

Using Immunization Contacts to Combat Vitamin A Deficiency

Report of an informal consultation

World Health Organization, Geneva

30 June - 1 July 1992

This report contains the collective views of an international group
of experts and does not necessarily represent the decisions
or the stated policy of the World Health Organization



WHO
Nutrition Unit
Expanded Programme on Immunization
and
The International Vitamin A Consultative Group (IVACG)

WHO/NUT/EPI/93.1
Distr.: Limited
English only

Using Immunization Contacts to Combat Vitamin A Deficiency

Report of an informal consultation

World Health Organization, Geneva

30 June - 1 July 1992



**WHO
Nutrition Unit
Expanded Programme on Immunization**

and

The International Vitamin A Consultative Group (IVACG)

Table of Contents

Introduction	1
Facts to consider	2
Why link vitamin A distribution to immunization contacts	3
Justification for early dosing with vitamin A supplements	5
Programme linkages	
Sustainable interventions	7
Short-term intervention	8
Proposed dosage schedule for vitamin A supplements	10
Special immunization contacts that can be used to combat vitamin A deficiency	
Special immunization activities	11
Prevention of blindness	11
Measles	11
Vitamin A supplementation at immunization contacts	
Infants	12
Mothers	13
Appendices	
Agenda	14
List of participants	16

Introduction

1. An informal consultation of experts was convened by the Nutrition Unit and the Expanded Programme on Immunization (EPI) in response to the request of the Research and Development Advisory Group of the EPI for recommendations about how the extensive contacts now achieved through immunization programmes might be utilized safely and effectively to combat vitamin A deficiency.
2. The specific objectives of the consultation were to review and update information on the safety and impact of vitamin A supplementation in infancy, particularly before 6 months of age, and to propose recommendations and programme guidelines for frequency and dosage levels for vitamin A supplementation through immunization contacts.
3. The group recognized that at this time there was limited information available upon which to establish firm WHO policy. Currently WHO is attempting, through field trials and consultations, to determine precisely the benefit, optimal age range and safest dose when linking vitamin A supplementation with immunization programmes. The results of some of those studies will not be available for up to three years. Whilst that research continues, this consultation report is being made available as programmatic guidance for those who wish to proceed now.
4. After careful review of available information, it was the consensus of the experts who were convened, that the dosage and frequency of administration of vitamin A proposed in this report is expected to be safe, and that substantial benefits are likely to be realized in the second half of infancy.
5. The experts represented a wide range of disciplinary competence, field experience, and differing views on the topic. The report is a synthesis of their discussions, conclusions and proposals. It has been reviewed and approved by the participants as reflecting the consensus reached at the meeting. In addition, a broad range of external experts in basic, clinical and applied sciences, and in programme management have reviewed and commented on the report.
6. The views expressed in this report suggest a new approach to the control of vitamin A deficiency in areas where it is now a problem of public health magnitude. Pending completion of the above mentioned research WHO does not at this time recommend routinely giving vitamin A supplementation at the time of immunization contacts at 6, 10 and 14 weeks of life. Meanwhile current recommendations for immunization-linked vitamin A supplementation starting at 6 months of age, and to mothers within four weeks after delivery, are confirmed.

Using Immunization Contacts to Combat Vitamin A Deficiency

Facts to consider

- The health and survival of children are at risk due to a deficiency of vitamin A, especially during periods of rapid growth and development. Severe deficiency interferes with vision and is potentially blinding and fatal. Milder deficiency weakens physiological defense mechanisms. This causes infections to be more severe which increases the risk of a fatal outcome.
- The World Health Assembly, the UNICEF Executive Board, The World Summit for Children, the Conference on Ending Hidden Hunger and the International Conference on Nutrition have all adopted as their goal the virtual elimination of vitamin A deficiency and its consequences, including blindness, by the end of the century.
- A combination of different strategies will be needed to achieve this goal. They include dietary diversification, fortification, and supplementation which should be linked to on-going programmes as appropriate to each country.
- Each year immunization programmes reach about 80% of the world's children, as well as their mothers, through an estimated 500 million contacts. Currently there are 5 possible immunization contacts during infancy.
- WHO estimates that 118 to 190 million children under 5 years of age live in areas where they are at risk of vitamin A deficiency. About 3.5 to 6.0 million are infants (12 months of age or younger). Where vitamin A deficiency is a significant public health problem, the 5 immunization contacts during infancy allow for between 17-30 million contacts with the potential for providing vitamin A supplements. The supplements can maintain sufficient vitamin A status to prevent blindness and lessen the risks of life-threatening health consequences during the first year of life.
- In areas of vitamin A deficiency, immunization contacts may also be used to promote dietary diversification and other health and development programmes.

Why link vitamin A distribution to immunization contacts?

Immunization programmes have established a delivery system that reaches a large proportion of populations where vitamin A deficiency is a significant public health problem.

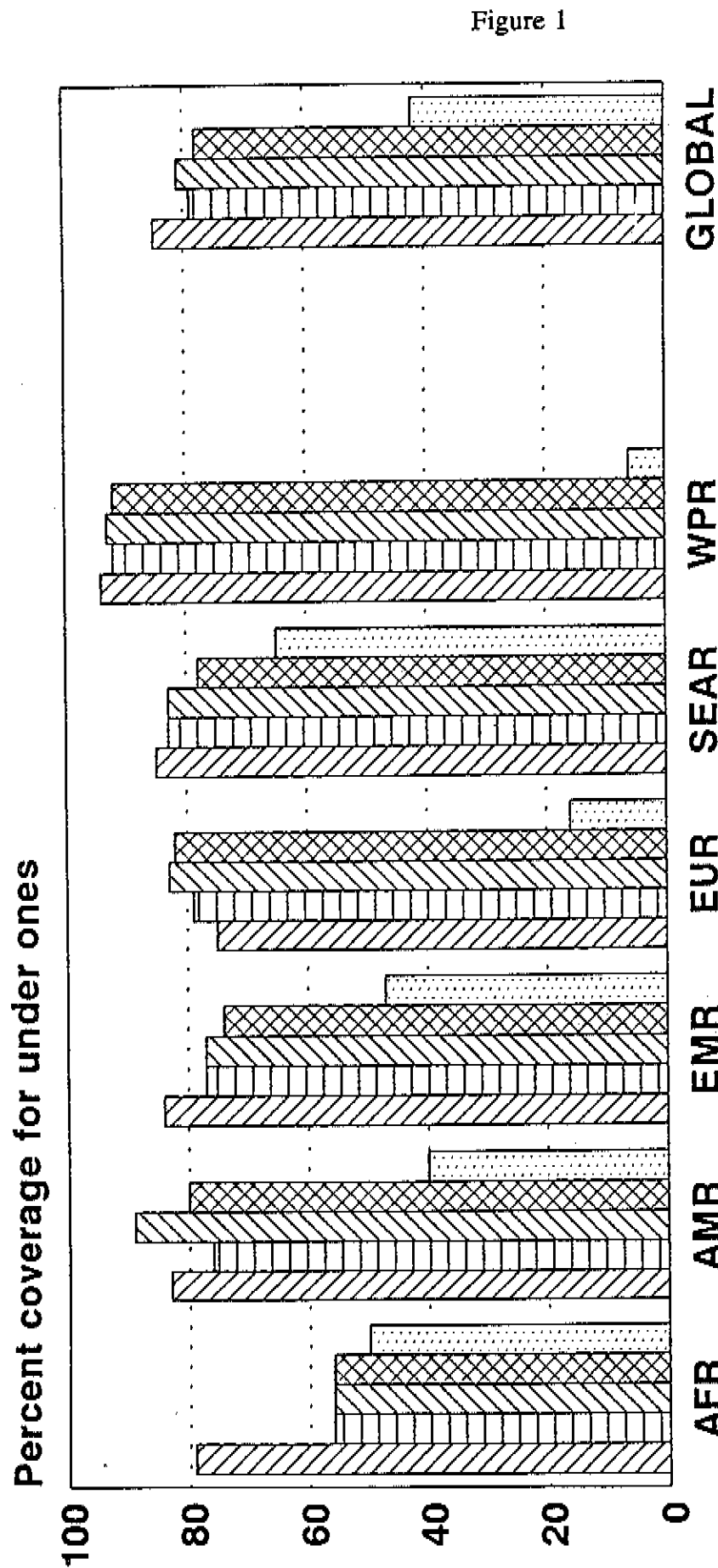
7. Immunization programmes now repeatedly reach a larger number of the world's infants than any other primary health care programme (Figure 1). Even in countries where coverage through other health services is low, immunization coverage remains relatively high. It is countries with poor health services coverage that often have a significant public health problem of vitamin A deficiency. Supplementation linked to immunization contacts in these communities will reach thousands of infants, young children, and women who are thus far uncontacted, and thereby provide protection from the health consequences of a deficiency. Unfortunately, those families who are still missed by all programmes are also the most likely to be in greatest need. Efforts to reach them through specialized programmes are still required.

8. Contacts with vitamin A-deficient mothers for the purpose of vaccine delivery to neonates may occur within the first month of life. The vitamin A content of breast milk from a malnourished mother can be increased for several months by giving her a single, large, oral dose of vitamin A (200 000 IU) at this contact. In the short term, this will improve her vitamin A status as well as that of her breast-feeding infant. However, a large-dose supplement should not be given beyond 4 weeks after delivery because there is a risk that fertility has returned and that a 200 000 IU dose could have adverse effects on fetal development early in pregnancy. Supplementation with 10 000 IU or less daily is safe at any time during pregnancy and lactation.

9. Linking vitamin A supplementation programmes with immunization contacts can provide additional benefits. Because many mothers view vitamins and tonics as beneficial to their children, providing vitamin A supplements may be seen as another reason to bring children for immunization. Increasing the number of immunized children has reciprocal benefits for general nutritional status as well as vitamin A status, e.g., fewer infections from measles and other vaccine-preventable diseases mean fewer vitamin A-depleted children at risk of corneal damage that may lead to loss of sight and life in childhood. In addition, sharing staff and overhead costs by combining two programmes increases cost-effectiveness, even if it does add a small cost in money and time.

10. It is the expressed intent of the Expanded Programme on Immunization to be partners with other primary health care and public health initiatives to reduce preventable morbidity and mortality in childhood. Using immunization contacts as a point of entry to communities and to individuals for providing nutritional supplements and to encourage good infant and child-feeding practices is an example of a practical means of carrying out this intent.

Immunization coverage of children less than 12 months of age by WHO Region



EPI VACCINES

- BCG
- DPT 3rd dose
- Polio 3rd dose
- Measles (a)
- Tetanus 2nd dose (b)

(a) up to two years of age
 (b) tetanus toxoid (mothers)

Figure 1

Justification for early dosing with vitamin A supplements

Newborn infants have limited vitamin A reserves.

11. A newborn has limited reserves of vitamin A, even when the mother is well nourished. Colostrum and early breast milk are rich, safe, and readily absorbable sources of vitamin A for the newborn. Mother's milk is an important and safe source of the vitamin as long as breast-feeding continues. Infants who are never breast-fed, or who are breast-fed only 1 or 2 months, are especially vulnerable to vitamin A deficiency. Unfortunately, this is increasingly the case, particularly in urban settings, among mothers who enter the work force. It is essential to provide these infants with vitamin A at least by the first 2-4 months of life. A mother may have money to purchase food for her infant but lack the knowledge to choose wisely from available items. In these situations blindness has been reported to occur by 2 to 6 months of age.

12. Breast milk even from a malnourished mother provides protection from xerophthalmia for as long as breast-feeding continues. Solid foods given during the weaning period, however, often contain minimal or no vitamin A. Therefore, during the weaning period, to maintain and build body reserves in anticipation of stopping breast-feeding, breast milk needs to be complemented by food sources of vitamin A. This is especially important in communities where breast-feeding is of long duration and where mothers are malnourished.

13. For the breast-fed infant, supplements given during the first 6 months of life will add to the vitamin A of mother's milk (which itself may be sub-optimal) to maintain adequate body reserves. A body reserve of vitamin A can be expected to decrease the severity and risk of fatality from infection-related illness from the second 6 months of life onwards. Based on meta-analyses of clinical trials of vitamin A supplementation, a substantial reduction of mortality risk during the 6-12 month age period is expected.

14. There is justification, therefore, in areas where vitamin A deficiency is a significant public health problem, to link the distribution of vitamin A supplements to the delivery of immunizations as a short-term means of improving vitamin A status.

In areas where vitamin A deficiency is a significant public health problem, immunization contacts can be an effective system for delivering vitamin A supplements. Infants who especially need supplementation are those who:

- Breast-feed from poorly nourished mothers whose vitamin A concentration in milk is low.
- Breast-feed for only 1 or 2 months, or who are not breast-fed at all.
- Are fed weaning foods that contain little or no vitamin A.
- Are already malnourished or exposed to repeated respiratory, diarrhoeal or other infections, and measles.

15. The immunization contact that provides a supplement to the infant also can be used to emphasize the importance of improving the intake of vitamin A in the mother's diet through food sources that will provide other nutrients as well.

Immunization contacts can be used to encourage mothers to:

- Eat vitamin A-containing foods, especially while they are breast-feeding.
- Include vitamin A-containing foods after 4-6 months in their infants' weaning diets.

Programme linkages

16. Vitamin A deficiency does not occur where diets contain sufficient vitamin A for the basic needs of growth and development, physiological functions, and for periods of added stress imposed by illness. To achieve sustainable dietary sufficiency, therefore, is the goal toward which efforts should be directed. Many social, economic and environmental factors determine how close communities are to achieving this goal. For communities where the goal may be distant, short-term measures will be needed to protect the health of children until dietary sufficiency can be achieved.

17. Fortunately programme planners and managers have several additional options from which to choose the mix of interventions that best suit available human, technical and financial resources and the context in which they could appropriately and effectively be implemented. Linking vitamin A supplementation with immunization contacts is only one of several strategies for achieving dietary vitamin A adequacy. In most countries there will be programmes to which one or more vitamin A intervention can be linked, e.g., primary health care, schools, family planning, literacy and income-generation. Some of the interventions are briefly described below.

Sustainable interventions

18. Public health programmes that decrease the burden of infections contribute significantly to improved nutritional status, including vitamin A status. Protection provided by immunization, particularly against measles, lessens risks to health and survival. Sanitation and parasite-control programmes, oral rehydration therapy, and the protection and promotion of breast-feeding all contribute to less severe and/or fewer gastrointestinal and respiratory infections for which currently there are few vaccines.

19. Programmes to diversify diets and assure an adequate intake of vitamin A and other micronutrients are crucial to achieving the goal of eliminating vitamin A deficiency in a sustainable manner. Such programmes contain the components that should be considered by all programmes involving mothers, and those who determine the diet of children, from the weaning period onward. This includes contacts with lactating women whose breast milk may contain low concentrations of vitamin A.

20. Horticultural programmes may be needed to increase availability of vitamin A-containing foods when they cannot be obtained from animal products. This can be done through local production in home, school or community gardens. In some circumstances, however, local vitamin A-rich food sources such as orange-coloured fruits (mango and papaya), as well as dark-green (amaranth and sweet potato leaves) and orange-coloured (carrots and squash) vegetables, cannot be grown due to water shortage or unfavourable climatic or soil conditions. Opportunities may occur to link horticultural and water programmes.

21. Nutrition education programmes are needed where vitamin A-containing foods are available, and sometimes even consumed in the home, but under-used to feed children. These programmes may require preliminary behavioral studies to adapt them to local cultural practices and attitudes to bring about the changes in feeding practices necessary to increase consumption of vitamin A-rich foods by infants and children. Educational programmes will need to consider local preservation methods to overcome problems related to seasonal availability and perhaps the lack of knowledge on how to prepare local vitamin-A rich foods in a suitable form for infants and children.

22. Fortification or enrichment of common foods for mothers and other members of the family, as well as of complementary foods for infants and young children, can be an effective means of delivering vitamin A. This requires a suitable food vehicle to be available, affordable, and widely consumed by vulnerable groups. At national level, additional conditions are necessary for successful fortification and enrichment programmes: a minimum level of industrial development to assure an uninterrupted supply of the food vehicle, regulatory mechanisms to assure quality control, and political commitment to provide the necessary support, sometimes including subsidization, to sustain the programme.

Short-term intervention

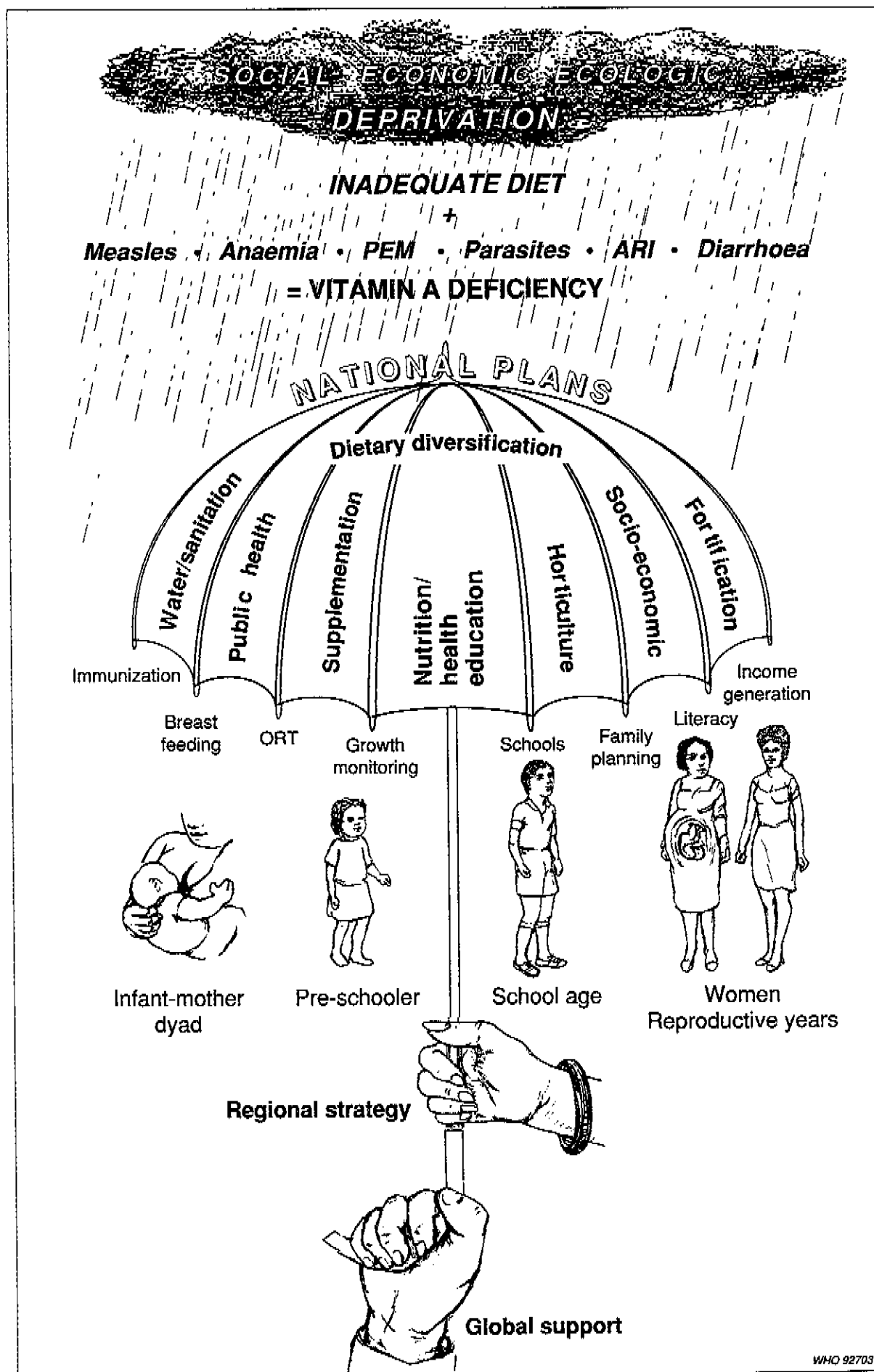
23. Supplementation programmes are the fastest way of improving the vitamin A status of deficient populations. **However, such programmes do not correct the underlying cause of the problem - not enough vitamin A-containing foods in the diet.** Using immunization contacts to deliver supplements of vitamin A can be a short-term measure to achieve adequate vitamin A status during the first year of life. Providing small doses at frequent intervals, which is logistically possible at immunization contacts, is likely to be more effective than a large dose given less frequently. Other delivery systems may be used to deliver supplements to older children.

24. Authorities in countries that choose to use immunization contacts to provide vitamin A supplements to infants and their mothers should, from the start of the programme, have as their intention replacement of supplementation with an independent, sustainable food-based solution within a limited period, e.g. 5 years. The development of a sustainable programme should occur without delay. Programme planners also should realize that supplementation through immunization contacts does not provide sustained protection of children through the remaining vulnerable early childhood years. The difficult-to-reach, largely un-immunized populations are likely to be the most disadvantaged and at risk of the sequelae of hypovitaminosis A. Therefore, planning should include operational links to other health and development programmes that will meet the goal of a sustained, adequate vitamin A status for all (Figure 2).

Mothers and infants in vitamin A-deficient areas should receive supplements of vitamin A according to the proposed schedule that follows until such time as appropriate sustainable dietary improvements have become established.

Figure 2

COMBATTING VITAMIN A DEFICIENCY



WHO 92703

Proposed dosage schedule for vitamin A supplements

Where vitamin A deficiency is a significant public health problem, authorities in countries who choose to link vitamin A distribution to immunization contacts should:

- Give 25 000 IU vitamin A orally at each immunization contact beginning at 6 weeks of age with at least a 4-week interval between doses.
- Give 200 000 IU vitamin A orally to women at delivery or during the following 4 weeks. This is the "safe window" - the period during which another pregnancy is least likely to occur.
- Combined supplementation of infant and mother is recommended and is expected to be safe.

25. This proposed schedule represents the consensus of a group of experts after careful review of available information. The proposal provides an alternative to the current policy for the supplementation of mothers within four weeks of delivery and of children older than six months of age. The dosage and frequency of administration of vitamin A as proposed is expected to be safe, and in areas of vitamin A deficiency, the potential benefits to be realized in the second half of infancy are likely to be substantial.

26. The proposed dosage schedules are shown in detail in Tables 1 and 2. These proposals are expected to be safe for public health use. The appropriate nutrition messages are also given.

27. Few acute side-effects are expected from multiple doses of 25 000 IU provided according to the proposed schedule. The acute symptoms of overdosage are transient and include vomiting, nausea, loss of appetite, and general irritability. Transient bulging of the fontanelle also occasionally occurs at dosages of 50 000 IU and above.

28. Health workers should use liquid vitamin A, preferably with a dispenser system, to deliver the measured 25 000 IU dose directly into the infant's mouth. The vitamin A supplements generally available contain vitamin A as retinyl palmitate, vitamin E as a preservative (antioxidant), and purified vegetable oil. The solution should be protected from direct sunlight and air exposure, but need not be maintained in the cold chain.

29. The 200 000 IU dose of vitamin A given to mothers within 4 weeks after delivery will improve her vitamin A status and boost the vitamin A concentration of her breast milk. The increased vitamin A concentration in breast milk will last for several months after a single supplement. The oral liquid 200 000 IU preparation usually is available in a gelatin capsule.

30. Vitamin A supplements not exceeding 10 000 IU daily can be safely given at any time to mothers who did not receive a high dose within 4 weeks after delivery.

Special immunization contacts that can be used to combat vitamin A deficiency

31. There are other situations where immunization contacts will provide special opportunities to combat vitamin A deficiency in areas where a significant public health problem exists.

Special immunization activities

32. Special additional immunization activities, for example to eradicate polio, are opportunities for vitamin A delivery. Distribution of vitamin A should also be considered in outbreak control activities for polio and neonatal tetanus. Infants and young children should receive a single oral 25 000 IU dose, provided a supplement has not been given within the last 4 weeks.

Prevention of blindness

33. Corneal damage due to vitamin A deficiency (cloudiness and/or ulcers in the normally clear, coloured central part of the eye) acutely threatens sight. It is a medical emergency which should be treated immediately with an oral dose of vitamin A (200 000 IU for children over 1 year; 100 000 IU for infants). Where possible, the child should then be referred to facilities where specialized care can be provided. In the absence of such facilities, the same dose of vitamin A should be given the following day. If the child is available to the worker, a third dose can be given again 4 weeks later. (See WHO/UNICEF/IVACG publication *Vitamin A supplements: a guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia.*)

Measles

34. Vitamin A supplementation reduces case fatality and severity of measles complications in children. Successful case management of measles is based on the appropriate treatment of serious complications, such as pneumonia, diarrhoea, and eye damage, and on the correct use of a high-dose vitamin A supplement. WHO and UNICEF recommend a single oral dose (100 000 IU for infants and 200 000 IU for children over 1 year) for children with measles who live in communities where there is known vitamin A deficiency or where measles case-fatality rates are above 1%. Where case-fatality rates are unknown, it is sensible to provide vitamin A to all children with measles. Many clinicians supplement the WHO/UNICEF recommendation with a further dose of vitamin A of the same concentration on the following day.

35. Although giving vitamin A supplements is not a substitute for appropriate treatment of specific complications, training of health workers in measles case management should stress the

use of vitamin A. Progress of this policy can be assessed by monitoring the proportion of children with measles treated with vitamin A, and by measuring case-fatality rates in special studies.

Vitamin A supplementation at immunization contacts

36. The tables shown below indicate the dose of vitamin A and its timing in relation to a standard immunization schedule. In addition to the dose of vitamin A and vaccine, mothers should be provided with the following nutrition messages for infants:

- Breast milk protects infants from developing eye signs of vitamin A deficiency. Exclusive breast-feeding - that is, giving no other fluid or food than breast milk - should be encouraged for the first 4-6 months of life.
- Vitamin A supplementation is essential for the infant who is never breast-fed, or breast-fed for only a short time, and whose status cannot be improved by sufficient dietary sources of vitamin A.
- Breast milk needs to be complemented by food sources of vitamin A after 4-6 months of age to ensure that the infant's nutritional needs are met. This is especially important in areas where mothers are malnourished and their diet is vitamin A-deficient.

Table 1.¹

Infants	25 000 IU vitamin A orally to the infant at each immunization contact beginning at 6 weeks provides a sufficient supply likely to carry the infant through at least the first year. There should be at least a 4-week interval between doses.	
Age of child	Vaccine	Vitamin A dose
6 weeks	DPT 1 and OPV 1	25 000 IU
10 weeks	DPT 2 and OPV 2	25 000 IU
14 weeks	DPT 3 and OPV 3	25 000 IU
9 months	Measles	25 000 IU ¹

¹ A larger dose of 100 000 IU at this contact is acceptable.

37. Immunization contacts often occur after the first year of life. Children 1-5 years of age should continue to receive 25 000 IU with each immunization contact with at least a 4-week interval between doses. This schedule applies even for children who may have contact with other health services that provide a high-dose supplement of 100 000 IU or 200 000 IU at 4-6 month intervals or during treatment for protein-energy malnutrition, diarrhoea or measles.

38. In addition, authorities in some countries may choose to supplement mothers directly if their health-delivery system reaches a high proportion of mothers at birth, or within 4 weeks of delivery. At this point, health workers should also be aware of the following nutrition information and use it appropriately as they interact with mothers:

- Mothers are often malnourished and have inadequate diets in areas where vitamin A deficiency is common among children.
- Mothers should be encouraged to diversify their diet to include vitamin A-rich foods that will improve their vitamin A status and boost the amount of vitamin A in their breast milk.
- When immediate improvement of vitamin A status is required, both the breast-feeding infant and the mother's vitamin A status can be safely improved by directly supplementing the mother with 200 000 IU of vitamin A within 4 weeks of delivery. Doses of 10 000 IU daily can be safely given at any time, including during pregnancy.

Table 2.

Mothers	200 000 IU vitamin A orally once at delivery or during the next 4 weeks increases the level of vitamin A in breast milk and improves their vitamin A status.
	Vitamin A dose
Within 4 weeks after delivery ¹	200 000 IU

¹ At the BCG/OPV contact with the newborn if this occurs during this time period.

39. Within 4 weeks of delivery is the only time that high doses of vitamin A, i.e., doses in excess of 10 000 IU, can be safely given to women of child-bearing age. (See IVACG publication *The safe use of vitamin A by women during the reproductive years.*)



INFORMAL CONSULTATION ON VITAMIN A SUPPLEMENTS THROUGH EPI
WHO, Geneva, 30 June to 1 July 1992

Agenda

Tuesday, June 30 9:00 am

Session 1.

- 1.1 Welcome Dr Rochon, HPP
 Dr Kim-Farley, EPI
 Dr Graeme Clugston, NUT
- 1.2 Introduction of Participants, Administrative Matters and Adoption of the Agenda for Discussion Items--G. Clugston
- 1.3 Terms of reference--B. Underwood, NUT
- 1.4 Progress in Initiatives to Incorporate Vitamin A into Immunization Programmes:

Global---B. Underwood, G. Clugston, N. Cohen, P. Greaves
Regional--B. de Benoist, AFRO; I. Darton-Hill, WPRO; M. Gurney, SEARO
National--D. Habte, Bangladesh; V. Reddy, India

Session 2.

- 2.1 Review and Update on the impact of vitamin A: the case for early dosing -
B. Underwood

DISCUSSION OF THE ISSUES

- 1) Newborns body stores; requirements for vitamin A in infancy; breast milk adequacy.
- 2) Impact issues before 6 months and 6-12 months where VAD is clinically and/or biochemically endemic.
- 3) Safety issues of frequency and dosage before 6 months.
- 4) Consideration of alternative schedules.
- 5) Cost-effectiveness of integrated programmes.

Session 3.

- 3.1 Recommendations on frequency and dosage schedule within EPI.
- 3.2 Criteria for where, when, and how to use vitamin A within EPI.
 - 1) Geographical targeting
 - 2) Special opportunities, e.g. national vaccination days

Wednesday, July 1 8:30 am

Session 4.

- 4.1 Modifications to the Draft Guideline for Programme Managers
 - 1) Rationale for linking programmes
 - 2) Justification for early dosing
 - 3) Linkages to other programmes that provide protection beyond infancy
 - 4) Use in the case management of measles
 - 5) Relief and famine situations
 - 6) Emergency treatment situations
 - 7) Other "windows of opportunity"
 - 8) Programme implementation
 - a) Starting up
 - b) Supply
 - c) Storage and stability
 - d) Training
 - e) Recording, monitoring and evaluation

Session 5.

- 5.1 Publications to follow: what is needed, who will assume initiative and who will co-sponsor?
- 5.2 Adjournment

LIST OF PARTICIPANTS IN THE VITAMIN A/EPI CONSULTATION

30 June - 1 July 1992

INVITED PARTICIPANTS

Dr D. Habte
Director
International Centre for Diarrhoeal Disease
Research (ICDDR)
Dhaka, Bangladesh

Dr V. Reddy
Director
National Institute of Nutrition
Jamai-Osmania
Hyderabad, India

Dr A. Tomkins
Director
Institute of Child Health
University of London
London, England

Dr C. Kjolhede
Associate Professor
Department of International Health
The Johns Hopkins University
Baltimore, Maryland
USA

Dr J. Olson
Distinguished Professor
Department of Biochemistry & Biophysics
3254 Molecular Biology Bldg.
Iowa State University
Ames, Iowa 50011
USA

Dr P. Greaves
UNICEF
UNICEF House
Three United Nations Plaza
New York, N.Y. 10017
USA

WHO Regional Office Nutrition Advisors

M. Gurney	SEARO
I. Darnton-Hill	WPRO
B. de Benoist	AFRO

WHO Headquarters

G. Clugston	NUT
B. Underwood	NUT
N. Cohen	EPI
C. Clements	EPI
R. Pararajasegaram	PBL
P.M. Shah	MCH

Document sent for review to:

IVACG Steering Committee:

Abraham Horwitz, Chairman, IVACG
Frances Davidson, Secretary, IVACG
Leonor P. Santos
Moses Chirambo
Franz Simmersbach
Vinodini Reddy
Alfred Sommer