

# Integration of vitamin A supplementation with immunization: policy and programme implications

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GLOBAL PROGRAMME FOR VACCINES AND IMMUNIZATION  
**EXPANDED PROGRAMME ON IMMUNIZATION**



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# Background

A meeting of international agencies involved in immunization and micronutrients was convened by WHO's Global Programme for Vaccines and Immunization (GPVI) and hosted by UNICEF/New York. The objective of the meeting was to consider how the gap between immunization coverage and vitamin A supplement coverage could be narrowed and to suggest guidelines for integration of vitamin A supplementation and immunization by:

- reaching consensus on answers to technical, logistical and monitoring questions raised by the integration of vitamin A supplementation with immunization activities, and
- sharing and reviewing experiences from the field with the integration of vitamin A and immunization activities.

There is now extensive evidence that vitamin A deficiency (VAD) is widespread in young children in many developing countries and that this deficiency substantially increases a young child's risk of death. A meta-analysis of a series of controlled trials indicates that routine vitamin A supplements given between six and 72 months of age can be expected to reduce mortality by about 23% wherever vitamin A deficiency exists. Additionally, vitamin A supplements as part of measles case management can reduce the case fatality rate by more than 50%. Vitamin A supplements, given to mothers immediately after birth, will improve mothers' vitamin A status as well as the vitamin A content of their breast milk, and will be likely to contribute to improved health of both mothers and infants wherever intake of vitamin A is sub-optimal.

The use of periodic large dose vitamin A supplements is a highly cost-effective approach to preventing and treating vitamin A deficiency in young children. Fortification of commonly consumed foods has been introduced successfully in some developing countries, but this approach is unlikely to be effective in the near future in the poorest countries. Improving the diets of pregnant and lactating women and young children will help to reduce the prevalence of vitamin A deficiency and is necessary for many other reasons. A mix of strategies is needed to ensure adequate vitamin A intakes for all people.

In countries (or parts of large countries) where vitamin A deficiency is known or thought to exist, vitamin A supplementation is likely to have an impact on reducing young child mortality that is as great as, or greater than, that of any single EPI antigen. Wherever infant and young child mortality rates are high, vitamin A deficiency is also likely. Because vitamin A is stored in the liver, the impact of supplementation on the individual is much longer lasting than, for instance, drugs that may

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be metabolized in mere hours. This opens up a wide range of possible supplementation strategies—supplements of appropriate dosages could potentially be given daily, weekly, monthly or as infrequently as once every four to six months. Present international practice has been to use very high doses of vitamin A (200 000 IU for children aged 12 months and over), given up to once every six months, on the assumption that this will be the best way of protecting the greatest number of children at the least possible cost.

In many countries recognized by WHO/UNICEF as having a VAD public health problem, less than 50% of infants and young children currently receive vitamin A supplements. Immunization programmes currently reach about 80% of the world's infants (and a somewhat smaller percentage of their mothers) each year through an estimated 500 million contacts. Tens of millions of children with inadequate vitamin A status are currently not receiving vitamin A supplements, although they are in routine contact with a health facility or health worker that provides immunization services.

With funding provided by CIDA through the Micronutrient Initiative, WHO's "EPI + Vitamin A Project" will be implemented over a four-year period. This project will work to link vitamin A supplementation to immunization programmes in three ways — through:

- routine immunization services;
- supplementary immunization events, such as national immunization days (NIDs), measles, tetanus toxoid (TT) and yellow fever campaigns; and
- treatment of measles and xerophthalmia.

Applied research, development of training materials, and surveillance and evaluation activities will also be supported.

The meeting in New York discussed technical, logistical and monitoring questions related to integrating vitamin A supplementation with immunization activities, and shared and reviewed experience from the field on integration.

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# Conclusions and recommendations

## 1. Provision of vitamin A supplements through routine contacts

There is a wide range of possible ways that children could receive adequate supplementation. In practice, high-dose<sup>1</sup> supplements provided by health, nutrition, or immunization workers are likely to remain the most important means of getting supplements to mothers immediately after delivery and to young children in most countries for the next few years. Immunization services often provide the only reliable routine contacts with health services for mothers and their infants.

The routine supplementation schedule to be followed was previously described in the WHO/UNICEF/IVACG Task Force publication “Vitamin A Supplements: A guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia” (2nd Edition, 1997). Subsequent review of this document has indicated that the importance of supplementing children at around six months of age should be emphasized. In VAD areas, infants require interventions that will provide optimal vitamin A levels at the critical time when they are no longer sure of breast milk as a sufficient source of vitamin A. The risk of vitamin A deficiency-associated mortality is highest in the group of children from six to 36 months of age, and this group should receive priority, although efforts should also cover children up to five years of age.

Increasingly, countries are choosing to give additional doses of vaccine in their routine immunization schedule after one year of age. These extra contacts with immunization services may provide opportunities to give age-specific doses of vitamin A supplements as well.

Data concerning seroconversion of measles and polio vaccines when given simultaneously with vitamin A indicate no significant reduction in seroconversion rates. It is anticipated that recommendations will soon also include those visits for DTP, hepatitis B, Hib and yellow fever vaccine as suitable for simultaneous administration of vitamin A. Additional information is, however, being collected to support this before any recommendation can be finalized.

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<sup>1</sup> For vitamin A supplementation “high dose” refers to amounts greater than 25 000 IU per dose.

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## **Recommendations (1)**

1.1 Vitamin A supplementation to the mother around the time of birth increases the vitamin A content of breast milk, and this should be explained to the mother. A dose of vitamin A (200 000 IU) should be given to all mothers irrespective of mode of infant feeding at the first contact she has with a health worker or nutrition worker, preferably at the time of delivery but no later than at the BCG contact provided that she has not already received a dose after childbirth and the contact occurs within six weeks of delivery.

**Note:** WHO/UNICEF recommendations allow for vitamin A supplementation to be given to lactating mothers up to eight weeks post-partum, but to simplify instructions to staff, a cut-off at six weeks (whether or not they are lactating) may be simpler to teach and implement. See “Safe vitamin A dosages during pregnancy and lactation” WHO, 1997 for more details of post partum doses for mothers.

1.2 An age-specific dose of vitamin A should be given to an infant according to the table:

**Summary table of target groups and potential immunization contact**

Target group	Immunization contact	Vitamin A dose
All <b>mothers</b> , irrespective of their mode of infant feeding, up to six weeks post-partum if they have not received vitamin A supplementation after delivery	BCG, OPV-0 or DTP-1 contact up to six weeks	200 000 IU
Infants 9-11 months of age	Measles vaccine contact	100 000 IU
Children 12 months and older		200 000 IU
Children 1-4 years old	Booster doses* Special campaigns* Delayed primary immunization doses*	200 000 IU

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\* Avoid giving a dose too soon after a previous dose of vitamin A supplement — the *minimum* interval between doses is 1 month (exceptionally, the interval may be reduced in cases of clinical VAD).

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## 2. Provision of vitamin A to children during supplementary immunization activities such as NIDs

NIDs offer an excellent opportunity to provide one high dose of vitamin A to all children aged 6-59 months. To ensure adequate vitamin A status, another contact approximately four to six months after NIDs would ideally be needed. The second high dose could be provided by organizing a “Micro-Nutrient Day” or through routine contacts. Even if a second contact cannot be guaranteed within the year, NIDs should still be exploited to deliver a one-dose supplement.

NIDs are high-volume events which rely on volunteers to administer vaccines to all children in a defined age group regardless of their immunization status, in as short a period of time as possible. Vitamin A should not be given during polio NIDs or other campaigns if adding this intervention jeopardizes the objective of the activity (e.g. eradication of polio). In order not to compromise the success of NIDs, the integration of vitamin A supplementation must be carefully designed and made as simple as possible. Additional staff/volunteers and financial resources should be included to administer vitamin A to ensure the smooth operation of NIDs and avoid slowing down a busy immunization post. The meeting proposed that WHO should develop clear guidelines and training materials to assist EPI managers in designing the vitamin A component.

Between 1998 and 2000, many countries where vitamin A is a problem will be undertaking polio NIDs. Many others are also planning immunization campaigns against measles, neonatal tetanus and yellow fever. These supplementary immunization activities also offer an excellent opportunity to deliver vitamin A to targeted deficient populations.

### *Recommendations (2)*

- 2.1 In the countries where vitamin A-deficiency is a public health problem and which are carrying out polio NIDs and SNIDs, vitamin A should be given during these campaigns. Adequate planning and training should be undertaken so that the target group in greatest need will be reached, technical feasibility is ensured and the primary objective of high coverage for supplementary OPV as well as vitamin A is reached. Vitamin A should be included in mopping-up operations only if adequate logistics and training capacity to ensure proper delivery of the supplements can be ensured. Since mopping up operations are often conducted at short notice, based on disease outbreak reporting, this may not always be possible. However mopping up operations often target very hard to reach populations where vitamin A deficiency is also likely to be a problem.
- 2.2 Where a high proportion of targeted children already receive vitamin A supplements through routine contacts with health facilities, it may not be appropriate to include vitamin A with supplementary immunization activities. The actual cut-off point of routine coverage to determine whether vitamin A should be included with supplementary immunization may vary somewhat from country to country. The decision should be based on assessment of the difficulty of improving routine coverage of vitamin A supplements compared with the possibility of high coverage through a link to supplementary immunization activities. In the absence of country-specific analysis to make a more informed decision, it is



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suggested that if routine coverage with vitamin A supplements is less than 80%, then vitamin A supplements should be included with supplementary immunization activities. One of the advantages of using supplementary immunization activities is that NIDs frequently reach a high proportion of children not reached by routine services and they reach children above one year of age.

- 2.3 Routine supplementation of vitamin A (whether through immunization or MCH services) should not be interrupted during NIDs.
- 2.4 An addendum to the Polio Field Guide should be developed by WHO as soon as possible to provide appropriate training in vitamin A administration for NIDs staff and volunteers. (*This is now completed and should be available by October 1998*).
- 2.5 The decision whether or not to include vitamin A in supplementary immunization activities should be taken as early as possible in the planning process, to allow for appropriate logistics and training planning.
- 2.6 Planning and implementing the logistics of the immunization activities and related activities, including vitamin A supplementation, is largely the responsibility of immunization field staff. Nutrition field officers should be asked to provide technical support related to vitamin A supplementation and dosage as well as monitoring its impact (EPI has an infrastructure better suited to monitoring coverage, rather than Nutrition, which can handle special impact assessment surveys and links to other vitamin A activities better than EPI).

### **3. High-risk approach**

Certain primary health care initiatives focus interventions on those known to be at high risk, rather than expending effort indiscriminately and including those who may not need it. Immunization programmes use the high risk approach in the following situations:

- Outbreak response
- Polio eradication (mop-up operations) – *see also recommendation 2.1*
- Measles control (urban campaigns) and elimination
- Neonatal tetanus elimination

These high-risk interventions may be suitable for the addition of vitamin A supplementation, enabling the vitamin to be delivered to otherwise difficult-to-reach populations.

#### ***Recommendation (3)***

- 3.1 Wherever the high-risk immunization strategy is used in vitamin A-deficient areas, consideration should be given to administering vitamin A supplementation at the same time.

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#### 4. Screening

- **Mothers:** The recommendation of the WHO/UNICEF/IVACG Task Force for post-partum supplementation is for one high-dose (200 000 IU) supplement shortly after delivery, a period likely to be infertile in a breast-feeding mother. (*See recommendation 1.1*)
- **Children during routine visits:** To avoid multiple dosing, there is a need to record vitamin A supplement administration on the child health card for *routine* health service visits. Children aged six months of age and above should ideally receive high-dose supplements of 100 000 IU at intervals of four to six months. Children should generally not receive two separate high-dose supplements of vitamin A within less than a month of each other. If infants under six months are not breast fed, they should receive one 50 000 IU supplement as a preventive measure, or if they show signs of clinical VAD, they should receive treatment of one 50 000 IU dose on two successive days.
- **Children in NIDs:** A child may have received a dose of vitamin A during a routine visit to health services just prior to an NID. The probability is low that a dose will have been given within four weeks, but even if it has, there is very little concern. By definition, the NID is being carried out in a VAD area and children are likely to have very low levels of vitamin A. Even if a dose is given closer than four weeks apart, the danger of transient undesirable effects is low, and of serious adverse effects is negligible. Thus, screening for previous doses need not be carried out during the NID, an activity that is likely to slow the flow of children considerably.

#### *Recommendations (4)*

- 4.1 Screening prior to maternal supplementation at the BCG/OPV-0 contact is necessary to avoid the risk of teratogenicity. The mother should be asked when she gave birth, and whether she has received a vitamin A supplement after delivery.
- 4.2 During routine immunization visits, all children should be screened for age and whether they have had a dose of vitamin A in the last four weeks — to determine if they are due an age-specific dose.
- 4.3 During NIDs, only screening for age is necessary, to determine the correct dose for the age of the child.

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## 5. Standardization of vitamin A capsules

Standardization of capsules with respect to dosage, colour and nipple is an important condition for the safe and efficient delivery of vitamin A supplements and the development of uniform global training materials and guidelines.

### *Recommendations (5)*

5.1 Vitamin A capsules should always include a nipple to simplify opening them. They should be standardized in three doses, colour-coded as follows:

50 000 IU	white	(not used in NIDs)
100 000 IU	blue	
200 000 IU	red	

## 6. Alternative methods of administration

Capsules have been the principle vehicle for giving vitamin A, although one country gives the liquid by teaspoon, and a multi-dose dispenser has been developed. No current method is free from problems in the field. Although the capsule does not require complicated or potentially dangerous equipment to administer, there are still possibilities for improving its presentation. A dropper system similar to that used for OPV would mean that nothing would have to be cut open, and no bulky dispenser issued. Such a dropper will probably be low cost, easy and fast to develop.

### *Recommendation (6)*

6.1 UNICEF and WHO will investigate the possibility of developing a simple dropper device for vitamin A delivery. Particular attention should be paid to developing a system which has accurate dosing, will cope with the possibility of blocking in the field due to the viscous nature of liquid vitamin A, and the possibility that mold may contaminate the outside of the containers.

## 7. Surveillance and monitoring

Surveillance and monitoring are essential for assessing both programme performance (e.g. determining whether vitamin A is delivered to those who need it, when and where they need it), and global progress towards the goal of eliminating vitamin A deficiency as a public health problem. Vitamin A supplementation is a cost-effective intervention, but ongoing efforts to demonstrate the cost/benefit and health impact of vitamin A need to be continued to garner political and public support for vitamin A supplementation.

### *Recommendations (7)*

7.1 In VAD countries, EPI information systems should be adapted to monitor vitamin A distribution and administration. Particular effort should be directed towards encouraging countries to report as a minimum, coverage of vitamin A supplementation for routine immunization. This would be measured as VA1

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(percentage of targeted children <1 year receiving 1 dose of vitamin A) and VA2 (percentage of targeted children <1 year receiving a second dose of vitamin A) in the first year of life.

- 7.2 During routine immunization, the administration of vitamin A to the mother and/or child should be recorded on the immunization or “Road to Health” card. It is helpful if cards can be modified to include a record of the date and dose of at least two doses of vitamin A — VA1 and VA2 (and more if possible).
- 7.3 The total number of infants/children receiving capsules (regardless of dose) of vitamin A given during an NID should be recorded on tally sheets. Programmes should not record doses on individual vaccination cards or Road to Health Cards, so minimizing delays at vaccination posts.
- 7.4 Appropriate surveillance tools, methods and training packages need to be developed to assist countries identify accurately those areas or target populations at risk for VAD.
- 7.5 Studies evaluating the cost-effectiveness of vitamin A supplementation linked to immunization programmes need to be continued. Best practices for ensuring the most efficient and effective delivery of vitamin A need to be published.
- 7.6 Further approaches to measuring impact need to be developed. A rapid test for measuring vitamin A status needs to be developed and field-tested.

## **8. Training and education**

As with any new intervention, the development of training materials and courses is a prerequisite for successful implementation. Health staff at all levels of the health system as well as others involved in the control of vitamin A deficiency and its consequences should know the treatment and prevention schedules. The most efficient way to ensure regular training is to integrate instruction modules into the existing curricula for health workers at all levels. Relatively short periods of training on vitamin A can be added to NIDs, IMCI and other curricula. Teaching materials that can easily be included in more formal training sessions are being developed by WHO and other organizations such as BASICS, Helen Keller International and IVACG.

### ***Recommendations (8)***

- 8.1 Training on vitamin A supplementation should be integrated with the EPI programme managers’ mid level (MLM) courses on immunization.
- 8.2 An annotated bibliography of existing vitamin A training materials (including those under preparation) should be compiled and made available to collaborators.
- 8.3 Job aids should be developed for providers and supervisors.
- 8.4 Advocacy materials should be developed for various target audiences.
- 8.5 The curriculum for medical and nursing schools should include the prevention of VAD.

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## 9. Target countries for WHO's "EPI + Vitamin A Project"

There are approximately one hundred countries classified by WHO as having clinical signs or severe, moderate or mild sub-clinical symptoms of vitamin A deficiency. The countries showing the most severe vitamin A deficiency, are mostly in Africa and South-East Asia. In addition, countries may have vitamin A deficient populations if under five mortality rates (U5MRs) are high, even if there is no documentation available on the prevalence of VAD.

Vitamin A supplements should be provided to all mothers and young children (see above for details on age) in all countries (or districts where there are major differences between districts, and where disaggregated data exists on serum retinol levels) where vitamin A deficiency is known to exist based on surveys or thought to exist.

Priority for support under the new WHO project will be given to countries with a well defined vitamin A deficiency problem and a sufficiently strong immunization system to implement the integrated intervention

### ***Recommendation (9)***

9.1 Priority countries will be selected in dialogue with EPI programme managers, the Nutrition Unit, and other key partners and collaborating organizations. In general, countries will be selected based on a combination of the following criteria, not relying on any one by itself:

(a) Burden of disease

- where the population is demonstrated to be clinically and/or sub-clinically vitamin A-deficient (*any country or district that demonstrates a serum retinol level of 0.7  $\mu\text{mol/l}$  or less in more than 20% of a representative sample of children is considered to be suffering from severe subclinical deficiency*);
- with a high under-five mortality rate in association with high measles case fatality rate or high PEM prevalence;
- where xerophthalmia exists.

(b) Programmatic issues

- where the EPI infrastructure is sufficiently strong to carry the additional load of vitamin A supplementation;
- willing to implement the project and make a commitment to undertake vitamin A elimination activities.

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## **10. Non-governmental organizations**

Numerous non-governmental organizations (NGOs) are actively engaged in vitamin A supplementation programmes. From their unique community-based focus, NGOs can play specific roles in country strategies to eliminate vitamin A deficiency. When contributing to immunization programmes, NGOs are able to increase coverage in areas where governments and larger organizations may find difficulty. NGOs play an active role in advocacy for nutrition interventions with central government, districts and community groups, often exactly where vitamin A deficiency exists. These efforts at advocacy are often based on regional surveys of nutritional status, and on pilot studies that have demonstrated successful strategies and ways to overcome operational barriers that can be adapted for larger scale programmes. For these reasons and more, efforts of NGOs in this area are acknowledged and supported.

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