User Manual for the Excel-Based Microplanning Tool

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Contents

Purpose of the microplanning tool

The microplanning tool is designed to help health care staff at facilities where children receive vaccinations to record the children living in their areas who require immunizations, track their immunization status, and identify children who are missing immunizations. Specifically, it automates the process of generating lists of children due for vaccination and calculates the required quantity of vaccines for daily, weekly, or monthly schedules.

For countries that do not have national immunization registries or whose registries are not accessible at primary health care centers or immunization outposts, this tool can provide some of the same features as a national immunization registry. The tool can use data exported from centralized databases using Excel's Export Wizard feature and in wide-format data, such as the **List of Children** worksheet in the tool. The data from the tool can also be imported back into the centralized system using the ETL (extract, transform, load) function.

Structure of the microplanning tool

The microplanning tool is an Excel-based application, so it is built with one of the most widely used platforms by health care providers for data reporting in health facilities. With Microsoft Excel, staff can easily use the tool without requiring any additional software installation. Specifically designed for vaccines supported by Gavi and aligned with the World Health Organization's (WHO) recommended vaccination schedule, the tool helps staff track vaccination histories, generate automated lists of children due for vaccination, and estimate vaccine needs based on the national immunization schedule.

The toolkit consists of interconnected worksheets, each serving a dedicated function to support vaccination planning. Below is a description of each worksheet included.

1. **Immunization Schedule**

- Purpose: Provides a comprehensive summary of the national immunization schedule, including each antigen, the required age for each dose, and the minimum interval between doses.
- Contents: Lists each antigen, with age requirements and injection intervals, to help users ensure timely vaccinations for each subject.

2. **List of Clients**

- Purpose: Functions as a detailed logbook, similar to those used at health facilities.
- Contents: Contains demographic and vaccination-related details, including:
    - Unique ID.
    - Full name, gender, and date of birth.
    - Contact information (caregiver's phone number and place of residence/work/study).
    - Vaccination status, contraindications, and refusals.
    - Vaccines administered and those pending for each subject.

3. **List of Children Due**

- Purpose: Automatically generates a list of children who are due for vaccinations.
- Contents: Based on age, vaccination schedule, and history, the tool lists children who need vaccinations, factoring in minimum dose intervals, contraindications, refusals, and expected vaccination dates. This list is updated in real time to reflect the current status within the local area.

4. **List of Pregnant Women Due**

- Purpose: Automatically generates a list of pregnant women who are due for tetanus-toxoid-containing vaccine (TTCV) vaccinations.
- Contents: Based on the status of being pregnant and the history of TTCV vaccination, the tool lists pregnant women who need TTCV vaccination. This list is updated in real time to reflect the current status within the local area.

5. **Vaccine Needed by Birth Cohort**

- Purpose: Estimates vaccine requirements for each birth cohort and pregnant women based on the **List of Children Due** and **List of Pregnant Women Due**.
- Contents: Summarizes the total vaccine doses needed for children and pregnant women and overall requirements to support effective resource planning in the area.

6. **Vaccine Needed in Total**

- Purpose: Calculates the total number of vaccine vials required, accounting for wastage and packaging configurations.
- Contents: Uses cohort-based estimates and adjusts for wastage factors by region, providing an accurate forecast of vial needs for the upcoming vaccination period.

Steps to use

Step 1: Update information in the Immunization Schedule worksheet

This worksheet offers an overview of the vaccination schedule recommended by WHO for Gavi-supported vaccines, with each vaccine/antigen listed by age group in the table below.

Table 1. Immunization schedule for children.

Vaccine Schedule (Age in month)						
Vaccine Name	Birth Dose	Dose 1	Dose 2	Dose 3	Dose 4	Age Restriction
Hepatitis B	0	1,5	2,5	3,5		60
BCG	0					12
DPT contained vaccines		1,5	2,5	3,5	18	60
IPV		3,5	9			12
OPV		1,5	2,5	3,5		12
Hib		1,5	2,5	3,5		24
Measles		9	18			24

Rubella		9				24
JE		9				60
PCV		1,5	2,5	3,5		12
Rota		1,5	2,5	3,5		12
Yellow Fever		9				60
Typhoid		9				24
HPV		108				144
Malaria		6	7,5	9	18	24
MMCV		9	12			24

The table above displays the vaccination schedule by age in months for various vaccines supported by Gavi, indicating the recommended age for each dose and age restriction. The **Age Restriction** column highlights the maximum age at which a child should receive a specific vaccine. If the vaccine is not administered before this age, it may no longer be effective or recommended, and the child might need alternative vaccinations or catch-up schedules. This age limit ensures that each vaccine is procured and allocated according to the needs of the targeted population, based on the priorities set by each country in its routine immunization program. Note that for the human papillomavirus vaccine (HPV) vaccine, the tool is currently designed for only girls aged 9 to 12 years. The vaccine schedules can be modified according to your country's program. Additionally, the current vaccine schedules recommended by WHO for the routine immunization schedule can be found here: https://www.who.int/publications/m/item/table1-summary-of-who-position-papers-recommendations-for-routine-immunization.

If any vaccines are not included in your country's national immunization schedule, enter **999** in the age fields for each dose. This will prevent the tool from generating a list of children due for those vaccines. For example, if the malaria vaccine is not provided in your country, enter **999** in the **Dose 1**, **Dose 2**, **Dose 3**, and **Dose 4** columns, as well as in the **Age Restriction** column for the malaria vaccine.

Vaccine Schedule (Age in month)						
Vaccine Name	Birth Dose	Dose 1	Dose 2	Dose 3	Dose 4	Age Restriction
Hepatitis B	0	1,5	2,5	3,5		60
BCG	0					12
DPT contained vaccines		1,5	2,5	3,5	18	60
IPV		3,5	9			12
OPV		1,5	2,5	3,5		12
Hib		1,5	2,5	3,5		24
Measles		9	18			24
Rubella		9				24
JE		9				60
PCV		1,5	2,5	3,5		12
Rota		1,5	2,5	3,5		12
Yellow Fever		9				60
Typhoid		9				24
HPV		108				144
Malaria		999	999	999	999	999
Meningitis		9				24

The table below provides detailed information on the minimum intervals required between doses for each vaccine/antigen, in accordance with the vaccination schedule recommended by WHO.

Table 2. Minimum Interval Between Doses (in days) table.

Vaccine	Dose 1-2	Dose 2-3	Dose 3-4	Dose 4-5	Dose 5-6
Hepatitis B	28	28	28		
BCG					
DPT contained vaccines	28	28	28		
IPV	48				
OPV	28	28			
Hib	28	28			
Measles	28				
Rubella					
JE					
PCV	28	28			
Rota	28	28			
Yellow Fever					
Typhoid					
HPV					
Malaria	28	28	168		
MMCV	90				

The table above outlines the minimum intervals between each dose of various vaccines, specifying the minimum number of days that must pass between each dose. For example:

- Hepatitis B vaccine: The minimum interval between doses is 28 days (Dose 1-2, Dose 2-3, and Dose 3-4).
- IPV (inactivated polio vaccine): There is a longer interval of 48 days between Dose 1 and Dose 2 when using a two-dose schedule.
- Malaria vaccine: A significant interval of 168 days (about 6 months) is required between Dose 3 and Dose 4.

You can modify and update the minimum intervals for each vaccine/antigen based on the latest guidelines from the national immunization program in your country.

Table 3. TTCV Vaccination Schedule for Pregnant Women table.

TTCV vaccination schedule for pregnant women Source: https://www.who.int/docs/default-source/tetanus/9789241515610-eng.pdf?sfvrsn=8b4e845a_2		
Status of vaccination	**TTCV1**	**TTCV2**
Unknown vaccination status	As early as possible	An interval of 4 weeks between the doses At least 2 weeks before birth
Partially vaccinated		
3 TTCV primary doses	As early as possible	An interval of 4 weeks between the doses
3 TTCV primary doses +1 booster	As early as possible	
3 TTCV primary doses + 2 boosters	As early as possible	
3 TTCV primary doses + 3 boosters	None (fully protected)	

Table 3 shows the vaccination schedule for women to ensure that pregnant women receive the tetanus-toxoid-containing vaccine (TTCV) according to their vaccination history and pregnancy stage, aiming to provide optimal protection against tetanus for both the mother and the newborn.

Step 2: In the List of Clients worksheet, update the list of clients, including children and pregnant women who are living in the region/country, and their vaccination histories

Collect information on all children residing in the area served by the health facility, including nonresident children. This information can be sourced from facility vaccination logs and medical information systems or gathered from household visits and home records.

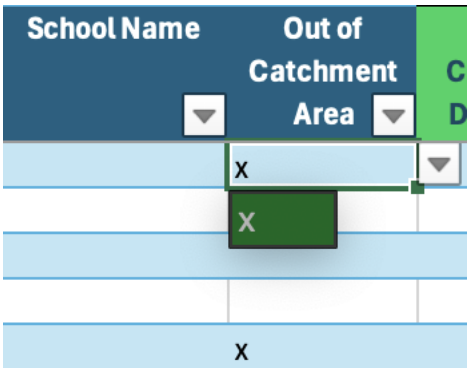
Nurses at health facilities are responsible for entering each child's personal details, including their residence status (whether they currently live in or outside the catchment area/community), into the relevant columns in the microplanning tool.

The **Age in Months** and **Birth Cohort** columns will be generated automatically based on the date of birth entered in the **Date of Birth** column.

No	Name	Date of birth	Gender	Age in Month	Birth Cohort	Mothers' Name	Phone Number	Catchment Area	School Name	Out of Catchment Area
1	A	1/10/24	M	4	2024					x
2	B	1/2/25	F	0	2025					
3	C	10/10/14	M	123	2014					
4	D	1/2/13	F	144	2013					
5	E	1/5/24	M	9	2024					x

In the **Gender** column, select **M** for a boy and **F** for a girl from the drop-down list.

The **Out of Catchment Area** column is used to record whether the child is present in the community or not. You can update this information as needed. If the child is not present in the catchment area, enter an **x** in the designated column. The tool accepts only an **x** or a blank entry in this field. This can be a helpful way to keep track of children who may migrate seasonally to other areas with their families or have left due to conflict, but who may come back later.



The same applies to the following information columns to record contraindications and refusals for each type of vaccine:

- HepB Contraindication
- BCG Contraindication
- DPT Contraindication
- OPV Contraindication
- IPV Contraindication
- Hib Contraindication
- PCV Contraindication
- Rota Contraindication
- Malaria Contraindication
- Measles Contraindication
- Rubella Contraindication
- JE Contraindication
- Meningitis Contraindication
- Yellow Fever Contraindication
- Typhoid Contraindication
- HPV Contraindication
- HepB_Refusal
- BCG_Refusal
- DPT Refusal
- OPV Refusal
- IPV Refusal
- Hib Refusal

- PCV Refusal
- Rota Refusal
- Malaria Refusal

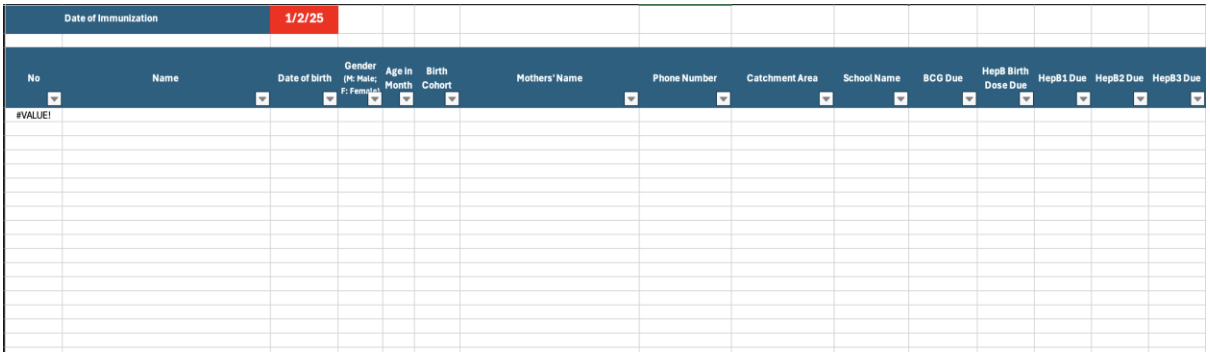
For vaccination history, ensure that the vaccination records are updated for all antigens, regardless of where the vaccination was administered. For example, if a child received the first dose of the hexavalent vaccine (containing Hep B, DTaP, Hib, and IPV) at a private facility, health workers must record the date in the appropriate columns (**HepB1**, **DPT1**, **IPV1**, and **Hib1**). Similarly, if a child received the first dose of the pentavalent vaccine (Hep B, DPT, Hib), health workers must enter the vaccination date in the **HepB1**, **DPT1**, and **Hib1** columns.

Note: Users must enter vaccination dates in a consistent format, according to their computer's date settings. For instance, if the computer's date format is dd/mm/yyyy, users must enter the vaccination dates in the same format.

No	Name	Date of birth	Gender	Age in Month	Birth Cohort	BCG	HepB Birth Dose	HepB1
1	A	1/10/24	M	4	2024		2/10/24	2/11/24
2	B	1/2/25	F	0	2025			
3	C	10/10/14	M	123	2014			
4	D	1/2/13	F	144	2013			
5	E	1/5/24	M	9	2024			

If the format is incorrect, the tool will not generate the list of children due for vaccination.

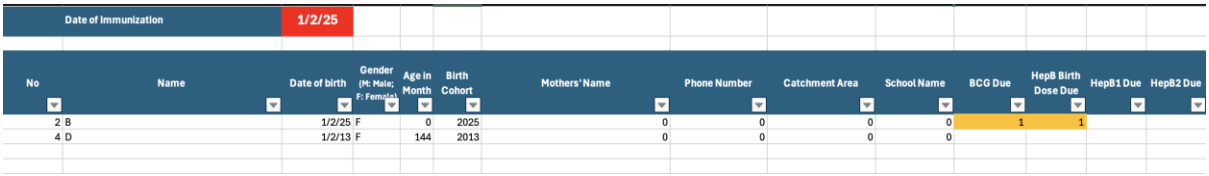
No	Name	Date of birth	Gender	Age in Month	Birth Cohort	BCG	HepB Birth Dose	HepB1
1	A	1/10/24	M	4	2024		2/10/24	2/11/24
2	B	1/2/25	F	0	2025			
3	C	10/10/14	M	123	2014			
4	D	1/2/13	F	144	2013			
5	E	1/5/24	M	9	2024		1/31/24	



Step 3: Generate the list of children and pregnant women due for vaccination

Based on the data entered in the **List of Clients** worksheet in Step 2, the tool will automatically calculate and display the children and pregnant women who need to be vaccinated in the worksheets **List of Children Due** and **List of Pregnant Women Due**, respectively.

The user must enter the expected vaccination date for each child in the **Date of Immunization** box. In this example, the date is set to 01/02/2025.

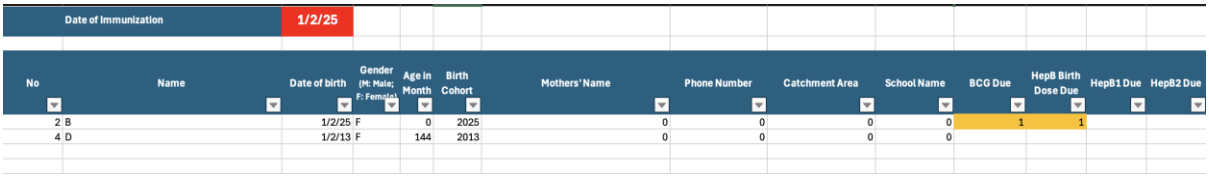


Date of Immunization	1/2/25												
No	Name	Date of birth	Gender (M: Male; F: Female)	Age in Month	Birth Cohort	Mothers' Name	Phone Number	Catchment Area	School Name	BCG Due	HepB Birth Dose Due	HepB1 Due	HepB2 Due
2	B	1/2/25	F	0	2025	0	0	0	0	1	1		
4	D	1/2/13	F	144	2013	0	0	0	0				

The tool will automatically generate a list of children due for at least one vaccine/antigen based on the following criteria:

- The subject must be present in the area.
- The subject must be of the appropriate age to receive the vaccine/antigen, according to your national vaccination schedule. The child's age is calculated by subtracting the date of birth from the expected vaccination date (in this example, February 1, 2025).
- The minimum interval between doses must align with the national vaccination program's guidelines (which the user has entered in Table 2 of the **Immunization Schedule** worksheet).
- The subject must have no contraindications. If a contraindication for any vaccine is recorded, the tool will exclude that vaccine from the child's vaccination schedule.
- The subject must not have refused the vaccine. If the caregiver or family refuses a specific vaccine/antigen, the tool will not include that vaccine in the child's vaccination list.
- The date format entered in the tool must match the date format set on the user's computer.

The resulting list will display the children who are due for vaccination based on these conditions.



Date of Immunization	1/2/25												
No	Name	Date of birth	Gender (M: Male; F: Female)	Age in Month	Birth Cohort	Mothers' Name	Phone Number	Catchment Area	School Name	BCG Due	HepB Birth Dose Due	HepB1 Due	HepB2 Due
2	B	1/2/25	F	0	2025	0	0	0	0	1	1		
4	D	1/2/13	F	144	2013	0	0	0	0				

The required vaccinations are highlighted in yellow.

Note: For children who have missed multiple vaccinations, the tool will suggest administering several vaccines/antigens on the same day. However, it is up to the medical doctor or family doctor to determine, during the upcoming visit, which vaccines should be prioritized for the child.

This list can be printed out for the family doctor or medical doctor to review and decide which eligible subjects should be vaccinated and which vaccines/antigens the child should receive based on the vaccination plan for December 31, 2024, as shown on the screen.

Similarly, the tool will list pregnant women who are due for vaccination based on the subject's TTCV vaccination history and pregnancy status, according to WHO's recommendation.

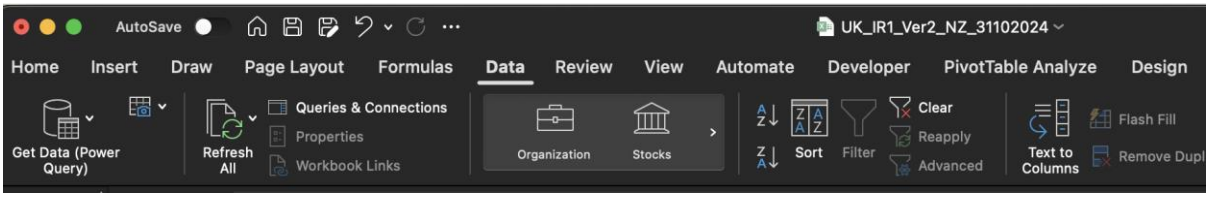
Date of Immunization	1/7/25											
No	Women ID	Name	Date of birth	Gender	Birth Cohort	Phone Number	Address	Catchment Area	Out of Catchment Area	TTCV1 Due	TTCV2 Due	TTCV3 Due
2	0	B	1/1/90	F	1990	0	EFGH	0	0		1	

Step 4: Estimate vaccine needs for the vaccination day

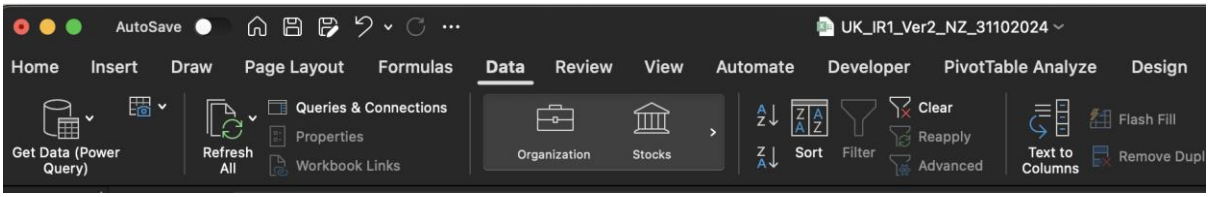
Based on the **List of Children Due** and **List of Pregnant Women Due** from the previous step, the tool will automatically calculate the quantity of vaccines needed for both children and pregnant women in the **Vaccine Needed by Birth Cohort** worksheet.

In this worksheet, use the PivotTable function to determine the number of vaccines required for each group of children, based on the **List of Children Due** and **List of Pregnant Due**.

After updating the list of subjects and vaccination history in Step 2, the medical staff or nurse should click on the **Vaccine Needed by Birth Cohort** worksheet. Then, on the menu, select the **Data** tab.



Next, click **Refresh All** to update the data.



The tool will then display the number of vaccines needed for each group of subjects, categorized by the year of birth, as shown below.

Catchment Area	(All)
School Name	(All)
Out of Catchment Area	(All)

Row Labels	Number of BCG	Number of HepB Birth Dose	Number of HepB1	Number of HepB2	Number of HepB3	Number of DPT1	Number of DPT2	Number of DPT3	Number of DPT4	Number of OPV1	Number of OPV2	Number of OPV3	Number of IPV1	Number of IPV2	Number of Hib1
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024	2	0	1	1	0	2	0	0	0	2	0	0	2	0	2
2025	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	**3**	**1**	**1**	**1**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**	**2**	**0**	**2**

As shown in the figure, there are a total of three children who need the BCG vaccine, one who needs the HepB1 vaccine, and so on.

In this PivotTable, you can customize the results by different groups, such as **Catchment Area**, **School Name**, and **Out of Catchment Area**, as shown in the image above.

For guidance on using Excel's PivotTable function, see: https://support.microsoft.com/en-us/office/create-a-pivottable-to-analyze-worksheet-data-a9a84538-bfe9-40a9-a8e9-f99134456576.

Step 5: Estimate the actual number of vaccines needed

On the tool, go to the worksheet **Vaccine Needed in Total**.

Vaccine Needed	Number of Doses	Wastage Factor	Vial Packaging	Total of Vaccine Needed	Number of Vials Needed
Hepatitis B	3	1,05	1	4	4
BCG	3	1,05	10	4	1
DPT contained vaccines	2	1,05	5	3	1
IPV	2	1,05	10	3	1
OPV	2	1,05	20	3	1
Hib	2	1,05	10	3	1
Measles	1	1,05	10	2	1
Rubella	1	1,05	10	2	1
JE	1	1,05	5	2	1
PCV	2	1,05	10	3	1
Rota	2	1,05	10	3	1
Yellow Fever	1	1,05	1	2	2
Typhoid	1	1,05	5	2	1
HPV	1	1,05	1	2	2
Malaria	1	1,05	1	2	2
MMCV	1	1,05	1	2	2
TTCV for Pregnant Women	1	1,05	10	2	1

Next, enter the accepted wastage factor for each region and the vial packaging for each vaccine, based on local practices in your country. Wastage factors may be set by local health authorities or based on vaccine wastage rates. To calculate the wastage factor based on vaccine wastage rates, use the following formula:

wastage factor = 100 divided by (100 minus the wastage rate %)

Alternatively, you can also use the WHO Vaccine Wastage Rates calculator found here: https://www.who.int/publications/m/item/vaccine-wastage-rates-calculator.

Using the number of children and pregnant women to be vaccinated, wastage factors, and vial packaging, the tool will calculate the total number of doses and vials required for the vaccination day as planned.

Step 6: Update the vaccination results

Based on the **List of Children Due** and those designated by the family doctor or medical doctor as eligible for vaccination, as well as the vaccines required (from Step 3), the medical staff or nurse in charge of vaccination and data entry will update the vaccination results for each child once they receive the vaccine.

For example, on February 1, 2025, child **B**, listed as **No 2**, received the **BCG** and **HepB Birth Dose** vaccines. After the vaccination, the medical staff or nurse will go to the **List of Children** worksheet, locate child **No 2**, and enter the vaccination results in the appropriate columns (**BCG** and **HepB Birth Dose**), as shown in the following screen:

No	Name	Date of birth	Gender	Age in Month	Birth Cohort	BCG	HepB Birth Dose	HepB1	H
1	A	1/10/24	M	4	2024		2/10/24	2/11/24	
2	B	1/2/25	F	0	2025	1/2/25	1/2/25		
3	C	10/10/14	M	123	2014				
4	D	1/2/13	F	144	2013				
5	E	1/5/24	M	9	2024				

Similarly, update the immunization data for children and pregnant women who visit and are vaccinated on the same vaccination day.

Troubleshooting instructions

Issue 1

I followed the instructions to input complete client information and vaccination history in the **List of Clients** worksheet. However, when I entered the vaccination date to generate the list of subjects needing vaccination that day, the table displayed the error **#VALUE**. What steps should I take to resolve this issue?

Solution

The date format you entered in the tool does not match the format set on your computer. You will need to update the date format on your computer to match the format used in the tool.

The process for changing the date format depends on your computer's operating system. Determine which operating system version you are using, and then follow the appropriate instructions to adjust the date format on your device.

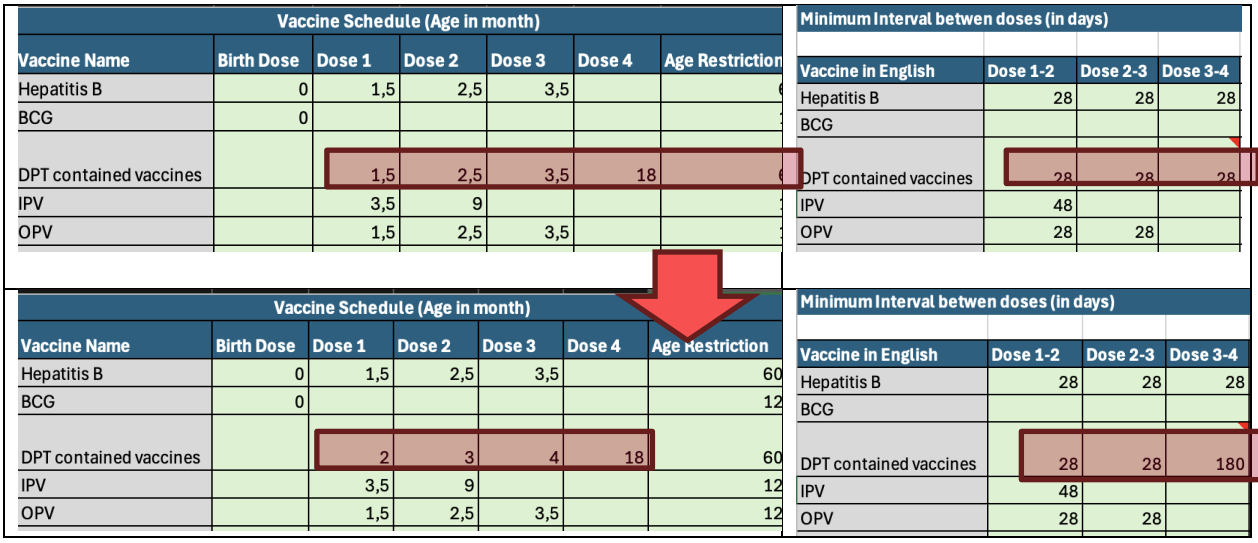
Issue 2

According to the vaccination schedule in my country, the DPT vaccine is administered as follows: Dose 1 at 2 months, Dose 2 at 3 months, Dose 3 at 4 months, and Dose 4 (booster) at 18 months. The interval between doses 1, 2, and 3 is at least 4 weeks, while Dose 4 is administered at least 6 months after Dose

3. Should I modify the tool, or is there a way to adjust the settings to ensure it calculates the vaccination schedule correctly for children in my country?

Solution

There is no need to modify the tool. Simply update the appropriate age for each dose in Table 1 and the minimum interval between doses in Table 2 within the **Immunization Schedule** worksheet, as shown in the image below:



Vaccine Schedule (Age in month)

Vaccine Name	Birth Dose	Dose 1	Dose 2	Dose 3	Dose 4	Age Restriction
Hepatitis B	0	1,5	2,5	3,5		
BCG	0					
DPT contained vaccines		1,5	2,5	3,5	18	
IPV		3,5	9			
OPV		1,5	2,5	3,5		

Minimum Interval betwen doses (in days)

Vaccine in English	Dose 1-2	Dose 2-3	Dose 3-4
Hepatitis B	28	28	28
BCG			
DPT contained vaccines	28	28	28
IPV	48		
OPV	28	28	

Vaccine Schedule (Age in month)

Vaccine Name	Birth Dose	Dose 1	Dose 2	Dose 3	Dose 4	Age Restriction
Hepatitis B	0	1,5	2,5	3,5		60
BCG	0					12
DPT contained vaccines		2	3	4	18	60
IPV		3,5	9			12
OPV		1,5	2,5	3,5		12

Minimum Interval betwen doses (in days)

Vaccine in English	Dose 1-2	Dose 2-3	Dose 3-4
Hepatitis B	28	28	28
BCG			
DPT contained vaccines	28	28	180
IPV	48		
OPV	28	28	

Issue 3

In the coming years, my country will introduce a new vaccine. What steps do we need to take to ensure the tool calculates who needs to be vaccinated based on the schedule for this new vaccine?

Solution

In the future, when a new vaccine is introduced into the routine immunization program, the microplanning tool will need to be updated to reflect the new vaccine's schedule and requirements. It is recommended that someone proficient in Excel functions modify the existing functions in the tool to accommodate the new vaccine.

Issue 4

I am currently using Excel 2016. Although I entered all the information as instructed, the tool is not generating a list of subjects to be vaccinated. What steps should I take to resolve this?

Solution

In the **List of Children Due** or **List of Pregnant Women Due** worksheet, use the Filter() function to display the subjects who need to be vaccinated. However, this function is only supported in Excel 2019 and later versions. For previous Excel versions, please use the **Advanced Filter** dialog box. To learn how to use **Advanced Filter**, see: https://support.microsoft.com/en-us/office/filter-by-using-advanced-criteria-4c9222fe-8529-4cd7-a898-3f16abdff32b.