GUIDE TO INTRODUCING

MENINGOCOCCAL A

CONJUGATE VACCINE INTO THE ROUTINE IMMUNIZATION PROGRAMME
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<th>Description</th>
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<tbody>
<tr>
<td>AEFI</td>
<td>adverse event following immunization</td>
</tr>
<tr>
<td>cMYP</td>
<td>comprehensive multi-year plan (for immunization)</td>
</tr>
<tr>
<td>CTC</td>
<td>controlled temperature chain</td>
</tr>
<tr>
<td>DHSI</td>
<td>district health information software</td>
</tr>
<tr>
<td>DTP</td>
<td>diphtheria-tetanus-pertussis</td>
</tr>
<tr>
<td>EPI</td>
<td>Expanded Programme on Immunization</td>
</tr>
<tr>
<td>FIC</td>
<td>fully immunized child</td>
</tr>
<tr>
<td>HBR</td>
<td>home-based record</td>
</tr>
<tr>
<td>HMIS</td>
<td>health management information systems</td>
</tr>
<tr>
<td>ICC</td>
<td>interagency coordinating committee</td>
</tr>
<tr>
<td>IDSR</td>
<td>integrated disease surveillance and response</td>
</tr>
<tr>
<td>IEC</td>
<td>information, education and communication</td>
</tr>
<tr>
<td>IM</td>
<td>intramuscular</td>
</tr>
<tr>
<td>IPV</td>
<td>inactivated poliovirus vaccine</td>
</tr>
<tr>
<td>MenACV</td>
<td>Meningococcal A conjugate vaccine</td>
</tr>
<tr>
<td>MenAfriVac®</td>
<td>Meningococcal A conjugate vaccine (trade name)</td>
</tr>
<tr>
<td>MCV</td>
<td>measles-containing vaccine</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MOV</td>
<td>missed opportunities for vaccination</td>
</tr>
<tr>
<td>NIP</td>
<td>National Immunization Programme</td>
</tr>
<tr>
<td>NITAG</td>
<td>national immunization technical advisory group</td>
</tr>
<tr>
<td>Nm</td>
<td>Neisseria meningitidis</td>
</tr>
<tr>
<td>PCR</td>
<td>polymerase chain reaction</td>
</tr>
<tr>
<td>PCV</td>
<td>pneumococcal conjugate vaccine</td>
</tr>
<tr>
<td>PIE</td>
<td>post-introduction evaluation</td>
</tr>
<tr>
<td>PsA</td>
<td>purified meningococcal group A polysaccharide</td>
</tr>
<tr>
<td>RI</td>
<td>routine immunization</td>
</tr>
<tr>
<td>SAGE</td>
<td>Strategic Advisory Group of Experts on immunization</td>
</tr>
<tr>
<td>Td</td>
<td>tetanus-diphtheria</td>
</tr>
<tr>
<td>TT</td>
<td>tetanus toxoid (vaccine)</td>
</tr>
<tr>
<td>VVM</td>
<td>vaccine vial monitor</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>YF</td>
<td>yellow fever</td>
</tr>
<tr>
<td>2YL</td>
<td>second year of life</td>
</tr>
</tbody>
</table>
ABOUT THIS GUIDE

This guide is primarily intended for use by national decision-makers and Expanded Programme on Immunization (EPI)/National Immunization Programmes (NIP) managers, and also by partners and other stakeholders involved in NIP.

The specific objectives of the guide are:

- to inform the policy discussions and decisions pertaining to the introduction of a meningococcal A conjugate vaccine (MenACV) into a national routine immunization (RI) programme with up-to-date references;
- to facilitate operational aspects related to the introduction of MenACV into a national RI programme for planning, implementation and evaluation phases.

This is a general guidance document that should serve as a reference, at all stages of the process, for the introduction of MenACV into a national immunization programme, from informing the decision to implementation and monitoring.

It draws from Principles and considerations for adding a vaccine to a national immunization programme,1 other World Health Organization (WHO) and technical guides, such as Immunization in practice2 and topic-specific guides, the experiences of countries that have introduced MenACV and WHO Vaccine Position Papers.3

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3 WHO Vaccine Position Papers (http://www.who.int/immunization/documents/positionpapers/en/).
INTRODUCTION
Meningococcal disease and its epidemiology

Meningococcal disease

*Neisseria meningitidis* (Nm, the meningococcus) is a leading cause of bacterial meningitis and sepsis throughout the world. Twelve types of *N. meningitidis*, called serogroups, have been identified, six of which (A, B, C, W, X and Y) can cause disease and epidemics. Meningococcal meningitis with seasonal variation occurs in small clusters throughout the world and accounts for a variable proportion of epidemic bacterial meningitis. The relative importance of the serogroups varies according to the geographic location (Fig. 1).

Bacterial meningitis has a very high fatality rate (up to 70% if untreated) and 10–20% of survivors develop permanent sequelae. Besides meningitis and sepsis, meningococci can cause pneumonia and, occasionally, focal infections such as arthritis, myocarditis, pericarditis, endophthalmitis, epiglottitis, otitis and urethritis.

Humans are the only natural reservoir of meningococci (asymptomatic nasopharyngeal carriage), and person-to-person transmission occurs through respiratory droplets.

Fig. 1. Serogroup distribution of invasive meningococcal disease, 2018

The African meningitis belt

The largest burden of meningococcal disease occurs in an area of sub-Saharan Africa, known as the meningitis belt. The African meningitis belt is a vast area, stretching from Senegal in the west to Ethiopia in the east, and including all or part of 26 countries that are susceptible to intermittent devastating outbreaks of meningococcal disease, with attack rates during major epidemics as high as 1% of the population. These 26 countries are: Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Côte d’Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Mali, Mauritania, Niger, Nigeria, Rwanda, Senegal, South Sudan, Sudan, United Republic of Tanzania, Togo and Uganda (Fig. 2).

Fig. 2. 26 countries of the African meningitis belt with areas at high epidemic risk

The risk of meningitis epidemics differs within, and among, these 26 countries. However, the weekly number of reported meningitis cases (Fig. 3) demonstrates that the main seasonal peak in all countries falls within the first five months of the year, whether the year is a high or low burden year.

During the dry season, from December to June, dust winds, cold nights and upper respiratory tract infections combine to damage the nasopharyngeal mucosa, increasing the risk of meningococcal disease. At the same time, transmission of meningococci may be
facilitated by overcrowded housing and by large population displacements or gatherings, such as pilgrimages and traditional markets. This combination of factors contributes to the large epidemics occurring in this area during the dry season.

![Number of cases vs. week graph](source)


**Fig. 3.** Number of suspected and confirmed meningitis cases by week in the African meningitis belt of 2004 (red), 2005 (orange), 2006 (yellow), 2007 (light green), 2009 (light blue), 2010 (blue), 2011 (purple), 2012 (pink) and 2013 (grey)

Meningitis serogroup A accounted for 80–85% of African meningitis epidemics before the introduction of a meningococcal A conjugate vaccine (MenACV) that began in 2010 through mass preventive campaigns and into RI programmes. Substantial outbreaks have also occurred caused by other meningococci belonging to group C, W or even X. Other pathogens such as *Streptococcus pneumoniae* type 1 have also caused meningitis outbreaks.
Meningitis control strategy

The WHO promotes a comprehensive approach to the prevention and control of meningitis in the African meningitis belt.

1. Epidemic preparedness and response to rapidly detect and respond to meningitis epidemics. It is based on three pillars:\(^5\)
   - surveillance, including detection, investigation and laboratory confirmation;
   - treatment and care;
   - reactive mass vaccination to limit the magnitude of the epidemic.

2. Prevention of meningococcal A disease through preventive vaccination with a conjugate vaccine. There is currently no affordable conjugate vaccine widely available to substantially protect populations against additional serogroups.

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**BOX 1: MENINGOCOCCAL VACCINES**

Currently there are three types of vaccines available.

**Polysaccharide vaccines** have been available to prevent the disease for over 30 years. Meningococcal polysaccharide vaccines are available in bivalent (groups A and C), trivalent (groups A, C and W), or tetravalent (groups A, C, Y and W) forms. They are not effective before two years of life. Protection offered is quite short-lived (two to three years) and they do not induce herd protection as they do not prevent carriage. To date, they have been widely used to respond to outbreaks.

**Conjugate vaccines.** Although purified capsular polysaccharide antigens elicit protective antibody responses, conjugate vaccines induce a higher and longer-lasting immunity and prevent nasopharyngeal carriage of the bacteria and thus its transmission. They are also effective in protecting children under two years of age. Since 2010, one MenACV, prequalified by the WHO and intended for use mainly in the African meningitis belt, has been widely available (marketed under the trade name MenAfriVac\(^\text{®}\)). Other WHO-prequalified conjugate vaccines are monovalent C and tetravalent A,C,W,Y conjugate vaccines. With the exception of MenAfriVac\(^\text{®}\), the price of conjugate vaccines is much higher than polysaccharide ones and their supply is currently quite limited.

**Protein-based vaccine.** Polysaccharide and polysaccharide-conjugate vaccines cannot be developed for group B due to antigenic mimicry with polysaccharide in human neurologic tissues. The first vaccine against *Neisseria meningitidis* group B (NmB), made from a combination of 4 protein components, was licensed in 2014. There is currently no NmB vaccine prequalified by the WHO.

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MenACV introduction in the meningitis belt

The introduction of MenACV represents a giant step towards achieving elimination of epidemic meningitis as a public-health problem in sub-Saharan Africa.

A two-pronged strategy

The recommended MenACV introduction strategy is two-pronged, as follows:

- mass vaccinate a broad age group (one to 29 year-old population) to provide direct and herd protection by reducing bacterial carriage and transmission and thus gain immediate benefits on a public-health level; then
- include the vaccine in RI programmes.

The Sixty-fourth Regional Committee for Africa endorsed the Regional Strategic Plan for Immunization 2014–2020 which has an objective that “by 2020 all countries within the meningitis belt will have introduced MenAfriVac® through campaigns and 15 of them will have introduced it in routine immunization”.

Rollout

In December 2010, MenACV was introduced through mass vaccination campaigns in Burkina Faso, Mali and Niger. Since then, campaigns have been conducted, or are planned, in almost all countries across the meningitis belt.

In 2016, Ghana and Sudan were the first two countries to introduce MenACV into their infant national immunization schedule; other countries have since followed or are planning such introductions.

Impact of MenACV mass preventive campaigns

Following the successful rollout and uptake of MenACV, epidemics due to NmA are dying out. The impressive public-health impact of vaccination against NmA has been consistently demonstrated in vaccinated populations through analyses of surveillance data, indicating >99% decline in the incidence of meningitis A (confirmed cases), -60%

6 http://www.who.int/mediacentre/factsheets/fs141/en/.
decline in the incidence of meningitis (suspected cases) and ~60% decline in the risk of meningitis epidemics (district level), with elimination of NmA carriage in vaccinated and unvaccinated populations.\textsuperscript{7,8,9,10}

![Graph showing incidence of meningitis in Chad 2009–2013](image)

**Fig. 4.** Incidence of reported cases of meningitis in Chad 2009–2013. Vaccination with MenAfriVac\textsuperscript{a} targeted persons 1–29 years of age at the end of 2011 and in 2012

The impact of mass preventive campaigns can only be sustained if followed by the introduction of MenACV into the RI schedule to assure that subsequent birth cohorts have immunity to NmA.

Indeed, modelling predicts that without the RI component, there may be a catastrophic resurgence of the disease within 10–20 years following a campaign (Fig. 5),\textsuperscript{11} and possibly earlier under different model assumptions.


Fig. 5. Annual incidence of NmA meningitis depending on vaccination strategies
CHAPTER 1

Decision-making and key considerations
Strategy and WHO recommendation for MenACV introduction

As described above, the introduction of MenACV is a two-fold strategy.

- Comprehensive mass vaccination campaigns targeting the one to 29 year-old age group. Based on a risk assessment, these campaigns may be conducted nationwide or in high-risk areas only.
- Introduction into the RI programmes to sustain the population protection by immunizing new birth cohorts.

**WHO recommendations regarding introduction into routine are as follows:**

- MenACV should be introduced into the RI schedule within no more than five years after completion of a mass campaign.
- Regimen is a 1-dose schedule, administered by deep intramuscular (IM) injection, preferably in the anterolateral aspect of the thigh, and given at 9–18 months of age based on local programmatic and epidemiologic considerations.

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For countries that previously conducted an initial mass campaign, the introduction should include a one-time catch-up campaign for birth cohorts born since the initial mass vaccination (or those too young to be vaccinated at the time of the campaign) and who would be outside the age range targeted by the RI programme.

For countries yet to conduct mass campaigns, it is recommended to conduct such a campaign and concomitantly introduce it into the RI programme.

Additional recommendations include the following:

- if, in a specific context, there is a compelling reason to vaccinate children less than nine months of age, a 2-dose infant schedule should be used starting at three months of age, with doses at least eight weeks apart;
- any children who miss MenACV vaccination at the recommended age should be vaccinated as soon as possible thereafter;
- in areas where RI coverage with MenACV is less than 60%, periodic campaigns could be considered to complement RI, as herd protection may not be sufficient to protect those who are not immunized. This should be accompanied by plans to strengthen the RI to assure additional catch-up campaigns are not needed in future.

WHO also emphasizes the need to conduct high-quality surveillance and vaccination programme evaluations.

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**BOX 2: MENAFRIVAC®; ONE VACCINE, TWO FORMULATIONS**

The only MenACV so far prequalified by WHO is marketed under the trade name MenAfriVac®. It is a lyophilized vaccine of purified meningococcal group A polysaccharide (PsA) covalently bound to tetanus toxoid (TT) that acts as a carrier protein.

Two formulations of the vaccine are available: (i) MenAfriVac® containing 10 μg of purified group A meningococcal polysaccharide antigen per dose for use in those aged 1–29 years; (ii) MenAfriVac 5 micrograms®, containing 5 μg of PsA-TT per dose for use in children aged 3–24 months (see Tables 2 and 3).

As per WHO recommendations:

- MenAfriVac 5 micrograms® (5 μg) should be used for routine immunization of infants and young children from 3 to 24 months of age.
- MenAfriVac® (10 μg) should continue to be used for catch-up and periodic campaigns from 12 months of age onwards.
What is the best age to administer MenACV?

The recommended age for administration of MenACV is between 9 to 18 months, based on local programmatic and epidemiologic considerations. There are a series of considerations to take into account when deciding to administer the vaccine in the first or second year of life. To support countries in optimizing the age of administration, they may want to consider the following.

- The existence of (or opportunity to strengthen) a second year of life (2YL) immunization contact.
  
  - Is there an existing contact in the 2YL (such as measles-containing vaccine second dose (MCV2) or DTP-containing booster) that can be built upon?
  
  - What would be the impact of adding a new vaccine to an existing 2YL platform?

- The relevance to initiate a 2YL immunization contact.
  
  - If not already established, are there plans to introduce MCV2 in the near future that may benefit from the synergies with MenACV in the 2YL?
  
  - Is the system ready for setting up a 2YL platform?
  
  - Would the 2YL platform be strong enough to ensure appropriate implementation of MenACV vaccination (management, policies, demand)? How can it be strengthened?
  
  - Should other interventions be added together with MenACV vaccination (immunization-related or not)?

- The capacity of the system for a rapid uptake of MenACV and the impact that MenACV immunization may have on other vaccinations (or other health interventions) delivered at the same time (for example, coverage of MCV1/yellow fever vaccine, coverage of MCV2 vaccine).
  
  - Is MenACV expected to increase demand for other vaccines administered at the same time?
  
  - Would health workers be open to delivering an additional injectable vaccine dose during the same visit? How to support them to do so?
  
  - Would caregivers be willing to accept their child receiving one more injection(s) during a given visit? How to inform them?
  
  - Will the national schedule provide catch-up opportunities for children who miss their dose at the recommended age?

- Epidemiological setting (see WHO additional recommendations, page 11).
Each country should define the recommended age of administration, but which should not be viewed as a cut-off point after which MenACV can no longer be administered. Instead:

- all children should receive vaccination at the national recommended age (for example, 9, 15 or 18 months);
- any children who missed vaccination at the recommended age should be vaccinated as soon as possible thereafter; they will then be included in the coverage calculation, as appropriate, even if the vaccination is delayed (as non-timely vaccination).

**BOX 3: KEY CONSIDERATIONS REGARDING IMMUNIZATION AND HEALTH SERVICES IN THE SECOND YEAR OF LIFE (2YL)**

1. **An increasing number of vaccine doses are recommended to be given after one year of age as part of a life course approach to vaccination.** In addition to MenACV, WHO global recommendations for doses of childhood vaccines to be given after one year of age include a second dose of measles-containing vaccine (MCV) and booster doses of diphtheria-, tetanus- and pertussis-containing vaccines. Additionally, countries may choose to adopt a 2+1 schedule for pneumococcal conjugate vaccine (PCV) in which the third dose can be administered in the second year of life.

2. **The extension of the vaccination schedule beyond infancy means that the concept of a fully immunized child (FIC) indicator must be expanded in the second year.** FIC should be specific to the age of the child and the corresponding set of vaccines that the child should have received, as per the national schedule, by that age. Programmes may choose to track FIC in two or more age categories: FIC<1, FIC<2, FIC<5, etc.

3. **Concerted efforts, including strong communication and health-worker capacity-building, are needed to change conventional thinking that immunization is just for infants.** If high levels of coverage in the second year of life and throughout the life course are to be achieved, then health workers, caregivers, communities and partners must have a solid understanding of why it is important and what they themselves can do to make it happen. This requires a major shift in thinking and practices by all parties involved.

4. **Whereas children should be vaccinated as soon as they are eligible, those who are brought late should not be denied vaccination.** Timely vaccination is crucial for reducing exposure to vaccine-preventable diseases but, with a few specific exceptions, it is better to vaccinate late than never. For 2YL vaccination, the age of 24 months should not be viewed as a cut-off point after which children are not vaccinated.

5. **Achieving high coverage in the second year of life, even with vaccines that have long been part of the vaccination schedule, requires even more attention, visibility and preparation as for introducing a new vaccine, and should not be taken lightly.** Areas requiring special attention include: data management/monitoring and evaluation; communication and health-worker capacity-building, including supportive supervision and other forms of post-training support.

6. **Data management, monitoring and evaluation for vaccination in the second year of life pose particular challenges.** Tally sheets and other data-management tools must be updated carefully to correctly capture all doses administered (even if the doses are not timely).

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**Adapted from,** Establishing and strengthening immunization in the second year of life: practices for vaccination beyond infancy, Geneva, World Health Organization, 2018 (http://www.who.int/immunization/programmes_systems/policies_strategies/2YL/en/).
and to encourage health-worker to properly screen, record and report doses administered. It will facilitate good vaccine management and estimation of needs. Monitoring progress across at least two birth cohorts and providing meaningful feedback can be challenging. Careful planning and learning from experience to date is needed to address these issues.

7. **Vaccination in the second year of life can serve as a platform for providing other essential services to children and mothers.** If carefully coordinated with other programmes, immunization services can reinforce and stimulate the uptake of other health services, such as growth monitoring and promotion, nutritional counselling, vitamin A and micronutrient supplementation, deworming, health education and family planning, malaria prevention and follow-up on early infant diagnosis of HIV/AIDS. Each country must assess the timing and schedules of these services and determine the feasibility of integration based on an examination of the human, material and financial resources needed.

The WHO Guide *Establishing and strengthening immunization in the second year of life: practices for vaccination beyond infancy* provides useful references on various aspects related to the introduction of a new vaccine into the 2YL, or strengthening of an existing platform. It includes some of the topics addressed in this guide, such as, policy reform, monitoring tools, microplanning, training and communication.

**BOX 4: COADMINISTRATION AND MULTIPLE INJECTIONS AT ONE VISIT**

Coadministration of MenACV was evaluated and found to be safe with diphtheria toxoid, tetanus toxoid, whole-cell pertussis, hepatitis B, *Haemophilus influenzae* type b, poliovirus, yellow fever, measles and rubella vaccines.

There is currently no data for coadministration with rotavirus vaccine, pneumococcal conjugate vaccine or inactivated poliovirus vaccine (IPV). However, there is no reason to expect vaccine interference and absence of data should not discourage coadministration.

Programmatically, MenACV should be simultaneously administered with MCV1 and yellow fever (YF) or MCV2, if eligible.

Multiple injections at one visit can be done as indicated in WHO recommendations. Ideally, injections should be administered in separate limbs, where possible. For three or more injections, WHO recommends separating the injections by at least 2.5 centimeters (approximately 1 inch) to differentiate local reactions.\(^\text{14}\)

For additional resources on the safety and acceptability of multiple injections, see (http://www.who.int/immunization/programmes_systems/policies_strategies/multiple_injections/en/).
Linking routine introduction with mass preventive or catch-up MenACV campaigns

As explained before:

- A country which has not yet started the MenACV rollout should both conduct a mass preventive campaign, targeting the 1–29 year old population, and introduce into RI programme. In such cases, there is no need for a catch-up campaign.

- A country which conducted a mass vaccination campaign in the past should introduce the MenACV into the RI programme no more than five years after completion of the mass campaign with a catch-up campaign to immunize birth cohorts born since the initial mass vaccination. This is typically for countries that had a mass campaign before MenAfriVac 5 mcg* was licensed and the WHO recommendations pertaining to routine use were issued.

Hence, the introduction into RI systematically comes with a campaign, either the mass preventive one (targeting 1-29 year olds) or the catch-up campaign. This section deals with scheduling the time of the campaign with regard to the timing of the RI introduction. It applies similarly for the mass preventive campaign (if introduction into RI is done concomitantly) and for the catch-up campaign (if the mass preventive campaign was conducted in the past).

The timing of the MenACV campaign will depend on the age at RI, with the priority objective not to miss any child. In this spirit, there will be circumstances under which children may receive two doses of the MenACV because of the timing of the routine and the campaign. In such cases, it should be ensured that there are at least eight weeks between the administration of two MenACV doses (as per SAGE recommendations).

<table>
<thead>
<tr>
<th>Target age of child for RI dose</th>
<th>Timing of catch-up / mass campaign</th>
<th>Target of campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 months of age</td>
<td>3 months [3–4 months] after RI introduction</td>
<td>In all instances: the catch-up campaign should target all children ≥ 12 months of age AND born less than one year before the initial mass campaign</td>
</tr>
<tr>
<td>15 months of age</td>
<td>3 months [2–3 months] before RI introduction</td>
<td></td>
</tr>
<tr>
<td>18 months of age</td>
<td>6 months [3–6 months] before RI introduction</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Link between introduction and catch-up MenACV campaign (or mass campaign if not previously conducted)

Example: if the target age for MenACV is nine months, the catch-up campaign should be conducted theoretically exactly three months, and in practice three to four months, after the introduction of MenACV into RI programmes. The catch-up campaign should target all children from one year of age to those born one year before the initial mass campaign.
The rationale and options for the choice of the period between the launch of the RI introduction and the catch-up campaigns are illustrated in Figs. 6 and 7.

<table>
<thead>
<tr>
<th>Age of children at the time of the campaign (in month)</th>
<th>5 6 7 8 9 10 11</th>
<th>Vaccinated during the campaign 6 months later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of each child the day of introduction into routine, 6 months after the campaign</td>
<td>11 12 13 14 15 16 17</td>
<td>Will be vaccinated in RI when 18 mth old</td>
</tr>
<tr>
<td></td>
<td>18 19 20 21 22 23 24 25</td>
<td>Vaccinated during the campaign</td>
</tr>
</tbody>
</table>

**Fig. 6. Rationale for the linking of campaign and RI introduction when vaccine is introduced at 18 months of age**

Example: a seven months old child at the time of the catch-up campaign will not be targeted by the catch-up campaign; however, she/he will have the opportunity to be vaccinated at 18 months of age through RI programme.

<table>
<thead>
<tr>
<th>Age of children at the date of introduction into RI (in months)</th>
<th>2 3 4 5 6 7 8 9 10 11 12 13 14 15 16</th>
<th>Will be vaccinated in RI when 9 mth old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of each child at time of campaign, 3 months after introduction into RI</td>
<td>5 6 7 8 9 10 11</td>
<td>Will be / Have been vaccinated in RI when 9 mth old</td>
</tr>
<tr>
<td></td>
<td>18 13 14 15 16 17 18 19</td>
<td>Vaccinated during the campaign</td>
</tr>
</tbody>
</table>

**Fig. 7. Rationale for the linking of campaign and RI introduction when vaccine is introduced at nine months of age**

Example: A child who is 13 months old when MenACV is introduced into RI programme is above the target age for RI, and will be vaccinated through catch-up campaign three months later when she/he will be 16 months old.

**Geographical scope of introduction into routine and for catch-up campaigns**

- Based on country-specific epidemiology and following a risk assessment, the mass vaccination campaigns are conducted nationwide or in high-risk areas only.
- Unless there are compelling reasons to do otherwise, it is assumed that catch-up campaigns will be conducted in the same areas as initial mass campaigns.
When making decisions regarding the scope of the RI introduction into the national immunization programme, the following additional elements can be taken into consideration.

- Complexity of implementation: if introduced only in high-risk areas, it could be a challenge to implement different vaccination schedules within the same country.
- Equity: public perceptions of inequity could arise with regard to different vaccination schedules in different parts of the country.
- Change in epidemiology: climate variability could result in the evolution of high-risk areas in the country (that is, extension of the meningitis belt), since epidemic risk is highly related to climatic conditions.
- Cost: even when supported by Gavi funding, vaccines for RI programmes are still partly financed by the national budget as per the Gavi co-financing policy (with a co-financing increase for countries transitioning up to total domestic financing), and cost-effectiveness use of domestic resources should be considered in designing the most appropriate programme.
- Contribution to regional efforts: nationwide introduction might also benefit neighbouring countries (for example, enhancing herd protection and maintaining the benefits of the initial mass campaigns).

Decision-making at country level

It is important to have a systematic and transparent process for making a decision about introducing MenACV into the national immunization programme. The national immunization technical advisory group (NITAG) or an equivalent independent country advisory body, if functioning, should be requested to undertake a rigorous review of the evidence and make an independent recommendation to the national government. Many aspects are to be considered by the NITAGs pertaining to vaccine and immunization characteristics, disease, economic and operational considerations, health policy and programmatic issues and possibly others.  

To this end, the NITAG should first define the recommendation framework and prioritize outcomes and other criteria to be considered in developing the recommendation. Among

15 A generic list of key elements to be considered when developing an immunization recommendation is accessible on the NITAG Resource Centre at (http://www.nitag-resource.org/uploads/media/default/0001/02/09e7f0a8c4596e3fbc789e170859ead3be1c9ff6.pdf).
others, some aspects that are specific to MenACV and may be of high interest for consideration include the following:

- the epidemic potential of the disease prevented by the vaccine;
- the regional recommendations and the contribution to the regional effort to eliminate NmA epidemics;
- the age of administration in the RI schedule, depending on other programmatic considerations, including potential impact and opportunities arising if the decision is made to administer along with MCV1, or by establishing/strengthening a 2YL immunization platform;
- the affordability and availability of conjugate vaccines protecting against a wider range of serogroups;
- the complementary actions to undertake to further control meningitis epidemics.

The frequently asked questions (FAQ) section of this guide addresses some specific issues pertaining to decision-making (pages 53-56).

Once the recommendation framework is established, the NITAG secretariat and/or working group in charge of preparing this recommendation, should search, assess and synthesize evidence. Relevant evidence is likely to include local, regional and global information and data. A portion of resources that can be useful for the NITAG can be found on the NITAG Resource Centre (www.nitag-resource.org). A full review of evidence by the Strategic Advisory Group of Experts (SAGE) on immunization has resulted in the WHO recommendation. The SAGE material is available (see page 11) and full systematic reviews do not need to be repeated.

The recommendation from the NITAG (and the decision from the Ministry of Health) should consider both the introduction into RI and the link with (mass or catch-up) campaigns. It should detail the target population for RI and for the campaign (age, geographical area, etc.).

As with other considerations pertaining to the national immunization programmes and policies, the national government will ultimately make the decision about MenACV introduction.
CHAPTER 2

Planning and implementation
Which plans and tools should be made or revised?

While some features are very specific to the MenACV, the overall process to plan and prepare its introduction into the national immunization programme should follow the general principles and guidelines for introduction of any new vaccine.

**Comprehensive multi-year plan (cMYP)**

Once introduction of the MenACV into the routine immunization programme is under consideration, the national comprehensive multi-year plan for immunization (cMYP) should be updated accordingly. Beyond cMYP, to ensure sustainability and consistency, key elements of the introduction should be incorporated in all strategic and programmatic plans and documents, such as the annual work plans and the national health plan.

**Introduction plan**

A detailed introduction plan needs to be developed. The plan should outline all activities and steps required for a successful introduction by programme component, identify government departments, institutions or external partners that are responsible for each activity, and include a timeline and detailed budget.

The WHO guide *Principles and considerations for adding a new vaccine to a national immunization programme*, provides a detailed outline for an introduction plan, as well as useful checklists and tools.

**Monitoring tools and information systems**

Update of monitoring tools should be anticipated to ensure that they all include MenACV well ahead of the date of introduction.

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WHO has published a *Handbook on the collection, assessment and use of immunization data*, a useful resource to guide programmes on how to improve and strengthen their monitoring systems and make better use of the data produced. As for every new vaccine introduction, all recording and reporting tools used for immunization should be adapted. This is an opportunity, if needed, to make general improvements to the tools and monitoring system.

Monitoring tools to update include:

- home-based records (HBR), for example, immunization (vaccination) cards, child health cards, mother child booklets or health passports;
- facility immunization registry;
- tally sheets;
- reporting forms;
- bulletins or feedback templates;
- other forms and databases related to disease surveillance, monitoring of AEFI and tracking systems for immunization coverage;
- electronic computing systems, such as, stock management tools, district health information software 2 (DHIS2), health management information systems (HMIS), etc.

Various components of the logistics management information system, such as vaccine order forms and stock records, and any other forms that list the vaccines provided by the national immunization programme should also be updated.

If MenACV is scheduled to be given at 15 or 18 months and is the first vaccine to be introduced in the 2YL, this will likely add an extra layer of complexity for data recording and reporting, so documents should include space for doses in the 2YL. This may also necessitate the creation of new registers for children aged above one year. For more detailed guidance on recording, reporting and use of data for 2YL vaccines in particular, please see the WHO guide, *Establishing and strengthening immunization in the second year of life: practices for vaccination beyond infancy*.

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All doses, regardless of when they are given, should be recorded on the above monitoring tools according to the age at which the child actually received the vaccines. It is recommended that the MenACV tally sheet tracks the doses given by age group, as this is the best way to monitor timely vaccination, while still allowing health workers to record vaccinations that are provided late.

All revised recording and reporting tools should be available in all health facilities before introduction of MenACV.

**National guides**

Existing national guides for immunization need to be updated accordingly to take into account MenACV vaccination.

**Microplanning**

Adequate microplanning is essential at the district level prior to introduction. Because population movements can be significant and local circumstances may have changed, it is important to verify estimates of the eligible population at the district level for each district in the country.

In many countries, microplanning tools currently in use are designed to support planning for vaccination in the first year of life. If MenACV is introduced during 2YL, microplanning tools must be revised and expanded to include the second year cohort aged 12–23 months. The target population is surviving infants from the birth cohort of the previous year.
Coordination

Once the decision to introduce the vaccine is made, it is important to strengthen or set up a coordination mechanism and this is typically done through the interagency coordination committee (ICC) and its technical sub-committees.

The coordination committee should monitor activities during the planning, implementation and evaluation phases and provide appropriate guidance and orientation when any gap arises. Coordination committees should ensure that regular meetings are planned and held and that minutes are shared with all participants.

The Ministry of Health should ensure that the NIP works closely with other programmes, such as reproductive and child health, nutrition and non-communicable diseases, as these programmes target children beyond one year of age and can bring valuable experiences for targeting those age groups. The Ministry of Education should also be involved, through the ICC and its technical committees, for countries targeting children 15 months and beyond.

Key vaccine characteristics

As explained above, the MenACV which is prequalified by WHO for RI use is MenAfriVac 5 micrograms®. The key characteristics of this formulation, such as packaging, presentation, storage and handling are summarized in Tables 2 and 3. Characteristics of the formulation to be used for the campaign are also indicated for the sole purpose of comparison, so as to make the differences clear.
<table>
<thead>
<tr>
<th>Trade name</th>
<th>MenAfriVac*</th>
<th>MenAfriVac 5 micrograms*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vaccine type</strong></td>
<td>Subunit vaccine</td>
<td>Subunit vaccine</td>
</tr>
<tr>
<td></td>
<td>Meningococcal A conjugate vaccine Lyophilized</td>
<td>Meningococcal A conjugate vaccine Lyophilized</td>
</tr>
<tr>
<td><strong>Composition of one dose (0.5 mL)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Active substances</strong></td>
<td>Purified polysaccharide from Group A <em>Neisseria meningitidis</em> 10 µg</td>
<td>Purified polysaccharide from Group A <em>Neisseria meningitidis</em> 5 µg</td>
</tr>
<tr>
<td></td>
<td>Tetanus toxoid (carrier protein) 10–33 µg</td>
<td>Tetanus toxoid (carrier protein) 5–16.5 µg</td>
</tr>
<tr>
<td><strong>Diluent</strong></td>
<td>Each ampoule contains the diluent with aluminium phosphate as adjuvant and thiomersal as preservative. The diluent is a white slightly opaque homogeneous suspension presented as 5 mL ampoule.</td>
<td>Each ampoule contains the diluent with aluminium phosphate as adjuvant and thiomersal as preservative. The diluent is a white slightly opaque homogeneous suspension presented as 5 mL ampoule.</td>
</tr>
<tr>
<td><strong>Disease protection</strong></td>
<td>Invasive meningococcal disease caused by group A <em>Neisseria meningitidis</em> only</td>
<td>Invasive meningococcal disease caused by group A <em>Neisseria meningitidis</em> only</td>
</tr>
<tr>
<td><strong>Method of administration (One 0.5 ml dose out of a decadose vial)</strong></td>
<td>Intramuscular injection</td>
<td>Intramuscular injection</td>
</tr>
<tr>
<td><strong>Shelf-life</strong></td>
<td>36 months at 2–8 °C (active) 42 months at 25°C (diluent)</td>
<td>36 months at 2–8 °C (active) 42 months at 25°C (diluent)</td>
</tr>
<tr>
<td><strong>Use in a controlled temperature chain (CTC)</strong></td>
<td>Up to four days at ambient temperatures not exceeding 40°C</td>
<td>Not yet approved for CTC use</td>
</tr>
<tr>
<td><strong>Presentation and type of vaccine vial monitor (VVM)</strong></td>
<td>Decadose: using 0.5mL vial of lyophilized vaccine and a 5mL ampoule of diluent, 10 doses of PsA-TT conjugate can be reconstituted. VVM30</td>
<td>Decadose: using 0.5mL vial of lyophilized vaccine and a 5mL ampoule of diluent, 10 doses of PsA-TT conjugate can be reconstituted. VVM30</td>
</tr>
<tr>
<td><strong>WHO recommendations</strong></td>
<td>Routine or campaign</td>
<td>Campaign</td>
</tr>
<tr>
<td></td>
<td>Vaccine schedule</td>
<td>Single dose, age 1–29 years</td>
</tr>
<tr>
<td></td>
<td>Handling open vials</td>
<td>Should follow the guidelines of the WHO multi-dose vial policy</td>
</tr>
</tbody>
</table>

**Table 2. Summary of MenAfriVac 5 micrograms* characteristics and schedules**
<table>
<thead>
<tr>
<th>MenAfriVac®</th>
<th>MenAfriVac 5 micrograms®</th>
</tr>
</thead>
</table>

**Same diluent**

**Different** cap colour: silver versus copper

**Different** label colour: brown versus pink

**Table 3. Meningococcal A vaccine presentation**
Logistics and vaccine management

How to forecast and calculate vaccine supply needs?

In general, MenACV should follow the standard procedures for vaccine supply and be integrated with other vaccines (calculation of needs, procurement and ordering mechanisms, stock-management system, etc.). Vaccine orders must be timed so that the supply is not disrupted.

Doses required for the annual supply are based on the size of the target population, estimates of vaccine coverage and vaccine wastage. As the regimen is a single dose, the simple formula below can be used.

\[
\text{MenACV doses required} = \text{Estimated size of target population} \times \text{Expected coverage} \times \text{Wastage factor}
\]

- Estimated size of population is the size of the birth cohort.
- Expected coverage is the targeted coverage for MenACV, based on national considerations, including NIP vaccines coverage.
- Wastage factor is \(1 / (1 - \text{wastage rate})\): with an average expected wastage rate of 50%, the wastage factor is 2.0. A 50% wastage rate is a standard proposed rate. This should be adjusted based on anticipated wastage rate.

In the forecasting of vaccine needs, buffer stock should be considered to cover unexpected delays in shipments and fluctuations in demand. This rolling buffer stock should be made prior to the launch of the vaccine.

Which cold-chain capacity is required?

Cold-chain and storage requirements should be considered in the introduction plan

1. The plan to introduce the vaccine should include the calculation of space requirements and cold-chain equipment at the national, departmental/district/health areas/municipal levels right down to the vaccination rooms at service-delivery points. The data on additional storage requirements are based on the dosage presentation and characteristics of MenACV plus the vaccines already in use. The calculation should
include an evaluation of storage and transport capacity for vaccines at each level of the cold chain, determining the need for additional equipment. This evaluation offers an ideal opportunity to update the national cold-chain inventory by type of equipment and operating condition.

2. While they do not require cold-chain storage, sufficient room space should also be available to store the vaccine diluent and injection devices.

3. As a mass preventive or catch-up campaign is planned, along with the introduction of the vaccine into RI programme, the required cold-chain capacity for the campaign should also be considered.

Cold chain and storage requirements for vaccine and diluent:

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Diluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>For MenAfriVac 5 micrograms* the measurement of the secondary packaging is:</td>
<td>The measurement of the packaging for the diluent is:</td>
</tr>
<tr>
<td>• Box: 50 vials of 10 doses (500 doses)</td>
<td>• Box: 50 ampoules (500 doses)</td>
</tr>
<tr>
<td>• Length: 18.5 cm</td>
<td>• Length: 10.5 cm</td>
</tr>
<tr>
<td>• Width: 9.5 cm</td>
<td>• Width: 8.7 cm</td>
</tr>
<tr>
<td>• Height: 6 cm</td>
<td>• Height: 17 cm</td>
</tr>
</tbody>
</table>

The packed volume per dose (secondary packaging) is 2.109 cm³\*.

The diluent should be stored at -25°C. In any event it should not be stored at above 40°C.

* The packed volume per dose for the vaccine is calculated as follows:

\[
\frac{\text{Length} \times \text{Width} \times \text{Height}}{\# \text{ vials} \times \# \text{ doses / vial}} = \frac{18.5 \times 9.5 \times 6}{50 \times 10} = \frac{1054.5}{500} = 2.109 \text{ cm}^3 / \text{dose}
\]
BOX 5: EXAMPLE OF CALCULATION OF REQUIRED STORAGE

If, based on the target population, targeted coverage and expected wastage rate, the annual required number of MenAfriVac 5 micrograms® doses is 2 000 000 doses, the equivalent storage volume will be:

2 000 000 x 2.109 = 4 218 000 cm$^3$ or 4218 litres (1 L = 1000 cm$^3$) or 4.2 m$^3$ (1m$^3$ = 1000 L)

The storage volume should then be calculated according to the supply period (for example, six months at central, three months at subnational or one month at service-delivery levels) and buffer stock.

In this case, at central level, the supply period is six months and one month buffer (that is, a total of seven months stock) and the estimated storage volume will be:

4218 litres / 12 months x 7 months = 2460 litres per supply period

There is thus a need for an additional 2460 litres storage capacity in the cold chain for the introduction of MenAfriVac 5 micrograms® vaccine.

BOX 6: CTC FOR CAMPAIGNS ONLY

The thermostability of the MenAfriVac® vaccine allows for the use of a CTC approach. At the time of printing, only the 10 mcg formulation can be used under CTC (that is, for campaigns only). Registration of MenAfriVac 5 micrograms® intended for use in RI does not include approval for storage and use under CTC conditions.

Service delivery

How to organize sessions with schedules including MenACV?

Vaccination sessions for MenACV will be integrated within those organized for infant/toddler immunizations. As with other vaccines, immunization sessions should have all the necessary supplies and materials for effective delivery. Supplies include chair and table,

water and soap, or hand sanitizer, stock of vaccine in vaccine carrier, ice packs, cotton, auto-disable syringes, reconstitution syringes, safety boxes with closed lids, waste bags for garbage and information, education and communication (IEC) materials. All forms and monitoring tools should be brought to every vaccination session, including the vaccination register, tally sheets, vaccination cards and AEFI forms.

Vials should be opened, even if only one child is eligible to receive MenACV at the vaccination session (see below for management of open vials).

**Instructions for use**

**Vaccine reconstitution**

MenAfriVac 5 micrograms® is presented as a white vaccine pellet in a vial, with sterile diluent in a separate vial.

- The diluent and reconstituted vaccine should be inspected visually for any foreign particulate matter and/or variation of physical aspects, prior to administration. In the event of either being observed, the diluent or reconstituted vaccine must be discarded.

- The vaccine must be reconstituted by adding the entire contents of the specific diluent (5 ml to 10-dose vial) to the vial containing the pellet using a new reconstitution needle and syringe.

- Only the diluent provided with the vaccine must be used for reconstitution. After the addition of the diluent to the pellet, the mixture should be shaken well until the pellet is completely dissolved in the diluent.

- A new sterile syringe and sterile needle should be used to administer each dose of the vaccine. After reconstitution, the vaccine should be used promptly.

- Management of an open vial should follow the guidelines of the WHO multi-dose vial policy.²²

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BOX 7: DO NOT CONFUSE DILUENTS!

It is important to avoid confusion of the MenAfriVac® diluent with that of other vaccines during coadministration.

To note, the diluent to be used for MenAfriVac® contains a preservative and should absolutely not be used for reconstitution of live vaccines, such as measles, mumps, rubella or yellow fever vaccines, which are to be reconstituted only with the diluent supplied, free of preservatives or other antiviral.

Vaccine injection

Injection of MenACV should follow the general practices for safe injection.

The entire contents of the syringe should be injected by deep intramuscular injection using a perpendicular 90 degree angle:

- in the anterolateral aspect of the thigh for children under 15 months (the deltoid muscle of the upper arm is not safe to use since it is not developed enough to absorb the vaccine and the radial nerve is close to the surface);
- in the deltoid muscle which may be used in older children.

Vaccine disposal and waste management

As part of the pre-introduction assessment, countries should assess the additional waste-management needs with the new vaccine and determine whether their current waste-management system is able to cope with this increase, or whether adjustments are needed (for example, incinerators need to be repaired or expanded, or additional ones need to be built).

The roll-out and procurement of health-care waste-management/disposal systems could be planned within the cMYP and introduction plans.
Training and supervision

Training

As with any other vaccine, successful introduction of MenACV requires comprehensive training activities geared to personnel at all levels of the immunization programme. The training agenda should be adapted to the various targets.

If well prepared, a two-day training should be sufficient to cover the necessary background information, operational issues and hands-on practice. Ideally, the training for MenACV introduction would be included as a part of any regular annual or refresher training for health workers.

Linking training with an annual microplanning activity can also build efficiencies and allow for more integrated planning of vaccine delivery.

BOX 8: KEY TOPICS TO BE ADDRESSED DURING TRAINING

Some key topics to address during training should include, among others:

- the difference between MenAfrivac® (10mcg) and MenAfriVac 5 micrograms®: age indication, use for campaigns versus use for routine immunization programme, no indication for use under CTC approach for MenAfriVac 5 micrograms®;
- vaccine storage and administration (type of injection, injection site etc.);
- age of eligibility and handling of over-age children (for example, any children who missed vaccination at the recommended age should be vaccinated as soon as possible thereafter);
- emphasis on policy to open a vial for just one child, according to updated national policies;
- emphasize reducing missed opportunities for vaccination (MOVs) as well as country guidance on catch-up vaccination of missed doses;
- open-vial policy and vaccine management;
- coadministration with other vaccines;
- recording and reporting tools;
- interpersonal communication with parents, especially if vaccine administered during 2YL (for example, parents visiting the clinic for other reasons may need to be made aware of this new vaccine and the need for it);
- dealing with refusals and hesitancy;
- side-effects and AEFI.
Supportive supervision

After MenACV is introduced, implementation should be periodically monitored through supportive supervision that includes on-the-job training. It is critical to have supportive supervisions in the months immediately following introduction.

Supervisor schedules and integrated checklist tools should be adapted to include MenACV. Staff should be specifically asked about vaccine coverage with MenACV and any problems (supply or demand) that they face with this vaccine. If MenACV administration is scheduled for the second year of life, the checklist can also include questions specific to the 2YL platform.

Acceptance and demand for MenACV: service quality, advocacy, communication and social mobilization

Generating acceptance and demand for MenACV relies on factors that aim to ensure that parents, caregivers, communities and key stakeholders:

- understand the risk of meningitis and value vaccination;
- trust the safety and effectiveness of the vaccines;
- are confident in the quality and reliability of immunization services;
- have the necessary information, capacity and motivation to seek vaccination on a timely basis.

Activities to generate acceptance and demand should be based on local data and should be tailored and targeted effectively for all communities.

Demand generation

There are five main activities that can help increase MenACV acceptance and demand. Examples include the following.
1. Service-quality enhancements: ensuring that front-line workers are competent and confident, are offered supportive supervision for corrective adjustments and to improve motivation, and are tailoring service delivery to meet local community needs.

2. Engaging communities (see below): increasing knowledge, attitudes and intentions to get vaccinated through communications-based interventions, creating and reinforcing social norms for vaccination in the 2YL (if relevant) and providing behavioural nudges or prompts to parents/caregivers, such as through text reminders.

3. Managing risks and building resilience: ensuring preparedness and response to severe AEFIs and vaccine-related events (for example, crisis communication planning) and engaging proactively with the media, including briefings on any important announcements or changes to the programme.

4. Building political will: mobilizing key influencers, such as paediatricians, medical and professional associations, parliamentarians and traditional/religious leaders and others to advocate for immunization and to help generate demand, working with local civil-society organizations to engage communities.

5. Generate and use social data for planning: using available tools to better understand barriers, and facilitators, to demand, to inform the design and evaluation of effective interventions.

Given the unique considerations for MenACV and recommended age for administration of MenACV, many interventions to generate demand will also involve making adjustments on the supply side. In particular, this requires a focus on service quality enhancements, the capacity of front-line health workers to communicate and engage effectively with caregivers and communities, and the involvement of communities in the planning and delivery of services so that they are responsive to local needs.

Demand generation interventions also help to build public trust and community resilience that can mitigate the potential negative impacts of vaccine-related events (such as AEFIs) or rumours and misinformation. Strong links between service-delivery and demand-generation activities are also vital to ensure equitable access and utilization of immunization services across all social and economic groups.

**A demand generation or IEC plan**

A demand generation or Information Education and Communication (IEC) plan should be prepared to encompass a range of activities across the five areas described above. Supporting materials should target several specific audiences, with specific key messages
for each, including caregivers and families, health-care workers, mid-level managers/supervisors, community health workers, community leaders and politicians, the media and professional/medical associations. The preparation of IEC materials for MenACV introduction is a useful opportunity for promotion of the value of vaccination in general and to invest in the training of health workers on interpersonal communication skills. The plan should also include a section on monitoring and evaluation, to assess the outcomes and impact of the interventions implemented.

Details on developing a comprehensive set of advocacy, communications and social mobilization activities for a new vaccine introduction can be found in section 3.8 of the WHO guide *Principles and considerations for adding a new vaccine to a national immunization programme: from decision to implementation and monitoring*.

### Which key messages should be addressed?

Examples of key messages for MenACV, to be refined for increased relevance in specific settings include:

- Meningitis is a devastating disease that may kill one in ten people infected, leaving one-quarter of survivors with severe disabilities, such as loss of limbs, blindness, paralysis and brain damage. Meningitis can affect people of all ages and cause death within 24 hours.

- Many germs can cause meningitis and, for decades, it was most often meningitis A that caused epidemics in the meningitis belt.

- Now there is a safe effective vaccine to protect against meningitis A. Vaccination with MenACV is the safest way to protect your child against this disease.

- Protecting your child from meningitis and other illnesses will also protect your family from the expenses that would occur if your child got meningitis.

- All babies should be vaccinated at 9 or 15 or 18 months-of-age (depending on country schedule).

- MenAfriVac® is very safe and causes no major side-effects.

- MenACV is available free-of-charge at your local health facility.

- The government supports MenACV vaccination and has added it to the national immunization programme. With this new vaccine, your child will receive more protection than ever. The vaccination card of the child should be presented to the health worker before every immunization.
If the selected schedule for MenACV is to administer at 15–18 months (with or without MCV2), the targeted communication strategy should also consider specific messaging on the importance of immunization in the second year of life. Creating demand for, and promoting utilization of, immunization services in the 2YL, may require changing attitudes and beliefs that immunization is only for infants. Health workers, caregivers, communities and partners must all have a solid understanding of the value of vaccination beyond the first year and throughout the life course, why it is important and what they themselves can do to achieve high coverage in this age group. This requires a major shift in thinking and practices by all parties involved. The 2YL visit should be positioned as part of a continuum of care for the entire first five years of the child’s life.

Additional guidance on this, including key messages to support 2YL vaccination, can be found in chapter 9 of the WHO resource on *Establishing and strengthening immunization in the second year of life: practices for immunization beyond infancy*.

### Defining locally relevant messages

Local context and data should drive the development messages and the way they are channelled; including consideration of culture, language and literacy of the target audience. Messages must be clear, simple and accurate.

Formative research, including focus-group discussions and key informant interviews, may be needed to develop and test messages about MenACV vaccination.

### Community engagement

In general, demand generation interventions developed in partnership with communities, are sound investments to help increase and sustain high coverage, reduce drop-outs, improve timeliness, reduce missed opportunities to vaccinate and increase community ownership of, and trust in immunization.

Engaging communities in support of the introduction of MenACV is especially important, as it involves a change in the immunization schedule. It is essential to ensure involvement, interaction and dialogue between community members and groups, and caregivers and front-line health providers.

Some activities can include the following:
Establish alliances with local governing institutions and actively engage community leaders and community representatives in every step of communication microplanning for the MenACV introduction.

Develop strategic partnerships with grassroots organizations that are already working with communities to conduct communication activities.

Establish feedback mechanisms and make sure to provide updates or responses to community grief or suggestions regarding quality and other aspects of the vaccination services.

Establish strong connections with local channels, such as radio, social media and the community to ensure participation and involvement of community representatives.

Reducing missed opportunities for vaccination

Missed opportunities for vaccination (MOV) occur when an individual comes into contact with health services, for any reason, but does not receive one or more vaccines for which they are eligible. Awareness of potential MOV, and implementing strategies to reduce them, can increase immunization coverage and reduce equity gaps. The introduction of MenACV offers an additional opportunity to improve health-worker knowledge about MOV and steps they can take to reduce them. These include, reminding health workers to routinely screen the vaccination status of children, including at non-vaccination visits, and advising them on how best to refer children who are not up-to-date with their vaccination(s). These efforts can lead to an increase in vaccine uptake and changes can also lead towards improving integration between prevention and treatment/curative services.

Opportunities for the integration of MenACV delivery with other vaccinations and health services

To improve the efficiency of health-service delivery, it is practical to consider administration of MenACV with other vaccines, or with the delivery of other health services. The decision to introduce MenACV into RI presents opportunities to link with other programmes and

Interventions,\textsuperscript{24} including establishment or strengthening of a 2YL immunization platform. The possibilities include the following.

- Integrating RI MenACV dose given at 15–18 months with the delivery of a Penta/DTP booster and measles or measles-rubella second dose (MCV2); this opportunity can also be integrated with the distribution of long-lasting insecticide treated bed nets for malaria control.

- If pneumococcal conjugate vaccine (PCV) is administered using the 2+1 schedule (first two doses before six months of age), MenACV can be administered with PCV3 at 9–18 months of age.

- School-entry screening and school-based vaccination of boys and girls (defaulters) with MenACV (and any other vaccines missed) and with Td boosters. As these interventions are school-based, collaboration with the Ministry of Education and schoolteachers will be important.

- Integration with vitamin A supplementation in communities where vitamin A deficiency is a public-health problem (vitamin A is given every six months to children aged 6-59 months old).

- Integration with deworming which is recommended every year for children 12-59 months in communities with a high burden of worms.

\textbf{Determining special populations and high-risk groups}

Special populations are those that are missed by RI services and include the hard-to-reach and underserved, among others. Disease burden tend to be disproportionately higher in more marginalized populations; therefore, concerted efforts to reach more people within these groups will not only realize a greater degree of equity, but will also achieve a greater health impact and contribute to economic development.

Many African meningitis belt countries, including those with high MCV1 coverage, face challenges of coverage inequity in their populations. In 2018, around 5 million infants in meningitis belt countries failed to receive MCV1 through RI services. Introduction of MenACV in RI provides an excellent opportunity to address coverage inequity issues, as well as to contribute to achieving regional elimination targets by finding and immunizing high-risk populations otherwise missed by RI. In under-vaccinated population groups, it is important to understand the reasons for under-vaccination and to respond with tailored strategies.

\textsuperscript{24} For more on integration of immunization with other services, see Working together: an integration resource guide for immunization services throughout the life course. Geneva, World Health Organization, 2018 (https://apps.who.int/iris/bitstream/handle/10665/276546/9789241514736-eng.pdf?ua=1).
Special populations include:

- urban poor populations;
- remote, difficult to reach (for example, inhabiting difficult to access terrain, such as mountainous) and nomadic populations;
- persons living in areas of civil conflict or insecurity;
- undocumented urban settlers/squatters;
- migrant populations;
- populations in areas near international and internal borders;
- refugees, internally displaced persons and other transient populations;
- politically and/or socially marginalized populations or minority groups;
- populations known to have a disproportionate share of the disease burden.

These populations are likely to miss vaccinations, even in the presence of robust RI programmes, unless special considerations are made and effective strategies developed to reach them. WHO has provided guidelines to countries for reaching the underserved and hard-to-reach populations\textsuperscript{25,26}.

\textsuperscript{25} Adapted from, Planning and implementing high-quality supplementary immunization activities for injectable vaccines. Geneva, World Health Organization, 2016.

\textsuperscript{26} For more information, advice and resources on how to address vaccine hesitancy, including tailoring immunization programmes for specific populations, please refer to (http://www.who.int/immunization/programmes_systems/vaccine_hesitancy/en/).
CHAPTER 3

Monitoring and evaluation
Adverse event following immunization (AEFI) management and surveillance

An adverse event following immunization (AEFI) is any untoward medical occurrence, which follows immunization, and which does not necessarily have a causal relationship with the use of the vaccine. If not rapidly and effectively dealt with, AEFIs can undermine confidence in a vaccine and can ultimately have dramatic consequences for immunization coverage and disease incidence.

AEFIs can be classified into five categories.\(^{27}\)

1. Vaccine product-related reaction: caused or precipitated by inherent properties of the vaccine product.
2. Vaccine quality defect-related reaction: caused or precipitated by a vaccine due to one or more quality defects of the vaccine product, including the administration device, as provided by the manufacturer.
3. Immunization error-related reaction: caused by inappropriate vaccine handling, prescribing or administration that, by its nature, is preventable.
4. Immunization anxiety-related reaction: arising from anxiety about the immunization.
5. Coincidental event: caused by something other than the vaccine product, immunization error or immunization anxiety.

**MenACV AEFI**

Predominantly mild and transient local reactions at the injection site of MenAfriVac 5 micrograms\(^{\circ}\) have been reported in less than 9% of infants. Common MenACV reactions that resolve spontaneously without any sequelae and rarely require treatment are:

- redness, pain, swelling, or induration at injection site;
- fever;
- headache, myalgia, arthralgia;
- nausea, vomiting, diarrhoea;
- pruritus, rash, urticaria;
- irritability, lethargy, persistent crying, loss of appetite.

Less common AEFI have been reported such as:

- convulsions;
- syncope, dizziness;
- anaphylaxis.

As will all vaccines, anaphylactic shock may occur in susceptible individuals, hence emergency kits containing 1:1000 adrenaline injections should always be available where vaccination is provided.

Precautions should be taken to avoid vaccinating individuals with previous allergic reactions to vaccine components.

**Monitoring and reporting of AEFI**

The monitoring and reporting of MenACV AEFI should be incorporated into the national AEFI/pharmacovigilance guidelines prior to the introduction. A system should be in place at the local level to facilitate prompt reporting of all AEFIs brought to the notice of the health system after immunization. AEFI that have been identified as serious\(^\text{28}\) should be investigated by national and subnational authorities trained to investigate. During investigation, it is important to collect sufficient detailed information for conducting a causality assessment by a group of experts. An assessment by experts to determine if there is any link between the AEFI and the vaccine/vaccination will help develop communication messages to address rumours. Clear procedures, including the lines of hierarchy, reporting and investigation forms to use and timelines for AEFI reporting, should be in place. Health workers should be specifically encouraged and trained on the recognition of adverse events, completion of the AEFI reporting form and appropriate notification of supervisors and the district health officer, according to established protocols.

Groups opposed to vaccines for any reason may initiate or perpetuate rumours of vaccine safety and spurious associations with coincident adverse events to discourage vaccination in the population. Because misinformation can be detrimental to vaccine acceptability and vaccination efforts, a robust AEFI monitoring infrastructure is essential to dispel rumours and demonstrate continued safety of MenACV.

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\(^{28}\) Death, life threatening, disability, hospitalization, congenital anomaly or a significant medical condition.
Meningitis surveillance

Meningitis surveillance should be strengthened, as necessary, along with the MenACV into RI programmes.

In the African meningitis belt, meningitis surveillance should not be targeted at a single pathogen, but should rather include the three main bacterial causes of meningitis: *N. meningitidis*, *Streptococcus pneumoniae* and *Haemophilus influenzae*.

The surveillance system aims to provide reliable and timely data to:

- detect and confirm cases and outbreaks;
- describe the epidemiology of the disease;
  - assess the case burden and incidence trends;
  - monitor changes in circulating serogroups;
  - monitor the circulation and distribution of specific strains;
  - monitor antibiotic susceptibility of circulating disease causing strains;
- measure the impact of control measures, including vaccine effectiveness and failure;
- identify geographical areas and populations at risk in order to implement and adapt adequate control measures.

Bacterial meningitis surveillance is based on the identification of patients with clinically suspected meningitis. The clinician suspecting the disease is the starting point for inclusion in surveillance, followed by laboratory confirmation. The two main approaches for surveillance include:

- case-based surveillance where individual-level data are reported from sentinel sites;
- enhanced surveillance, within the integrated disease surveillance and response (IDSR) framework, where aggregated district data are reported weekly.

Both systems are extensively described in the *Vaccine preventable diseases surveillance standards* and *WHO-AFRO Standard Operating Procedures for surveillance of meningitis, preparedness and response to epidemics in Africa*. Outbreak response is described in the WHO reference guide, *Managing meningitis epidemics in Africa*.

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31 See page 6.
Vaccine introduction and coverage monitoring

Integration of tools to monitor introduction and coverage

Monitoring tools at the service delivery level should be updated, as described earlier (page 21) for instance:

- home-based records (HBR), such as immunization (vaccination) cards, child health cards, mother child booklets or health passports;
- facility immunization registry;
- tally sheets;
- reporting forms;
- bulletins or feedback templates;
- other forms and databases related to disease surveillance, monitoring of AEFI and tracking systems for immunization coverage;
- electronic computing systems, such as stock-management tools, DHIS2, HMIS, etc.

Supportive supervision visits should also monitor appropriate use and completion of the various tools to improve the quality of data reporting.

Coverage monitoring

Calculating MenACV coverage is necessary for evaluating the performance of a vaccine programme. As with other NIP vaccines, administrative coverage can be supplemented by scheduled coverage surveys together with other vaccines.

MenACV coverage monitoring requires collection of all administered doses in the corresponding age group (for example, <12 m, 12–23 m) and an estimation of the target population, which is the same as for other vaccines recommended at the same age.

A coverage monitoring wall chart for MenACV vaccination should be maintained and displayed in the health facility. The chart should include the target population of children at the health facility or catchment area and record the number of children vaccinated per month, per dose, over time, until the target is reached. Similarly, countries may choose
to monitor with other vaccines recommended at the same age to detect if there are important differences in the uptake of those different vaccines.

**Evaluation**

Global experience with the introduction of new vaccines is now very extensive, and most countries have introduced at least one or more new vaccines in the last 10 years. For these reasons, WHO no longer recommends that all countries should conduct a post-introduction evaluation (PIE) within 6–12 months following national introduction.

More simply, the WHO recommendation is now to combine the assessment of any new vaccine introduction with the next scheduled EPI review or other evaluation opportunity.

**EPI programme reviews**

EPI programme reviews are undertaken every three to five years and should be adapted to include MenACV once it has been introduced.

WHO has recently revised its methodology for conducting EPI review\(^2\) which recommends integrating immunization-related programme assessments, where feasible, in order to promote efficiency. If a MenACV component is to be integrated with the EPI review, the main objectives and critical knowledge gaps regarding MenACV introduction should be considered in the desk review stage so that these issues can be addressed through specific lines of questioning included in the review tools.

Additional modifications may also be required to assess the implementation and identify any problems associated with vaccinating in the second year of life. Guidance on how to integrate new vaccine introduction and 2YL questions into a EPI review is provided in the new methodology.

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Coverage surveys for mass preventive and catch-up campaigns

Coverage surveys should be conducted after mass preventive and catch-up MenACV campaigns. The WHO Vaccination coverage cluster survey: reference manual\(^{33}\) provides general guidance to design and implement a coverage survey.

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Annexes

Annex 1 – Preparedness assessment (checklist)

Annex 2 – Meningitis: case definition/alert and epidemic thresholds/case management

Annex 3 – Frequently asked questions
The checklist aims to guide preparation for the introduction of MenACV into RI once the policy decision is taken (at 9–7, 6–4 and 3–1 months prior to introduction).

## Critical activities

<table>
<thead>
<tr>
<th>1. Were the following components of RI operationally planned before the introduction of MenACV?</th>
<th>9–7 m</th>
<th>6–4 m</th>
<th>3–1 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Vaccine and supplies management.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>b. Waste management.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>c. AEFI surveillance and case management.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>d. Training (including development of training material and a strategy for cascading).</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>e. Demand generation/social mobilization/IEC plan.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>f. Monitoring, reporting and data analysis.</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

| 2. Is there a coordination team at all levels (central, regional, district)? | Yes | Yes | Yes |

| 3. Is there political commitment for supporting the introduction of MenACV into RI at all levels? | Yes | Yes | Yes |

| 4. Do validated action plans at all levels identify target population by region, district health areas, health facilities, vaccination site? | Yes | Yes | Yes |

| 5. Are special strategies planned for geographically hard-to-reach and underserved populations, marginalized, resistant and other special populations? | Yes | Yes | Yes |

| 6. Have opportunities for integration of MenACV delivery with other interventions been considered? | Yes | Yes | Yes |

| 7. Have funds been received and distributed for all planned activities? | Yes | Yes | Yes |

| 8. Have health workers and volunteers been trained? | Yes | Yes | Yes |

## PLANNING, COORDINATION & FUNDING

<table>
<thead>
<tr>
<th>MONITORING &amp; SUPERVISION</th>
</tr>
</thead>
</table>

| 1. Is MenACV integrated in the supervision plan? | Yes | Yes | Yes |

| 2. Are supervisors/monitors informed and trained to take MenACV into consideration in their activities? | Yes | Yes | Yes |

| 3. Have arrangements been made to ensure reporting of coverage and other data, including analysis, to the next highest level, as all the other vaccines in the immunization calendar? | Yes | Yes | Yes |

<p>| 4. Are national RI guidelines and microplanning tools updated with MenACV and distributed? | Yes | Yes | Yes |</p>
<table>
<thead>
<tr>
<th>Critical activities</th>
<th>9-7 m Yes/No</th>
<th>6-4 m Yes/No</th>
<th>3-1 m Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VACCINE, COLD CHAIN &amp; LOGISTICS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Has the cold-chain space been assessed and is there sufficient functional cold-chain capacity and/or contingency plans for vaccine storage that takes into consideration MenACV and the other vaccines of routine immunization?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• refrigerators</td>
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<td></td>
<td></td>
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<tr>
<td>• freezers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cold boxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• vaccine carriers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Do the districts have waste-management plans that clearly describe how, when, where and by whom filled safety boxes will be transported and incinerated/discarded?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Did the districts integrate the increasing capacity of waste management with the introduction of MenACV?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Have pocket guides for vaccinators (and supervisors), forms, checklists, training and communication materials been updated with MenACV and made available?</td>
<td></td>
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<tr>
<td>5. Are the supplies for MenACV introduction and other inputs consistent with target population and expected wastage factors?</td>
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<tr>
<td>• vaccines (target population x wastage factor)</td>
<td></td>
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</tr>
<tr>
<td>• auto disable syringes</td>
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<td></td>
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<tr>
<td>• mixing syringes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• safety boxes</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>DEMAND GENERATION AND IEC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are social mobilization and communication activities being implemented according to plans/microplans for the introduction of MenACV into routine immunization?</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Is the community aware of the introduction of MenACV into routine, including the date and place of the launch of the introduction?</td>
<td></td>
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</tr>
<tr>
<td><strong>BUDGET</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are budgeted action plans at all levels for MenACV introduction into RI developed in line with the cMYP for resource mobilization purposes?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y (Yes)/ N (No)</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

If the MACV is introduced at 15 or 18 months-of-age, it is recommended to complement this checklist with the checklist developed for planning, implementing and strengthening vaccination in the second year of life, available in the 2YL practical handbook.\(^{34}\)

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Annex 2 – Meningitis: case definition/ alert and epidemic thresholds/ case management

This annex provides key information on case definition, epidemiological thresholds and case management. It is extracted from two references documents.

Meningitis case definition

**Suspected meningitis case:**

Any person with sudden onset of fever (>38.5°C rectal or 38.0°C axillary), and neck stiffness or other meningeal signs, including bulging fontanelle in infants.

**Probable meningitis case:**

Any suspected case with macroscopic aspect of cerebrospinal fluid (CSF) turbid, cloudy or purulent; or with a CSF leukocyte count >10 cells/mm³ or with bacteria identified by Gram stain in CSF; or positive antigen detection (for example, by latex agglutination testing) in CSF.

In infants: CSF leucocyte count >100 cells/mm³; or CSF leucocyte count 10-100 cells/mm³ and either an elevated protein (>100 mg/dl) or decreased glucose (<40 mg/dl) level.

**Confirmed meningitis case**

Any suspected or probable case that is laboratory confirmed by culturing or identifying (i.e. polymerase chain reaction) a bacterial pathogen (Neisseria meningitidis, Streptococcus pneumoniae, Haemophilus influenzae type b) in the CSF or blood.
Epidemiological thresholds

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert threshold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 000–100 000*</td>
</tr>
<tr>
<td></td>
<td>Under 30 000</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>3 suspected cases / 100 000 inhabitants / week (Minimum of 2 cases in one week)</td>
</tr>
<tr>
<td></td>
<td>2 suspected cases in one week Or An increased incidence compared to previous non-epidemic years</td>
</tr>
<tr>
<td>Epidemic threshold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 suspected cases in one week Or Doubling of the number of cases in a three-week period e.g. Week 1: 1 case, Week 2: 2 cases, Week 3: 4 cases</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass vaccination within 4 weeks of crossing the epidemic threshold***</td>
<td></td>
</tr>
<tr>
<td>Distribute treatment to health centres</td>
<td></td>
</tr>
<tr>
<td>Treat according to epidemic protocol</td>
<td></td>
</tr>
<tr>
<td>Inform the public</td>
<td></td>
</tr>
</tbody>
</table>

*For district populations with more than 100 000 inhabitants, it is recommended to calculate attack rates by sub-districts containing 30 000 to 100 000 inhabitants.**In special situations such as mass gathering refugees displaced persons or closed institutions, two confirmed cases in a week should prompt mass vaccination.

***If a neighbouring area to a population targeted for vaccination is considered to be at risk (cases early in the dry season, no recent relevant vaccination campaign, high population density), it should be included in a vaccination programme.

Case management

Treat all meningitis cases as quickly as possible, using appropriate antibiotics according to the current national treatment protocol. If possible, perform the lumbar puncture before antibiotic treatment. Start presumptive treatment without waiting for laboratory results.

Recommended treatment for suspected cases of bacterial meningitis during meningococcal meningitis epidemics

- In children aged 0 to 2 months, ceftriaxone 100mg/kg/day IM or IV once daily for 7 days.
- In children older than 2 months, ceftriaxone 100mg/kg/day, once daily (maximum 2g) IM or IV for 5 days.
- In children over 14 years and adults: ceftriaxone 2g/day once daily IM or IV for 5 days.
Patients admitted to health centres with no improvement within 48 hours or with convulsions or in quasi-coma should be transferred to the hospital.

To deal with large-scale meningococcal epidemics in remote areas with little viable infrastructure, single-dose ceftriaxone treatment protocols may be implemented. However, it is essential to ensure community follow-up of cases after 24 hours and refer to a hospital if more appropriate care is needed.

Outside epidemics, the recommended duration of treatment for bacterial meningitis in children of all ages and adults is 7 – 10 days.

For suspected bacterial meningitis during outbreaks of pneumococcal meningitis, and for confirmed pneumococcal meningitis during or outside outbreaks, extending the duration of treatment up to 14 days should be considered.
Annex 3 – Frequently asked questions

Generalities on meningitis disease

• What is meningococcal meningitis?
• What are the symptoms of meningococcal meningitis?
• What is the diagnosis test and treatment for meningococcal meningitis?

Decision-making

• Is it appropriate to introduce the vaccine into the routine programme if there are no confirmed cases of NmA meningitis following mass preventive campaigns?
• Are recent NmC, NmW and NmX outbreaks signs of a replacement of NmA by other serogroups?
• Would it be preferable to introduce a multivalent conjugate meningococcal vaccine into routine?
• Is it preferable to administer the vaccine at 9, 15 or 18 months-of-age?
• How does herd protection work?
• Can use of MenACV into routine increase the coverage of other vaccines co-administered with MenACV?
• Are there any contraindications for administering MenACV?

Generalities on meningitis disease

What is meningococcal meningitis?

Meningococcal meningitis is a bacterial form of meningitis, a serious infection of the thin lining that surrounds the brain and spinal cord. It can cause severe brain damage and is fatal in up to 70% of cases if untreated. Several different bacteria can cause meningitis but Neisseria meningitidis is the one with the potential to cause large epidemics. There are 12 serogroups of Neisseria meningitidis that have been identified, six of which (A, B, C, W, X and Y) can cause epidemics.

The bacteria are transmitted from person-to-person through droplets of respiratory or throat secretions from carriers. The average incubation period (time from acquisition of organism to disease onset) is four days, but can range between two and 10 days. Neisseria meningitidis only infects humans and there is no animal reservoir.

The extended meningitis belt of sub-Saharan Africa, stretching from Senegal in the west to Ethiopia in the east (26 countries in all), has the highest rates of the disease. Before 2010 and the mass preventive immunization campaigns, Group A meningococcus has accounted for an estimated 80–85% of all cases in the meningitis belt, with major epidemics occurring at intervals of 7–14 years. Since then, the proportion of the A serogroup has declined dramatically.
What are the symptoms of meningococcal meningitis?

The most common symptoms are: a stiff neck; high fever; sensitivity to light; confusion; headaches, and vomiting. Even when the disease is diagnosed early, and adequate treatment is started, 5–10% of patients die, typically within 24 to 48 hours after the onset of symptoms. Bacterial meningitis may result in loss of limbs, brain damage, hearing loss, or a learning disability in 10–20% of survivors. A less common but even more severe (often fatal) form of meningococcal disease is meningococcal septicaemia, which is characterized by a haemorrhagic rash and rapid circulatory collapse.

What is the diagnosis test and treatment for meningococcal meningitis?

Initial diagnosis of meningococcal meningitis can be made by clinical examination followed by a lumbar puncture showing a purulent spinal fluid. The diagnosis is supported or confirmed by growing the bacteria from specimens of spinal fluid or blood, by agglutination tests, or by polymerase chain reaction (PCR).

Meningococcal disease is potentially fatal and should always be viewed as a medical emergency. Admission to a hospital or health centre is necessary, although isolation of the patient is not.

Decision-making

Is it appropriate to introduce the vaccine into the routine programme if there are no confirmed cases of NmA meningitis following mass preventive campaigns?

Mass preventive campaigns with MenACV conducted since 2010 have had a dramatic impact at national and regional levels, with a more than 99% decline in NmA meningitis case incidence in vaccinated populations in countries of the meningitis belt. This immediate public-health benefit is due to the overall vaccine effects associating the direct individual protection and the elimination of NmA carriage that induce interruption of transmission and herd-protection.

Thus, for countries that have already conducted mass preventive campaigns, introduction should paradoxically occur at a time when NmA has almost disappeared, precisely because of the impact of the campaigns (conducted in the country and/or neighbouring countries).

Hence, it would then be an unfortunate mistake to consider that absence of cases justifies not introducing the vaccine into RI. In reality, the absence of NmA is proof of the effect of the vaccine, whose impact needs to be sustained.

Risk of NmA should not be misconstrued and policy-makers should not feel complacent about the lack of cases. Delayed introduction of MenACV into the RI programme will result in decreased herd-protection and will generate large and fast-growing pockets of susceptible individuals who have not been in contact with NmA, leading to a high risk of catastrophic resurgence of NmA epidemics.
Are recent NmC, NmW and NmX outbreaks signs of a replacement of NmA by other serogroups?

Before the introduction of MenACV in 2010, NmA caused 80–85% of meningitis cases and epidemics in the countries of the African meningitis belt. NmA epidemics have now been virtually eliminated from this region but, at the same time, cases of meningitis and outbreaks due to other serogroups (NmC, NmW and NmX) continue to be detected. In particular, a new hyper-invasive strain of NmC, which was detected initially in 2013 in Sokoto State, Nigeria, has been the cause of large epidemics. Other pathogens such as *Streptococcus pneumoniae* type 1 have also caused meningitis outbreaks.

An expert group convened by WHO concluded that the re-emergence of NmC\(^{35,36}\) is probably due to natural evolutionary changes in the bacteria, rather than serogroup replacement following MenACV rollout. The reasons behind this conclusion are that: i) NmA carriage outside epidemics before the introduction of MenACV was usually not detectable, or at very low levels, leaving little opportunity for replacement of the bacterium in its ecological niche; ii) large and rapid fluctuations in serogroup/strain distribution are known to occur in absence of vaccine intervention; iii) this strain is a completely new clone.

Meningitis epidemics cannot be predicted, and such re-emergence of NmC calls for strengthening surveillance and increased preparedness to rapidly detect outbreaks and to organize reactive vaccination campaigns. Meanwhile, sustaining the protection against NmA is critical to avoid resurgence of NmA epidemics.

Wouldn’t it be preferable to introduce a multivalent conjugate meningococcal vaccine into routine?

In an environment with high visibility of non-NmA epidemics, the need for protection against a wider range of serogroups critically appears. The conditional decision of the Gavi Alliance board (in November 2018) to support countries in implementing vaccination programmes with multivalent meningococcal conjugate vaccines in the near future, brings hope that the elimination of all meningococcal meningitis epidemics in the African meningitis belt could be within reach.

However, this is unfortunately not imminent, as:

- the price of multivalent conjugate vaccines remains high (on average more than 100 times the price of MenACV) and in addition to the affordability issues, such vaccines are currently supplied in very limited quantities;
- it is unlikely that affordable vaccines will be licensed, prequalified by WHO and widely available before 2023, not accounting for the risks and potential delays involved in product development significant uptake will also take additional years.

Hence, the promising prospect of widely available and affordable multivalent meningococcal conjugate vaccines cannot become a justification for delayed roll out of the monovalent vaccine rollout. Instead, sound and successful RI of MenACV will lay the groundwork for a smooth transition to future multivalent vaccines. In this context, the introduction of MenACV into RI should be seen as a major step on the way towards enhanced meningitis control.

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Is it preferable to administer the vaccine at 9, 15 or 18 months-of-age?

MenACV can be administered with a single-dose regimen from nine months-of-age. As explained above, these are mostly programmatic considerations that could help decisions about the target age for RI, in particular with regard to the establishment/strengthening of a 2YL platform.

How does herd protection work?

Vaccines are generally primarily intended to protect those who receive them: this is direct protection. Beyond this direct effect, vaccination may, under certain conditions, increase protection of the general population, including those who are not immunized, by preventing the acquisition, clearance and/or multiplication of the pathogen in the immunized person. The immunized person is therefore no longer or less contagious, that is, likely to transmit the pathogen, and will then prevent unimmunized individuals from becoming infected, developing the disease and further disseminating the pathogen. The more the population is immunized, the more the circulation and the transmission of the pathogen is reduced. This indirect effect of vaccination results in herd protection.

Achievement and level of herd protection depends on many factors, including vaccine characteristics. Polysaccharide meningococcal vaccines do not provide herd protection, as they do not prevent bacterial carriage. MenACV, like other meningococcal conjugate vaccines, does provide herd protection. Considering the infectiousness of NmA meningitis, herd protection is a cornerstone of MenACV strategy and has been largely responsible for the immediate public-health impact following mass campaigns.

MenACV catch-up campaigns are intended to protect new birth cohorts and to sustain herd protection, which could otherwise vanish if a large part of the population is not immunized, especially within the age range where transmission occurs the most.

Can use of MenACV into routine increase the coverage of other vaccines co-administered with MenACV?

Fear of meningitis is strong in many communities, especially where there is a history of devastating epidemics. Hence, demand for meningitis vaccination is high. In certain settings therefore, MenACV is likely to create a momentum and drive the coverage of co-administered vaccines.

Are there any contraindications for administering MenACV?

Please refer to the latest version WHO Position Paper on Meningococcal Vaccines, as well as that of the MenAfriVac 5 mcg® leaflet: “The vaccine must not be administered to subjects with known hypersensitivity to any component of the product or to subjects having shown hypersensitivity after previous administration of the vaccine. It should not be used in subjects with acute infectious diseases and/or ongoing progressive (acute or chronic) illnesses. Any body temperature $\geq 38^\circ C$ or active infection is reason to delay immunization.”

Please refer to the commercial leaflet for full information on the vaccine characteristics.

WHO, in particular through its country offices and Regional Office for Africa, can provide further support for implementing this guide. Requests can be addressed through the relevant WHO country office (https://www.afro.who.int/countries).