4	4	4							
Shelf thickness (t)	3	3	3							
Floor to bottom shelf (b)	20	20	20							
Shelf unit volume (litres)	866	866	706							

Net storage capacity 2,437 litres

2.44 m³

Grossing factor 4.25

Formulae for manual calculation:

1) Shelf unit volume =(w x l x (H-(b + 10 + n x t))/1000) x 0.67 litres

2) Net storage capacity = ∑(shelf unit volumes) litres

3) Grossing factor = Gross volume/(Net storage capacity/1000)

If the room is very large and complicated you may have to draw the layout on a separate sheet of paper. Keep all your worksheets together and give them to the

team leader at the end of the assessment so that your manual calculations can be double-checked.

A blank copy of Worksheet A is shown in Annex 9.

5.1.2 Calculate method for PIS/PQS pre-qualified refrigerators and freezers

Assessors will record details of all the refrigerators and freezers at each facility, including make and model. For PIS/PQS pre-qualified models, the net vaccine storage capacity and/or the icepack freezing capacity can be obtained from the **PQEquipment** worksheet. See example in Figure 10.

Figure 11: Equipment lookup table

Refrigerator and freezer database Index

1) Worksheet is set up for printing in A4 landscape.
2) Some columns are hidden for printing purposes. Hidden columns are only labelled in English.
3) Data are taken from WHO/UNICEF Product Information Sheets, WHO/V&B/00.13, and from the PQS database.

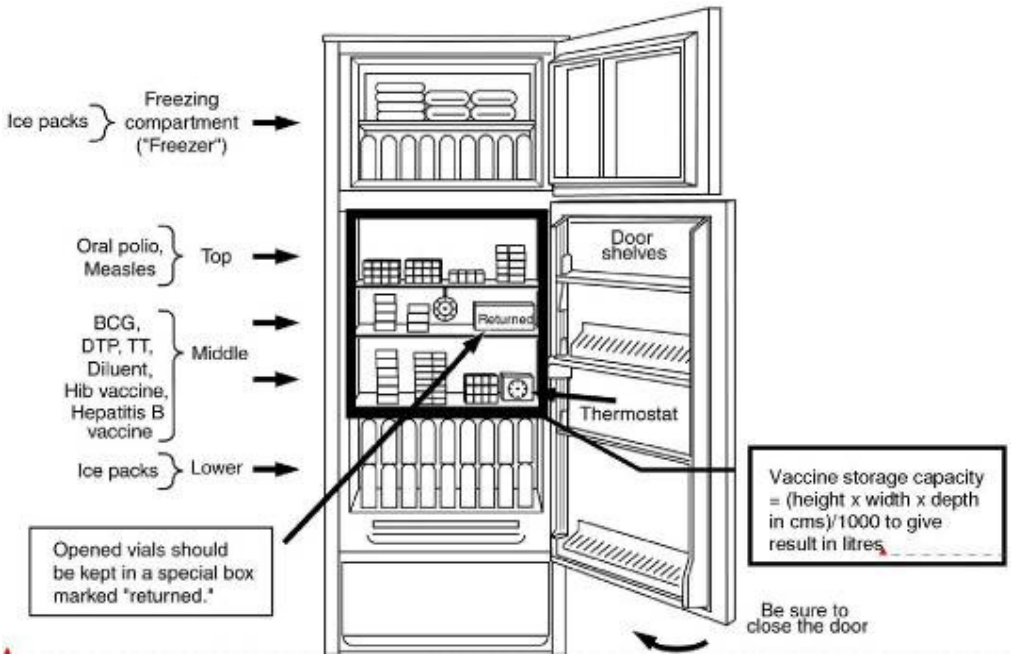
Nbr. of products listed: 48

Equipment identification						Temp zone H=Hot, T=Temperate M=Moderate	Net storage volume (litres)		Icepack freezing
Description Click to filter	Make	Model	PIS/PQS code	Type	Refrigerant		Refrigerator	Freezer	Kg/24 hrs at 32°C with vaccines
Refrigerator	Electrolux	RCW 42 EG/CF	E3/21-M	AR	NH3	T	10.5	1.6	1.1
Refrigerator	Electrolux	RCW 42 EK/CF	E3/22-M	AR	NH3	T	18.2	1.2	1.0
Icelined refrigerator	Electrolux	TCW 1152/CF	E3/24-M	ILR	R134a	H	169.0		2.1

5.1.3 Calculation for non PIS/PQS pre-qualified refrigerators and freezers

Assessors should also record the make and model of refrigerators and freezers that are not WHO pre-qualified. For these models there are no published data on vaccine storage capacity, so this must be measured on site. Figure 7 illustrates dimensions that should be recorded in a typical front-opening domestic refrigerator and describes the calculation method.

Figure 12 – Guidance diagram for measuring domestic refrigerators



5.1.4 Calculation method for cold stores and dry stores using pallets

Many countries use pallets for storing syringes and safety boxes. Some countries are beginning to use pallets for storing and handling vaccines in larger cold rooms.

A typical shrink-wrapped 120 x 80 cm pallet holds around 1,000 litres (1.0 m^3) and a 120 x 100 cm pallet can hold around 1,200 litres (1.2 m^3). However pallets are often used simply as a convenient way to keep manually stacked products off the floor. In this case cartons may be stacked up to 2.0 metres high, or more; in this situation the volume per pallet has to be calculated. Figure 8 shows an example of this approach.

Volume in litres per pallet = pallet width x pallet depth x stack height/1,000

Volume in m^3 per pallet = pallet width x pallet depth x stack height/1,000,000

(dimensions are measured in centimetres).

Figure 13: Pallets used as a base for manually stacked vaccines

A estimate of the approximate capacity of a pallet store can be done in the following way:

1. Floor standing, no stacking: If goods are stored on pallets standing on the floor, first establish how many pallets can be accommodated in the store in such a way that every pallet is accessible. In a well-organized store the pallet positions should be marked on the floor and the bays can then be counted.

   Net storage capacity = (number of pallet positions x volume per pallet)

2. Floor standing with stacking: Pallets are often stacked on top of one another, especially where products like syringes are kept in bulk. This arrangement is not very good practice because it restricts EEFO handling. The calculation in this case is similar to the previous example.

   Net storage capacity = (number of pallet positions on the floor x number of tiers in a stack x volume per pallet)

3. Pallet racking: Modern pallet stores use pallet racking to store pallets in multiple tiers. Racking is built as a series of bays, each one of which typically fits two standard pallets. Pallet racking stores cannot operate without mechanical lifting equipment. The calculation in this case is as follows.

Net storage capacity = (Number of pallet positions x volume per pallet)

Figure 14: Pallet racking store

As noted previously, it can be difficult to establish whether the capacity of a dry store is adequate, because these spaces are often used to store multiple products. If this is the case, you should ask the storekeeper to describe the area in the store that s/he has specifically assigned for syringes and safety boxes. If s/he is unable to do this it is likely that the store is not well managed.

5.2 Measuring icepack or cool water pack capacity

The indicator applies only where cold boxes are used for vaccine distribution. In future, once suitable products have been pre-qualified, the indicator will also cover palletised and wheeled insulated containers. Assessors will record details of all the icepack freezers at each facility, including make and model. For PIS/PQS pre-qualified models, the net vaccine storage capacity and/or the icepack freezing capacity can be obtained from the **PQEquipment** worksheet. See example in Figure 10, repeated here

Figure 15: Equipment lookup table

Refrigerator and freezer database Index

1) Worksheet is set up for printing in A4 landscape.
2) Some columns are hidden for printing purposes. Hidden columns are only labelled in English.
3) Data are taken from WHO/UNICEF Product Information Sheets, WHO/V&B/00.13, and from the PQS database.
Nbr. of products listed: 48

Equipment identification						Temp zone H=Hot, T=Temperate M=Moderate	Net storage volume (litres)		Icepack freezing
Description Click to filter	Make	Model	PIS/PQS code	Type	Refrigerant		Refrigerator	Freezer	Kg/24 hrs at 32°C with vaccines
Refrigerator	Electrolux	RCW 42 FG/CF	E3/21-M	AR	NH3	T	10.5	1.6	1.1
Refrigerator	Electrolux	RCW 42 EK/CF	E3/22-M	AR	NH3	T	18.2	1.2	1.0
Icelined refrigerator	Electrolux	TCW 1152/CF	E3/24-M	ILR	R134a	H	169.0		2.1

The following data are needed to establish whether the equipment is adequate to satisfy needs:

1. Total icepack freezing/cooling capacity in kg/24 hrs.
2. Total icepack storage capacity in litres if used in combination with the freezing capacity.

3. Peak demand for icepacks and/or cool water packs in kg/24hrs.

5.3 Measuring the capacity of cold boxes and passive containers

The indicator also only applies where cold boxes are used for vaccine distribution. The table below shows which indicators are considered here.

Assessors will collect the following information:

1. Make and model of the most commonly used passive containers in the country.
2. Number of each type available at each visited facility.

After collecting this information, use the **Passive_Containers** worksheet to find the number and size of icepacks needed for each cold box and its vaccine storage capacity. See example in Figure 15.

Figure 16: Cold box lookup table

	A	B	C	D	E	F	G	H	O	P	Q	R
1	**Passive container database**					Not translated. No user action required						Index
2	WHO/UNICEF Product Information Sheets, WHO/V&B/00.12											
3	Equipment identification					Vaccine storage	Weight (kg)		Water-packs required		Cold life	Warm life
4	Type	Make	Model	Code PIS	Code PIS	capacity (l)	loaded	empty	Type	Number	@+43°C	@-20°C
5	Click to filter:											
6	Large vaccine cold box	Electrolux	RCW 25/CF	E4/05-M	CB_large	20.7	32.80	17.00	0.6	24	129.9	
7	Large vaccine cold box	Ina ColdMed	CB/INO/B3/90	E4/09	CB_large	16.2	31.80	16.30	0.4	12	107.0	
8	small vaccine cold box	Ina ColdMed	CB/INO/C2/90	E4/10	CB_small	6.5	20.60	12.50	0.4	8	81.0	
9	Large vaccine carrier	Thermos	3504 UN/CF	E4/18-M	VC_large	1.7	5.10	2.50	0.3	4	34.0	
10	Large vaccine carrier	Polyfoam Packers	EPUPF/1.5	E4/19	VC_large	1.4	4.50	2.40	0.3	4	37.0	
11	small vaccine cold box	Ina ColdMed	CB/INO/D1/90	E4/20	CB_small	4	13.50	7.20	0.4	6	83.0	
12	small vaccine cold box	Oyster International		E4/22	CB_small	9.75	32.90	17.60	0.4	24	119.0	
13	Large vaccine carrier	Beijing	IA	E4/34	VC_large	1.3	4.60	2.50	0.4	4	34.0	
14	Large vaccine cold box	Savopak Oy	KR 48	E4/37-M	CB_large	20.9	50.00	28.00	0.6	24	121.0	
15	Large vaccine carrier	Gio Style Spa		E4/52-M	VC_large	2.6	6.50	1.80	0.4	8	32.0	
16	Small vaccine carrier	Electrolux	RCW 2/CF	E4/53-M	VC_small	0.6	2.10	1.20	0.3	2	32.0	
17	Small vaccine carrier	True Pack	T.P.001	E4/55-M	VC_small	0.76	1.91	0.54	0.3	3	21.0	
18	small vaccine cold box	Blow Kings	55-CF	E4/57-M	CB_small	8.6	21.70	8.20	0,3 & 0,4	24	65.0	
19	small vaccine cold box	Electrolux	RCW 12/CF	E4/62-M	CB_small	8.5	21.00	11.70	0.6	14	114.0	
20	Small vaccine carrier	Ivalex	IVC-3	E4/67	VC_small	1.6	3.80	1.90	0.3	4	37.0	

See Annex 6 for an example of a nomogram generated using these data.

5.4 Measuring transport capacity

A transport capacity calculation is only needed for 'full' assessments at primary and sub-national levels. The vaccine distribution data required can be collected at the same time as the data needed for the icepack/cool water pack calculation.

Assessors will measure the gross capacity of the available delivery vehicle(s). For refrigerated vehicles, curtain sided and box bodied vehicles this is the internal length, width and height of the refrigerated body. For flatbed trucks, pickups and the like it is the internal length and width of the load carrying area.

Refrigerated vehicles: Vaccines are likely to be shipped in un-insulated cartons, in plastic crates, or on pallets[6]. Therefore the maximum vaccine capacity of the vehicle is defined by the available safe storage volume which is:

usable internal length x usable internal width x useable stacking height[7] x a utilization factor to allow for the space occupied by the packing crates or boxes.

Safe stacking height is determined by the stability of the load AND the need to maintain air circulation; the packing crate utilization factor needs to be established[8].

Other vehicles: Vaccines will be shipped in cold boxes or the future palletised or wheeled insulated containers. Therefore the maximum vaccine capacity of the

[6] Refrigerated vehicles are sometimes used to transport cold boxes, but this is highly inefficient.

[7] Typically allowing at least 450mm free space above the load plus the height of a pallet (150mm) below the load to allow for air circulation all round. But this depends upon the vehicle and the location of the refrigeration unit. Ideally, all refrigerated vehicles should be temperature-mapped to establish the limits of the safe storage zone. If mapping has been carried out, the results will establish the useable volume.

[8] See for example: *Loading a Reefer to Optimize Quality* http://www.horizonlines.com/getdoc/0120a540-fa17-4762-937d-b1abfe6c66f6/LoadingaReefertooptimizeqty.aspx

vehicle is defined by the number of insulated units that can be loaded and safely restrained for the journey. For cold boxes on a flatbed or curtain-sided truck this is likely to be no more than 2 or 3 layers. It could be more for a box bodied vehicle where the body provides additional lateral restraint.

5.5 Compliance with safety stock and maximum stock levels

Table 8 below lists the relevant EVM indicators.

Table 8: Criterion E6 – stock management system

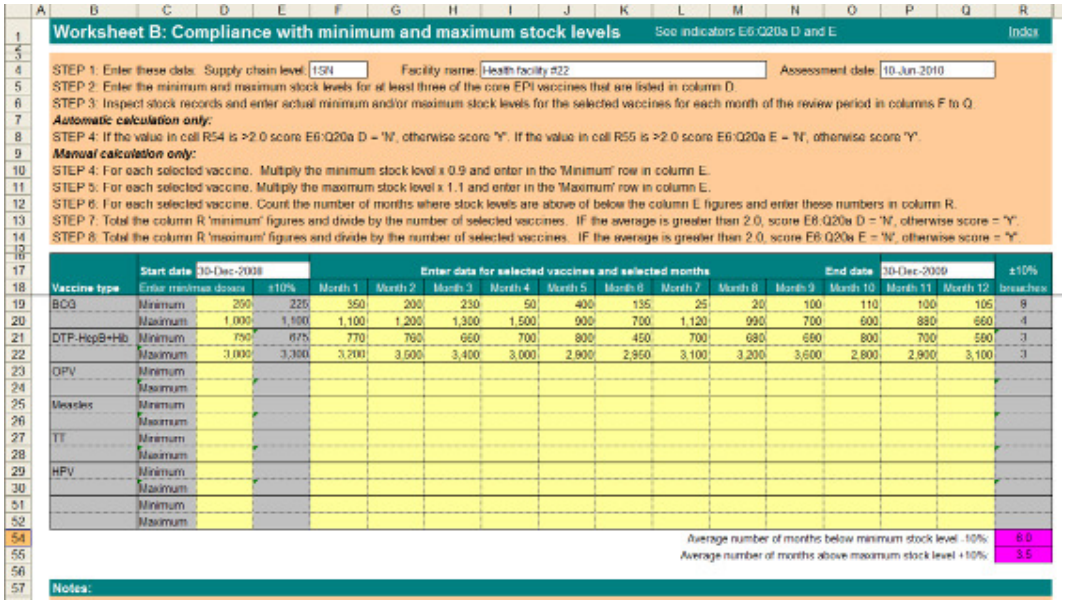
Question No.	*EVM Question*	*Source*
E6:20a D	During the review period, did the stock of each and every vaccine remain within its EVM recommended maximum? [Y, N]	Field data & EVM Assistant
E6:21a E	During the review period, did the stock of each and every vaccine remain within its EVM recommended minimum? [Y, N].	Field data & EVM Assistant

EVM recommends that all countries set a maximum stock level and a minimum (safety stock) level for each vaccine and that these levels are observed in all stores. This is the best way to reduce the risk of stockouts and overstocking. The EVM guidance note and scoring system accepts a discrepancy of +10% on maximum stock level and -10% on minimum stock levels.

In addition to this, the methodology built into **Worksheet B** allows a maximum stock level breaches that could occur due to demand uncertainty but no stores are expected to continue receiving vaccines while the current stock is above the maximum stock level. The worksheet B further allows stores to remain below the minimum stock level only till next delivery that provides opportunity to make adjustment. No stores are expected to stay below the minimum stock levels through two consecutive deliveries.

Vaccines arrive in stores either through a delivery or a collection system. The number of deliveries per year and the quantities required for each of the chosen vaccines should be planned. However, demand inevitably varies and a well-managed facilities will make appropriate stock adjustments every time supplies are requisitioned. If this is not done, stock levels will be out of balance. Worksheet B can be used to check this. Figure 16 gives an example.

Figure 17: Worksheet B – assessing maximum and minimum stock levels



Worksheet B: Compliance with minimum and maximum stock levels — See indicators E6:Q20a D and E — Index

STEP 1: Enter these data: Supply chain level: ISN — Facility name: Health facility #22 — Assessment date: 10-Jun-2010

STEP 2: Enter the minimum and maximum stock levels for at least three of the core EPI vaccines that are listed in column D.

STEP 3: Inspect stock records and enter actual minimum and/or maximum stock levels for the selected vaccines for each month of the review period in columns F to Q.

Automatic calculation only:

STEP 4: If the value in cell R54 is >2.0 score E6:Q20a D = 'N', otherwise score 'Y'. If the value in cell R55 is >2.0 score E6:Q20a E = 'N', otherwise score 'Y'.

Manual calculation only:

STEP 4: For each selected vaccine. Multiply the minimum stock level x 0.9 and enter in the 'Minimum' row in column E.

STEP 5: For each selected vaccine. Multiply the maximum stock level x 1.1 and enter in the 'Maximum' row in column E.

STEP 6: For each selected vaccine. Count the number of months where stock levels are above of below the column E figures and enter these numbers in column R.

STEP 7: Total the column R 'minimum' figures and divide by the number of selected vaccines. IF the average is greater than 2.0, score E6:Q20a D = 'N', otherwise score = 'Y'.

STEP 8: Total the column R 'maximum' figures and divide by the number of selected vaccines. IF the average is greater than 2.0, score E6:Q20a E = 'N', otherwise score = 'Y'.

Start date: 30-Dec-2008 — Enter data for selected vaccines and selected months — End date: 30-Dec-2009

Vaccine type	Enter minimum doses	±10%	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	±10% breaches
BCG	Minimum	200	225	350	200	230	50	400	135	25	20	100	110	100	105	8
	Maximum	1,000	1,100	1,100	1,200	1,300	1,500	900	700	1,120	990	700	600	880	660	4
DTP-HepB+Hib	Minimum	750	675	770	760	660	700	800	450	700	680	680	800	700	590	3
	Maximum	3,000	3,300	3,200	3,500	3,400	3,000	2,900	2,950	3,100	3,200	3,600	2,800	2,900	3,100	3
OPV	Minimum															
	Maximum															
Measles	Minimum															
	Maximum															
TT	Minimum															
	Maximum															
HPV	Minimum															
	Maximum															
	Minimum															
	Maximum															

Average number of months below minimum stock level -10%: 6.0

Average number of months above maximum stock level +10%: 3.5

Notes:

The data collection and scoring principles are as follows:

- Select a minimum of three of the vaccines shown in the **Vaccine type** column. This list is automatically generated from the Vaccine_select worksheet.
- Ask the storekeeper to give you the 'maximum stock level' and 'minimum (safety stock) level' for each vaccine. Enter these data in column D. If you cannot obtain this information, you cannot score the indicators.
- Calculate the allowed range: +-10% maximum and minimum and enter in the column E. If you are using the electronic version, these figures are calculated automatically.
- Check the record of the selected vaccines and enter the maximum and the minimum records in the worksheet B.
- For each vaccine, check if stores are continuing receiving vaccines while remaining above the maximum stock levels during deliveries. If this case is valid enter "1" in column R for maximum stock level.
- For each vaccine, check if stores are continuing remaining below the minimum stock level during delivery or collection. If this case is valid enter "1" in column R for minimum stock level.
- two consecutive instances below the minimum stock level -10% and the number of two consecutive instances above the maximum stock level +10%. Enter these figures in column R. In the electronic version the count is done automatically.
- Check the record for minimum and maximum stock in column R. If the figure for one of stock breaches is 1, score 'Y' against the respective indicators. Otherwise, score 'N'.

6. How to read and use the nomograms

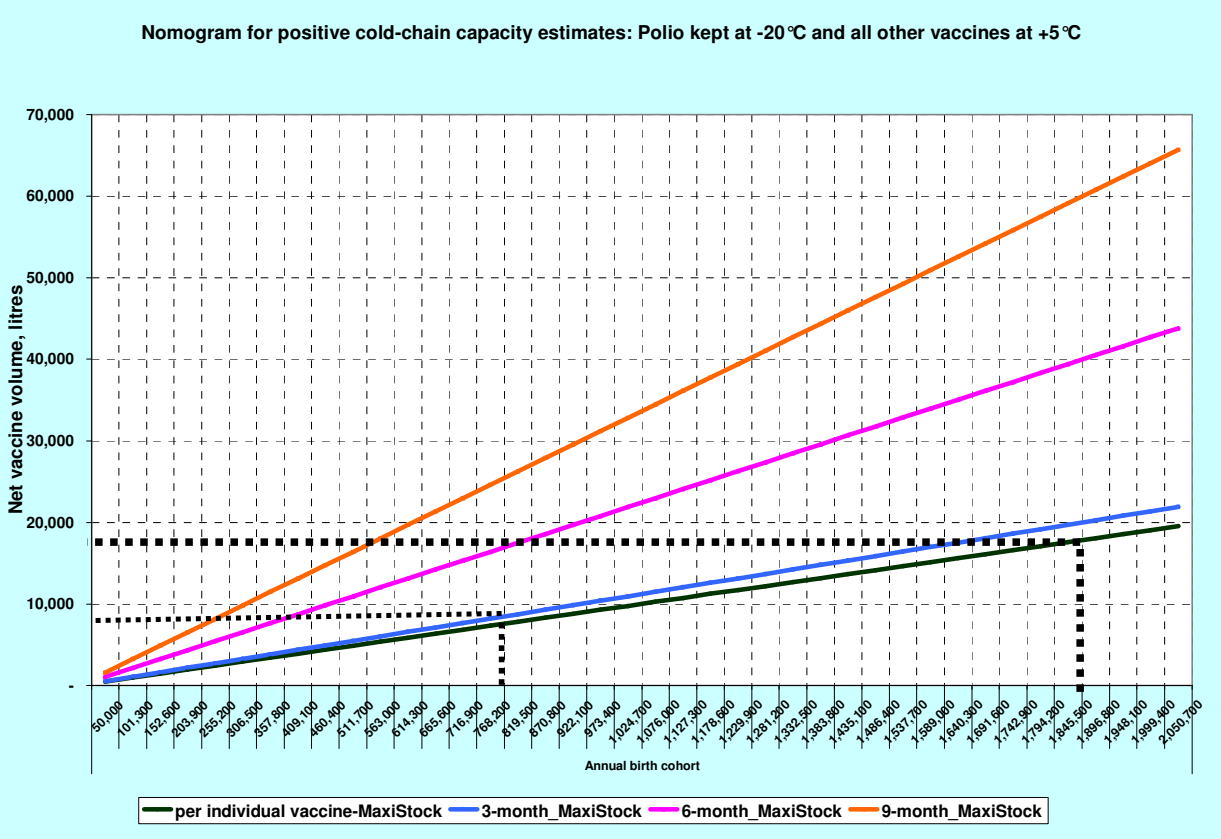
This section describes how to use the nomograms when working in the field. The example shown in Figure 17 shows vaccine storage capacity at primary and sub-national levels at +5°C. At these two upper levels in the supply chain, polio vaccine is kept at frozen. The companion chart *Nomogram_Negative_Polio* is used to estimate the required storage capacity at -20°C.

In the example chart the target population range shown on the bottom x-axis is set between 50,000 and 2,000,000. This range has been chosen because the primary store serves a maximum of just over 1.8 million recipients and the smallest sub-national store serves around 100,000 recipients.

The figures on the vertical y-axis show the net vaccine volume in thousands of litres.

The four sloping lines show maximum stock levels for deliveries 'per individual vaccine' and, at 3 month, 6 month and 9 month intervals. The colour coding is shown in the legend at the bottom of the chart. We will be using the 'per individual vaccine' line (black) and the 3 month line (blue) in the two scenarios that follow.

Figure 18: Reading a nomogram



The first scenario is at the national vaccine store (NVS) – a primary store. The second scenario is at a provincial store – i.e. at sub-national level.

6.1 Scenario 1 – National vaccine store

Scenario:

- Population served: 1,830,000
- Vaccine is delivered to the store direct from the vaccine manufacturers at different intervals. BCG, pentavalent and OPV are received three times a year. Measles and TT are received twice a year. The maximum stock level established

for each vaccine is different. Therefore we need to use the 'per individual vaccine' line on the chart (black line).

- OPV is stored at -20°C, so does not contribute to the volumes on this chart
- The NVS has four large cold rooms. Using Worksheet A you have assessed the available net storage capacity as 30,000 litres.

Assessment:

- Enter the figure you have calculated for net storage capacity (30,000 litres or 30 m^3) against indicator **E3:01a – A** in the EVM questionnaire.
- Refer to the black line on the chart. Draw a vertical line from the x-axis where the population = 1,830,000.
- Draw a horizontal line from the point where the vertical line intersects the black line back to the y-axis. Read off the net vaccine volume ~ 18,000 litres. This is the maximum volume of vaccine you expect in the store.
- Add 10% to the net vaccine volume to allow some tolerance for periodic over-stocking: 18,000 x 1.1 = 19,800 litres, or 19.8^3.
- Enter this figure in the EVM questionnaire against indicator **E3:01a – B.**

Because the available net cold room capacity is greater than the maximum vaccine volume + 10%, you now know that the country has sufficient storage capacity at the NVS.

6.2 Scenario 2 – Provincial store

Scenario:

- Population served: 700,000
- Vaccine is delivered to the provincial store from the NVS. All six vaccines are delivered at three monthly intervals and all are stored at +5°C. The maximum stock level set for all vaccine is 3 months. Therefore we need to use the 3-month line on the nomogram for cold storage capacity where, again, all vaccines except OPV are kept at +5°C.
- The regional store has two cold rooms. Using Worksheet A you have assessed the available net storage capacity as 8,500 litres.

Assessment:

- Enter the figure you have calculated for net storage capacity (8,500 litres or 8.5 m^3) against indicator **E3:01a – A** in the EVM questionnaire.
- Refer to the blue line on the chart. Draw a vertical line from the x-axis where the population = 700,000.
- Draw a horizontal line from the point where the vertical line intersects the black line back to the y-axis. Read off the net vaccine volume ~ 8,500 litres. This is the maximum volume of vaccine you expect in the store.
- Add 10% to the net vaccine volume to allow some tolerance for periodic over-stocking: 8,500 x 1.1 = 9,350 litres, or 9.4m^3.
- Enter this figure in the EVM questionnaire against indicator **E3:01a – B.**

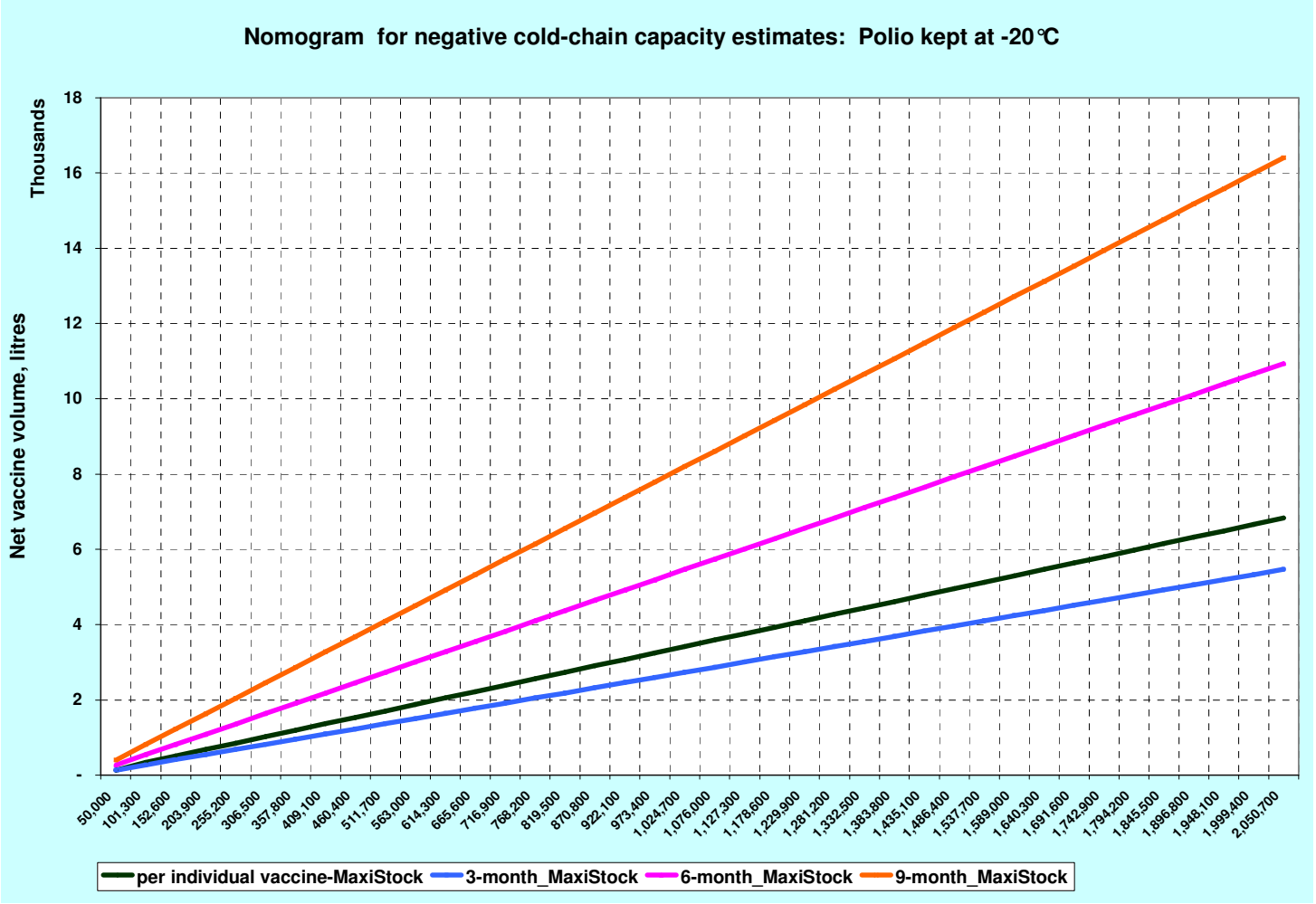
Because the available net cold room capacity is smaller than the calculated maximum vaccine volume + 10%, you now know that this provincial store has insufficient storage capacity. In your recommendations and improvement plan you can advise whether storage capacity could be increased by adding additional shelving, whether an additional cold room is needed, or whether delivery frequency should be decreased to (say) 2 months.

6.3 Other nomograms

The principles described above apply to the use of the other nomograms

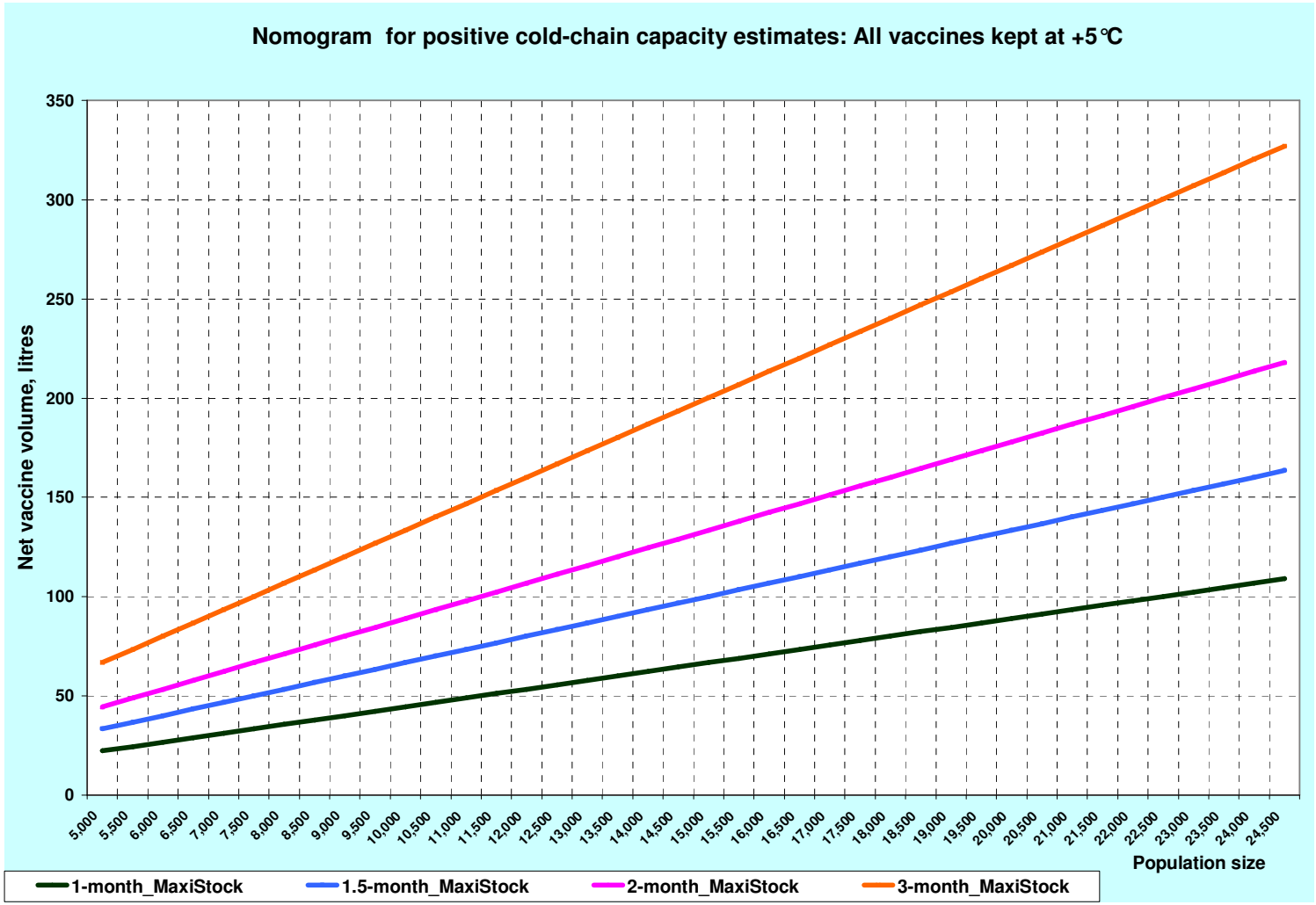
Annex 1: Nomogram example for storage at -20°C

Scenario: target population between 50,000 and 2,000,000 with maximum stock options per individual vaccine, 3, 6 and 9 months.



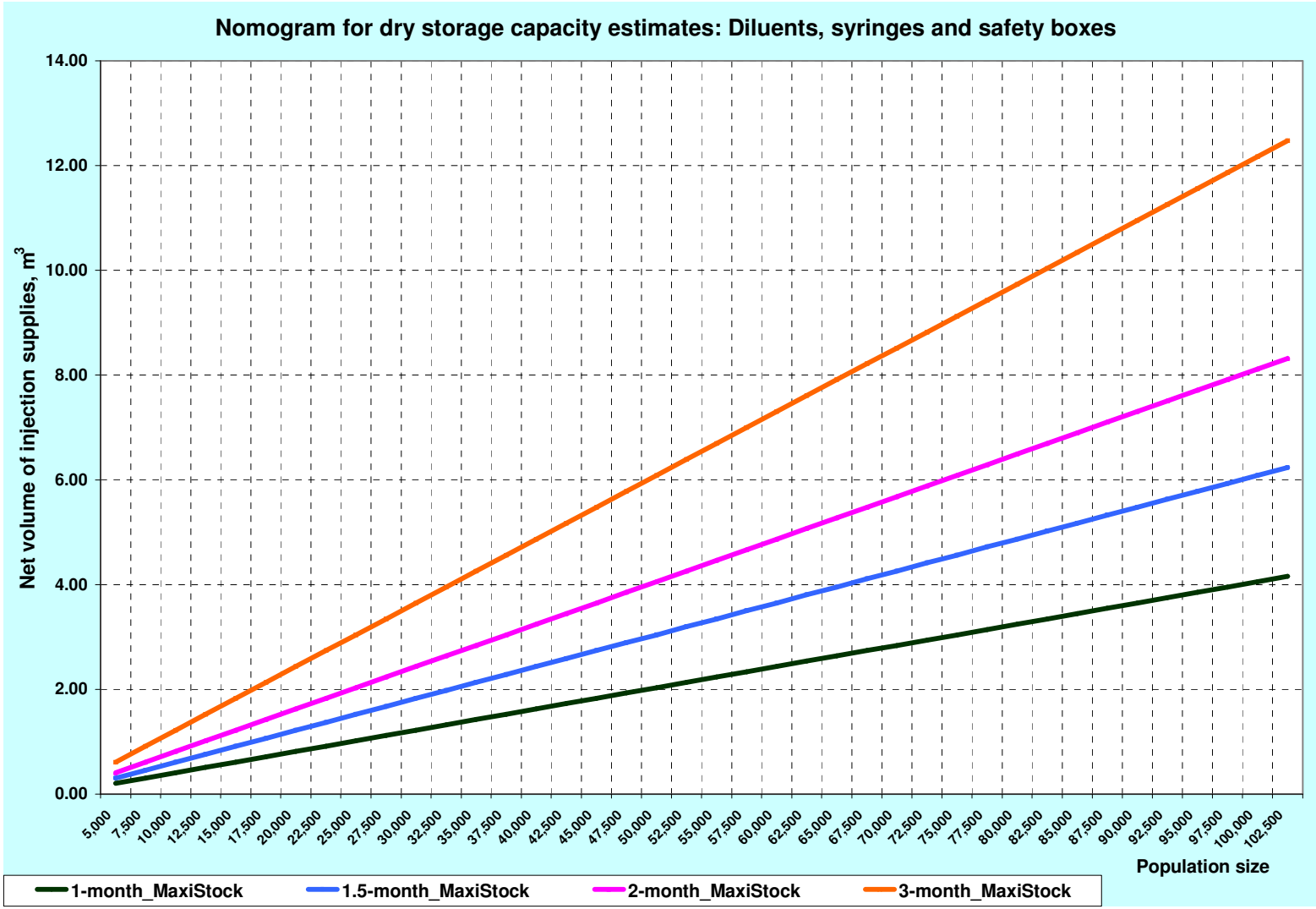
Annex 2: Nomogram example – all vaccines at +5°C

Scenario: Lowest delivery and service delivery level stores with target population between 5,000 and 25,000 and maximum stock options of 1, 1.5, 2, and 3 months.



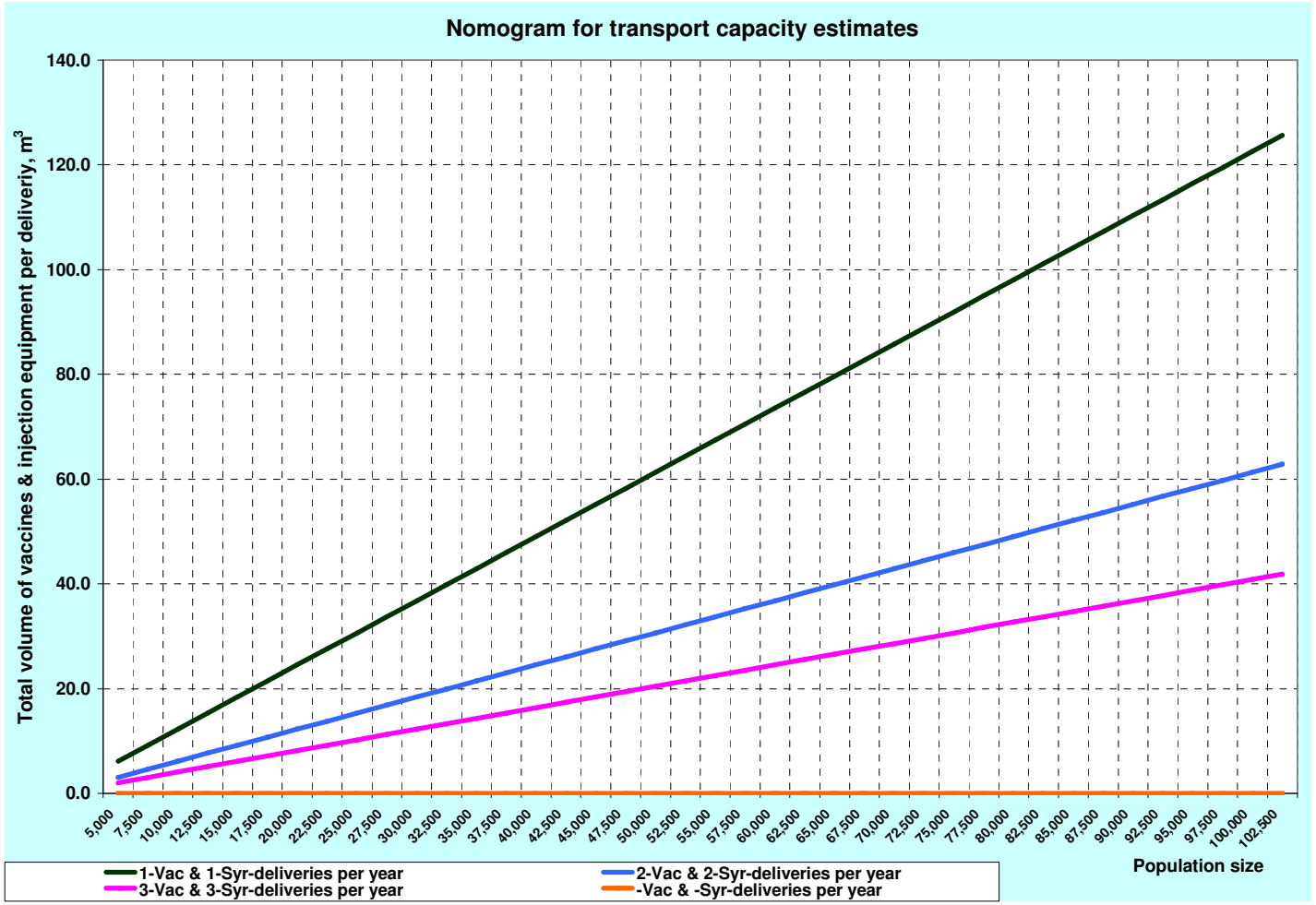
Annex 3: Nomogram example for dry store

Scenario: Target population between 5,000 and 100,000 with maximum stock options 1, 1.5, 2 and 3 months.



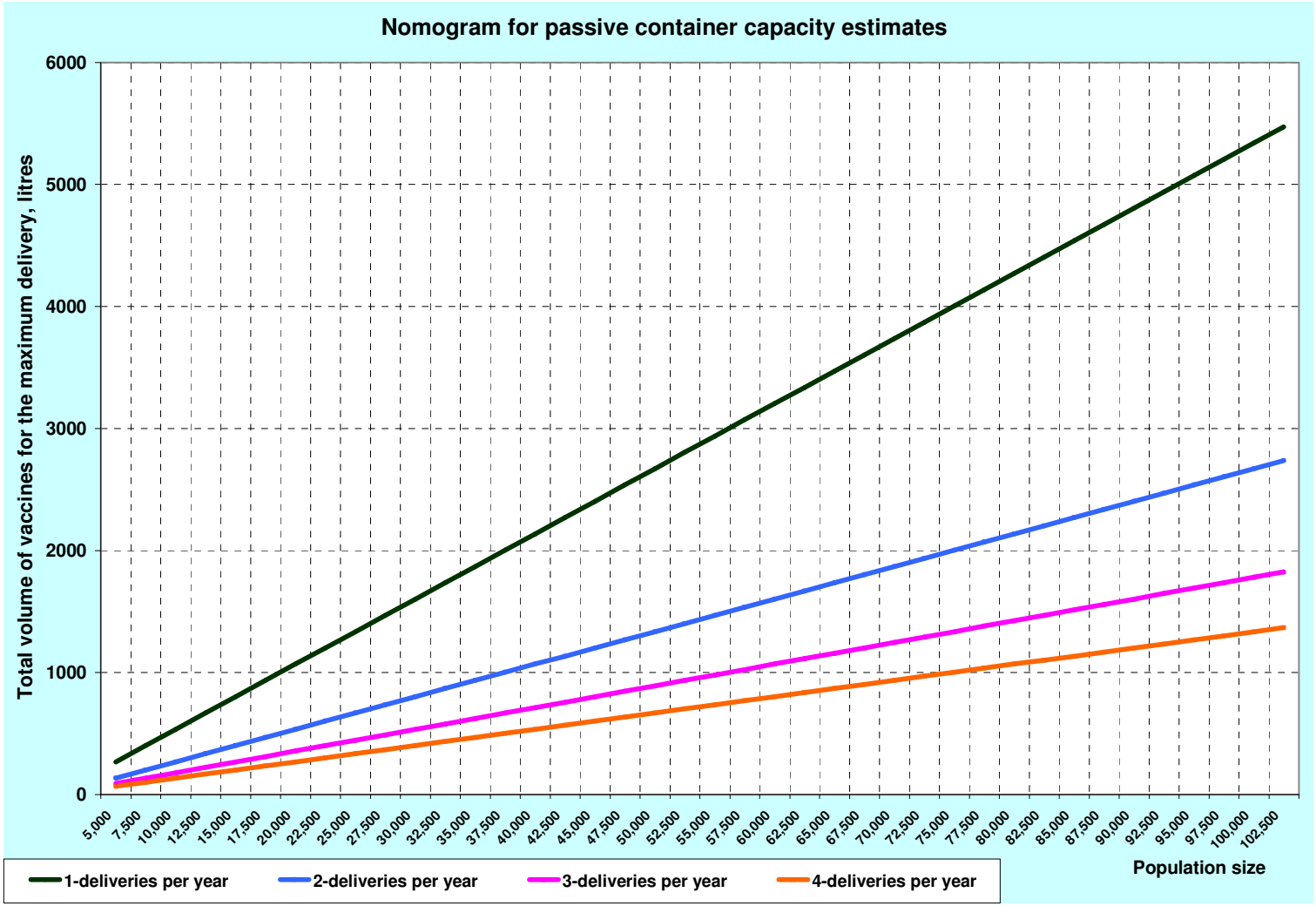
Annex 4: Nomogram example for transport capacity

Scenario: Target population between 5,000 and 100,000 with the option of 1, 2 and 3 deliveries per year. The horizontal orange line represents the fourth option, for which a delivery frequency was not entered.



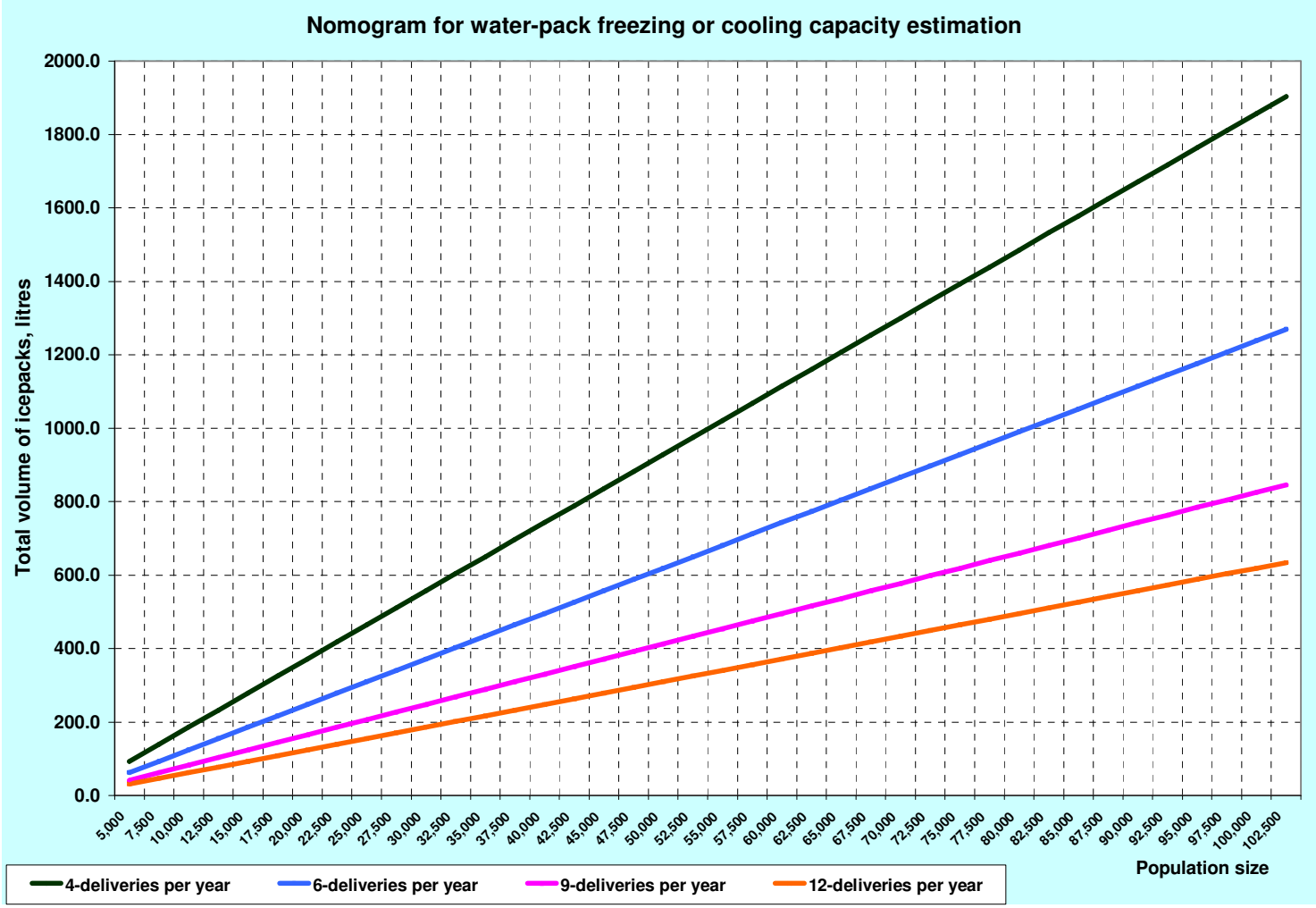
Annex 5: Nomogram example for passive containers

Scenario: Target population between 5,000 and 100,000 with the option of 1, 2 and 3 deliveries per year.



Annex 6: Nomogram example for water-pack freezing capacity

Scenario: Target population between 5,000 and 100,000 with the option of 4, 6, 9 and 12 deliveries per year



Annex 7: Passive container lookup table

Passive container database

Not translated. No user action required

Index

WHO/UNICEF Product Information Sheets, WHO/V&B/00.12

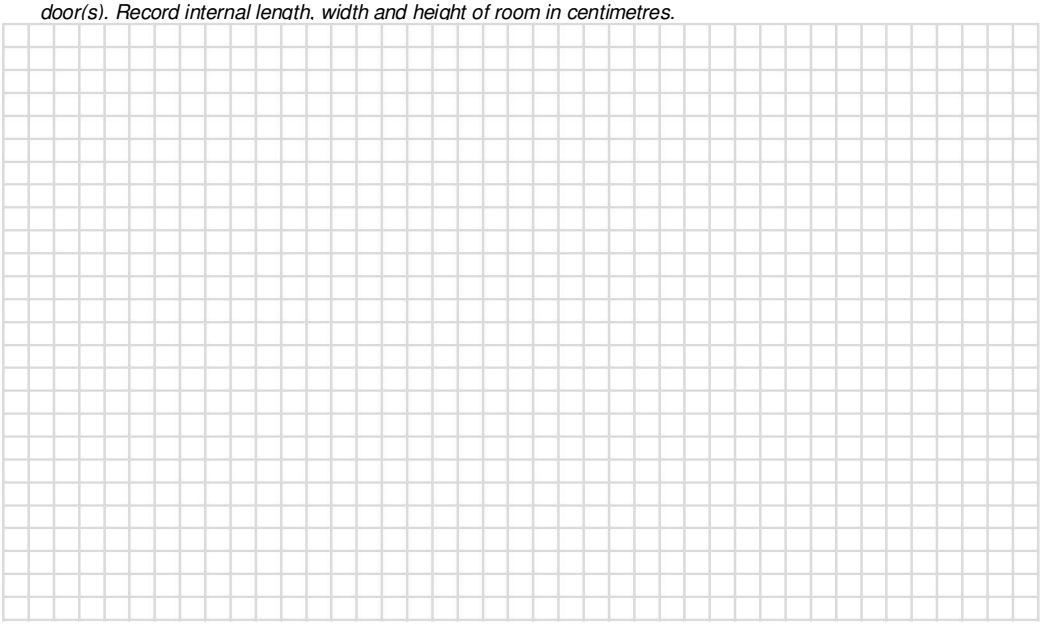
Equipment identification					Vaccine storage	Weight (kg)		Water-packs required		Cold life	Warm life
Type Click to filter:	Make	Model	Code PIS	Code PIS	capacity (l)	loaded	empty	Type	Number	@+43°C	@-20°C
Large vaccine cold box	Electrolux	RCW 25/CF	E4/05-M	CB_large	20.7	32.80	17.00	0.6	24	129.9	
Large vaccine cold box	Ina ColdMed	CB/INO/B3/90	E4/09	CB_large	16.2	31.80	16.30	0.4	12	107.0	
small vaccine cold box	Ina ColdMed	CB/INO/C2/90	E4/10	CB_small	6.5	20.60	12.50	0.4	8	81.0	
Large vaccine carrier	Thermos	3504 UN/CF	E4/18-M	VC_large	1.7	5.10	2.50	0.3	4	34.0	
Large vaccine carrier	Polyfoam Packers	EPI/PF/1.5	E4/19	VC_large	1.4	4.50	2.40	0.3	4	37.0	
small vaccine cold box	Ina ColdMed	CB/INO/D1/90	E4/20	CB_small	4	13.50	7.20	0.4	6	83.0	
small vaccine cold box	Oyster International		E4/22	CB_small	9.75	32.90	17.60	0.4	24	119.0	
Large vaccine carrier	Beijing	IA	E4/34	VC_large	1.3	4.50	2.50	0.4	4	34.0	
Large vaccine cold box	Savopak Oy	KR 48	E4/37-M	CB_large	20.9	50.00	28.00	0.6	24	121.0	
Large vaccine carrier	Gio Style Spa		E4/52-M	VC_large	2.6	6.50	1.80	0.4	8	32.0	
Small vaccine carrier	Electrolux	RCW 2/CF	E4/53-M	VC_small	0.6	2.10	1.20	0.3	2	32.0	
Small vaccine carrier	True Pack	T.P.001	E4/55-M	VC_small	0.76	1.91	0.54	0.3	3	21.0	
small vaccine cold box	Blow Kings	55-CF	E4/57-M	CB_small	8.6	21.70	8.20	0,3 & 0,4	24	65.0	
small vaccine cold box	Electrolux	RCW 12/CF	E4/62-M	CB_small	8.5	21.00	11.70	0.6	14	114.0	
Small vaccine carrier	Inalsa	IVC-3	E4/67	VC_small	1.6	3.80	1.90	0.3	4	37.0	
Large vaccine carrier	Apex Continental	IVC-9AF	E4/67-M	VC_large	1.6	4.30	1.90	0,3& 0,4&0,	4	36.0	
Small vaccine carrier	Apex Continental	IVC-8F	E4/68-M	VC_small	0.85	2.20	1.30	0.3	2	18.5	
Small vaccine carrier	Blow Kings	VDC-24-CF	E4/69-M	VC_small	0.9	2.20	1.10	0,3 & 0,4	2	15.6	
small vaccine cold box	Electrolux	RCW 6/CF	E4/70-M	CB_small	4.4	19.05	10.75	0.3	19	65.0	
Large vaccine cold box	Apex Continental	ICB-11F	E4/72-M	CB_large	23.1	48.90	18.90	0,3& 0,4&0,	50	100.0	
small vaccine cold box	Apex Continental	ICB-8F	E4/75-M	CB_small	5	25.00	11.80	0.3	26	98.0	
Large vaccine cold box	Blow Kings	CB/20/5U-CF	E4/76-M	CB_large	20	49.00	20.70	0,3 & 0,4	52	145.0	
Large vaccine carrier	Blow Kings	VC/42/MOD/2/CF	E4/77-M	VC_large	1.5	3.70	1.80	0.3	4	36.0	
small vaccine cold box	Blow Kings	CB/5/2A/CF	E4/78-M	CB_small	7.2	26.80	14.80	0,3 & 0,4	26	98.0	
Small vaccine carrier	Promociones LISA		E4/79	VC_small	0.7	2.88	1.44	osani 0,125	8	27.0	
Large vaccine carrier	Nylex Packaging	CFC free	E4/81-M	VC_large	1.4	5.30	2.40	0.6	4	53.0	
Large vaccine carrier	Blow Kings	BK-VC 1.6 - CF	E4/83-M	VC_large	1.7	4.50	1.80	0,3 & 0,4	4	36.0	
Vaccine carrier for NID	CIP Industries	Frigivac for kick Poli	E4/84-M		1.7	2.34	0.42	0.3	3	5.5	
small vaccine cold box	Electrolux	RCW 8/CF	E4/86-M	CB_small	5.3	13.80	7.02	0.6	10	49.5	
Large vaccine cold box	Apex Continental	ICB-14F	E4/86-M	CB_large	15	33.30	11.20	0,4 & 0,6	22	61.0	
Large vaccine cold box	Beijing	LCB-8A	E4/87-M	CB_large	1.6	4.80	2.40	0.4	6	50.0	
Large vaccine carrier	Blow Kings	CB/10 - CF	E4/88-M	VC_large	10	33.80	17.50	0.6	17	95.0	
small vaccine cold box	Polyfoam Packers	390	E4/80-M	CB_small	9.2	21.10	6.88	0.4	27	52.0	
Small vaccine carrier	AOV International	AVC-24	E4/89-M	VC_small	0.86	2.00	1.00	0.40	2	14.00	
Small vaccine carrier	AOV International	ADVC-24	E4/90-M	VC_small	0.9	2.40	1.40	0.40	2	19.50	
Large vaccine carrier	AOV International	AVC-44	E4/91-M	VC_large	1.6	4.20	2.20	0.4	4	40.50	
Large vaccine cold box	AOV International	ACB-503L	E4/92-M	CB_large	23.3	47.50	22.20	0.3	50	141.00	
Large vaccine cold box	AOV International	ACB-316L	E4/93-M	CB_large	22	49.50	21.90	0.6	31	174.0	
Large vaccine carrier	Termo-Kont	TM8	E4/94-M	VC_large	3	6.10	1.60		6	36.0	20.0
Large vaccine cold box	Termo-Kont	TM35	E4/95-M	CB_large	18.8	16.60	4.32		22	63.2	30.0
Large vaccine cold box	Termo-Kont	TM52	E4/96-M	CB_large	28.4	20.50	5.90		24	76.0	
Large vaccine cold box	CIP Industries	LSR 50	E4/97-M	CB_large	21.6	37.30	10.30		43	100.0	
small vaccine cold box	CIP Industries	SLR 100	E4/98-M	CB_small	9	24.00	11.20		22	112.0	
Large vaccine carrier	Dometic	RCW4	E4/99-M	VC_large	3	7.60	3.30	0.6 & 0.3	7	25.7	10.9
Large vaccine cold box	AOV International	ACB-246LS	E4/100-M	CB_large	16	36.00	14.80	0.6	24	83.0	
small vaccine cold box	AOV International	ACB-264SL	E4/101-M	CB_small	6	26.60	14.20	0.4	26	134.0	

Annex 8: PIS/PQS refrigerator and freezer lookup table

Refrigerator and freezer database									Index
1) Worksheet is set up for printing in A4 landscape.									
2) Some columns are hidden for printing purposes. Hidden columns are only labelled in English.									
3) Data are taken from WHO/UNICEF Product Information Sheets, WHO/V&B/00.13, and from the PQS database.									
Nbr. of products listed:	48								
Equipment identification						Temp zone	Net storage volume (litres)		Icepack freezing
Description	Make	Model	PIS/PQS code	Type	Refrigerant	H=Hot, T=Temperate M=Moderate	Refrigerator	Freezer	Kg/24 hrs at 32°C with vaccines
Click to filter:									
Refrigerator	Electrolux	RCW 42 EG/CF	E3/21-M	AR	NH3	T	10.5	1.6	1.1
Refrigerator	Electrolux	RCW 42 EK/CF	E3/22-M	AR	NH3	T	18.2	1.2	1.0
Icelined refrigerator	Electrolux	TCW 1152/CF	E3/24-M	ILR	R134a	H	169.0		2.1
Refrigerator & freezer	Electrolux	RCW 42AC/CF	E3/30-M	CR	R134a	H	12.0	12.0	2.1
Refrigerator & freezer	Electrolux	RCW 42DC/CF	E3/31-M	SE	R134a	H	14.0	14.0	2.4
Refrigerator & freezer	BP Solar	VR50F	E3/37-M	SE	R134a	H	17.5	5.0	2.4
Icelined refrigerator	Vestfrost	MK 144	E3/57-M	ILR	R134a	H	45.0		
Icelined refrigerator	Electrolux	TCW 1990	E3/62-M	ILR	R134a	H	37.5		16.5
Icelined refrigerator	LEC RefrigerationPLC	VC 139 F	E3/64-M	ILR	R134a	H	107.5		
Refrigerator & freezer	Norcoast	NRC 30-10	E3/65-M	SE	R134a	H	15.5	12.2	2.8
Refrigerator & freezer	Fortum AES	CFS49 ISI	E3/70-M	SE	R134a	H	20.0	4.8	3.6
Icepack freezer	Electrolux	FCW 20 EG/CF	E3/72-M	AF	NH3	T		14.0	2.4
Icepack freezer	Electrolux	FCW 20 EK/CF	E3/73-M	AF	NH3	T		14.0	2.4
Icelined refrigerator	Vestfrost	MK 074	E3/75-M	ILR	R134a	H	20.0		3.0
Refrigerator & freezer	Sun Frost	RFVB-134a	E3/77-M	SE	R134a	H	38.7	32.5	2.3
Refrigerator & freezer	Dulas	VC-150 F	E3/79-M	SE	R134a	H	85.0	14.4	8.7
Icepack freezer	Electrolux	TFW 800	E3/80-M	CF	R134a	H		145.0	18.6
Icelined refrigerator	Vestfrost	MK 204	E3/81-M	ILR	R134a	H	63.0		
Icelined refrigerator	Vestfrost	MK 304	E3/82-M	ILR	R134a	H	108.0		
Refrigerator & freezer	TATA BP Solar	TBP VR 50	E3/83	SE	R134a	H	18.0	5.0	6.4
Refrigerator & freezer	Sibir	V 170 GE	E3/84-M	AR	NH3	H	55.0	36.0	1.2
Refrigerator & freezer	Sibir	V 170 EK	E3/85-M	AR	NH3	H	55.0	36.0	1.0
Refrigerator & freezer	Sibir	V 110 GE	E3/86-M	AR	NH3	H	17.0	15.0	1.0
Refrigerator	Sibir	V 110 KE	E3/87-M	AR	NH3	T	17.0	15.0	0.6
Refrigerator & freezer	Electrolux	RCW 50 EG/CF	E3/88-M	AR	NH3	H	24.0		2.4
Refrigerator & freezer	Zero	PR 245 K/E	E3/89-M	AR	NH3	T	18.0	20.0	3.1
Refrigerator & freezer	Zero	GR 245 G/E	E3/90-M	AR	NH3	T	18.0	20.0	3.3
Refrigerator & freezer	Electrolux	RCW 50 EK	E3/91-M	AR	NH3	H	24.0		2.4
Refrigerator & freezer	Norcoast	Model 120-30	E3/92-M	SE	R134a	H	63.0	30.0	4.3
Refrigerator & freezer	Electrolux	RCW 50DC/CF	E3/93-M	SE	R134a	H	24.0	4.8	5.8
Refrigerator & freezer	Electrolux	RCW 50 AC	E3/94-M	CR	R134a	H	24.0	8.0	4.0
Icepack freezer	Zero	PF 230 IP KE	E3/95-M	AF	NH3	H		144.0	5.4
Vaccine/icepack freezer	Vestfrost	MF 114	E3/96-M	CF	R134a	H		72.0	17.5
Vaccine/icepack freezer	Vestfrost	MF 214	E3/97-M	CF	R134a	H		192.0	22.9
Vaccine/icepack freezer	Vestfrost	MF 314	E3/98-M	CF	R134a	H		264.0	32.4
Vaccine/icepack freezer	Electrolux	FCW 300	E3/99-M	CF	R134a	H		264.0	7.2
Vaccine/icepack freezer	Electrolux	FCW 200	E3/100-M	CF	R134a	H		144.0	7.2
Refrigerator & freezer	Solamatic	PVR150	E3/101-M	SE	R134a	H	30.0	7.2	3.6
Refrigerator & freezer	Zero	GR 265 G/E	E3/102-M	AR	NH3	H	16.0		1.8
Refrigerator & freezer	Dulas	VC-65 F	E3/103-M	SE	R134a	H	37.5	9.6	3.0
Refrigerator & freezer	Kyocera Solar	VaccPack XL 2100	E3/104-M	SE	R134a	H	21.0	9.6	5.4
Refrigerator & freezer	Kyocera Solar	VaccPack XL 6000	E3/105-M	SE	R134a	H	60.0	9.6	2.6
Refrigerator & freezer	Bright Light Solar	PS65	E3/106-M	SE	R134a	H	37.5	9.6	6.4
Icelined refrigerator	Dometic	TCW 3000	E3/107-M	ILR	R134a	H	126.5		5.4
Refrigerator & freezer	Zero	PR 265 K/E	E3/108-M	AR	NH3	H	37.5	9.6	2.4
Refrigerator & freezer	Bright Light Solar	PS40	E3/109-M	SE	R134a	H	18.0	2.4	2.4
Refrigerator & freezer	PT. Dilihan Glory	DOVLINE	E3/110-M	RC	R134a	T	16.0		16.0
Icelined refrigerator & vac/icepack freezer	Dometic	TCW 2000	E3/111-M	ILR	R134a	H	60.0	42.0	28.8

Annex 9: Worksheet A

A. *Draw a sketch plan of the room showing shelving layout, position of refrigeration units (if any) and position of door(s). Record internal length, width and height of room in centimetres.*



Location: Room description:

B. *Record the following dimensions in centimetres:*

Internal room dimensions

Room length (L) cm

Room width (W) cm Gross volume (L x W x H) m³

Room/stacking height (H) cm (in very high rooms enter maximum stacking height)

Shelf unit dimensions

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10
Shelf width (w)										
Shelf length (l)										
Nbr of shelves (n)										
Shelf thickness (t)										
Floor to bottom shelf (b)										
Shelf unit volume (litres)										

Net storage capacity litres

m³

Grossing factor

Formulae for manual calculation:

1) Shelf unit volume =(w x l x (H-(b + 10 + n x t))/1000) x 0.67 litres

2) Net storage capacity = ?(shelf unit volumes) litres

3) Grossing factor = Gross volume/(Net storage capacity/1000)

Annex 10: Worksheet B

Worksheet B: Compliance with minimum and maximum stock levels See indicators E6:Q20a D and E Index

STEP 1: Enter these data: Supply chain level: [ ] Facility name: [ ] Assessment date: [ ]
STEP 2: Enter the minimum and maximum stock levels for at least three of the core EPI vaccines that are listed in column D.
STEP 3: Inspect stock records and enter actual minimum and/or maximum stock levels for the selected vaccines for each month of the review period in columns F to Q.
Automatic calculation only:
STEP 4: If the value in cell R54 is >2.0 score E6:Q20a D = 'N', otherwise score 'Y'. If the value in cell R55 is >2.0 score E6:Q20a E = 'N', otherwise score 'Y'.
Manual calculation only:
STEP 4: For each selected vaccine. Multiply the minimum stock level x 0.9 and enter in the 'Minimum' row in column E.
STEP 5: For each selected vaccine. Multiply the maximum stock level x 1.1 and enter in the 'Maximum' row in column E.
STEP 6: For each selected vaccine. Count the number of months where stock levels are above of below the column E figures and enter these numbers in column R.
STEP 7: Total the column R 'minimum' figures and divide by the number of selected vaccines. IF the average is greater than 2.0, score E6:Q20a D = 'N', otherwise score = 'Y'.
STEP 8: Total the column R 'maximum' figures and divide by the number of selected vaccines. IF the average is greater than 2.0, score E6:Q20a E = 'N', otherwise score = 'Y'.

	Start date			Enter data for selected vaccines and selected months									End date			±10%
Vaccine type	Enter min/max doses		±10%	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	breaches
BCG	Minimum															0
	Maximum															0
DTP-HepB+Hib	Minimum															0
	Maximum															0
OPV	Minimum															0
	Maximum															0
Measles	Minimum															0
	Maximum															0
TT	Minimum															0
	Maximum															0
HPV	Minimum															0
	Maximum															0
	Minimum															0
	Maximum															0
	Minimum															0
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	Minimum															0
	Maximum															0

Average number of months below minimum stock level -10%: [ ]
Average number of months above maximum stock level +10%: [ ]

Revision history

Date	Change summary	Reason for change	By /Approved
12.05.2010	First draft		Hailu M. Kenea
18.06.2010	General revision for EVM Assistant V1		Andrew. G and Souleymane Kone
22.06.2010	Acknowledgements section added. Minor change to section 5.5.		Hailu M. Kenea
24.06.2010	Change on page 28-29 on maximum and minimum stock level evaluation		Hailu M. Kenea