7.2 VITAMIN A DEFICIENCY

Vitamin A is an important micronutrient for maintaining normal growth, regulating cellular proliferation and differentiation, controlling development, and maintaining visual and reproductive functions. Diet surveys have shown that the intake of Vitamin A is significantly lower than the recommended daily allowance in young children, adolescent girls and pregnant women. In these vulnerable sub-groups multiple nutritional problems such as inadequate intake of energy and micronutrients other than Vitamin A coexist. Inspite of the fact that there has not been any significant improvement in the dietary intake of Vitamin A and coverage under Massive Dose Vitamin A programme has been low, there is a decline in clinical Vitamin A deficiency in under-five children in the country. This could perhaps be due to increase in access to health care, consequent reduction in severity and duration of common childhood morbidity due to infections. However, biochemical deficiency continues to be common.

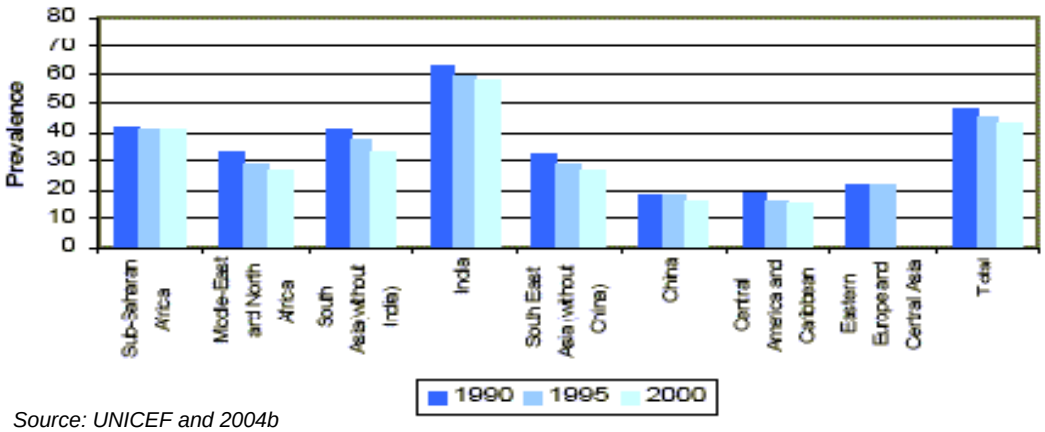
Table 7.2.1: Prevalence of vitamin A deficiency in South Asia (%)

Country	Children		
	Deaths prcptd (no.)	<6 w / sub clinical VAD (%)	<6 w / clinical VAD (%)
Afghanistan	50000	53	-
Bangladesh	28000	28	0.7
Bhutan	600	32	0.7
INDIA	330000	57	0.7
Nepal	6900	33	1
Pakistan	56000	35	-
S.A region	471500	-	-
World total	1150000	-	-

Source: UNICEF2003 b:WHO 2000; UNICEF & MI 2004 a

Prevalence of vitamin A deficiency (VAD)

Figure 7.2.1: Trends in prevalence of subclinical vitamin A deficiency among children under 6, by region, 1990-2000



Source: UNICEF and 2004b

Prevalence of clinical and sub clinical vitamin A deficiency in India is among the highest in the world (Table 7.2.1 and Figure 7.2.1). Though prevalence of clinical vitamin A deficiency is less than 1% in India, biochemical subclinical deficiency is quite high; the decline in subclinical vitamin A deficiency over the last decade has

been quite to small. India remains to be the home of more than a quarter of the world's preschool children suffering from subclinical VAD and a third of the preschool children with xerophthalmia. Clinical symptom of VAD such as night blindness is seen among women of reproductive age and in pregnant women.

Table 7.2.2: Time trends in age wise average intake of vitamin A

Age group		75-79	96-97	00-01	04-05
10-12	B	101	131	169	221
	G	105	111	174	205
13-15	B	114	138	196	215
	G	103	133	180	251
16-17	B	120	184	183	241
	G	115	145	213	261
Adult	M	142	172	242	267
Adult NPNL	F	118	148	219	254
Preg		160	142	227	261
Lact		133	162	212	249

Source: NNMB reports, 1975-2005

Dietary intake of vitamin A

NNMB provides time trends in dietary intake of vitamin A. it is obvious that vitamin A intake continues to be substantially lower than the RDA in all age groups (Table 7.2.2). Vitamin A intake has not increased over the last three decades either in urban or rural areas (Table 7.2.3). Vitamin A intake is higher in INP states (northern and eastern states) as compared to NNMB states (mainly peninsular states) (Table 7.2.4 & 7.2.5).

Table 7.2.3: Time trends in intake of vitamin A in rural and urban areas (c/day)- NNMB & INP

Nutrient	NNMB							INP (1995-96)	
	Rural					Urban Slums		Rural	Urban
	1975-79	1988-90	1996-97	2000-01	2004-05	1975-79	1993-94		
Vitamin A	257	294	300	242	257	248	352.5	355	356.0

Source: National Nutrition Monitoring Bureau, India Nutrition Profile
Survey Population: Rural & urban; Sample Size: Rural, 33048 (1975-79), 14391 (1996-97), 30968 (2000-01), 32500 (1975-80), 5447 (1993-94), INP (46457)

Table 7.2.4: State wise average intake of vitamin A (per CU/day)

States	Vitamin A (μg)		
	R	U	C
Haryana	415		
Himachal	481		
Punjab	448		
Rajasthan	395	423	400
Chandigarh	257	411	391
Delhi	486	382	386
Bihar	267	243	263
Sikkim	376	322	368
Arunachal	698		
Assam	235		
Manipur	347	395	357
Meghalaya	297	285	296
Mizoram	802	1062	855
Nagaland	702		
Tripura	441	173	431
Daman & Diu	552		
D & N Haveli	340		
Goa	205	12	198

Combined; R=Rural; U=Urban;
Source India Nutrition Profile 1998

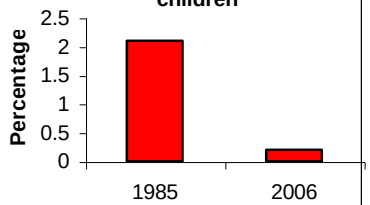
Table 7.2.5: Time trends and interstate differences in average vitamin A intake in different states - NNMB

Food stuffs	Year	Ker	TN	Kar	AP	Mah	Guj	Ori	Pooled	RDA
Vit A (ug)	75-79	176	211	242	264	313	272	-	246	600
	88-90	297	240	269	286	311	286	417	282	
	96-97	274	250	229	278	220	277	526	300	
	04-05	162	199	178	245	198	207	523	257	

Prevalence of clinical signs of vitamin A deficiency

Data from NNMB surveys show that there has been substantial decline in prevalence of Bitot's spots (Figure 7.2.2). The NNMB micronutrient survey indicates that currently prevalence of Bitot's spots in preschool children is

Figure 7.2.2: Prevalence of Bitot's spots in preschool children



Source: NNMB reports

only 0.7%; prevalence of night blindness is less than 0.5 % in NNMB surveys.

Figure 7.2.3: Prevalence of Bitot's spots and night blindness in children in different surveys

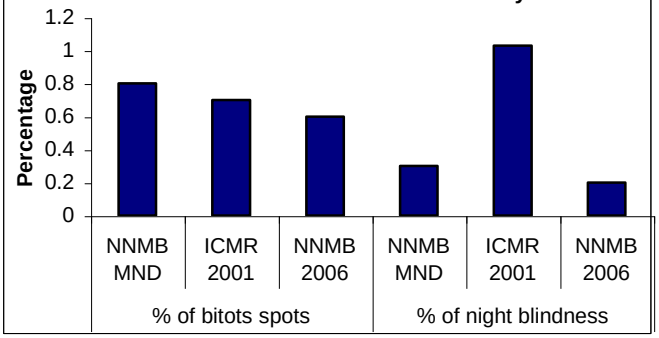
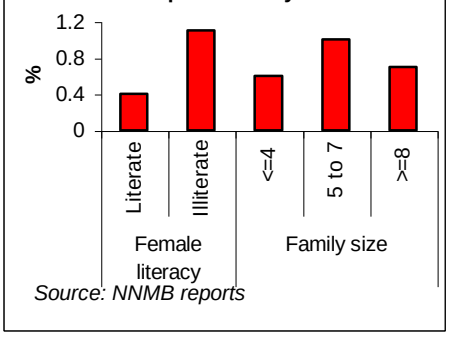


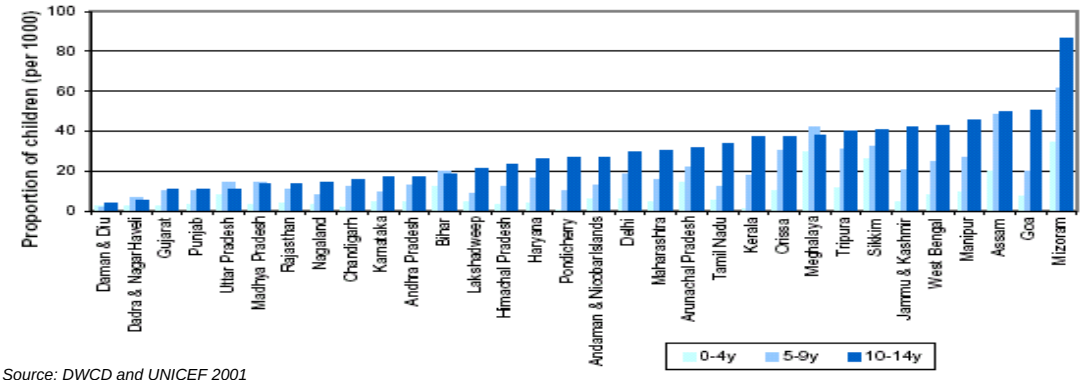
Figure 7.2.4: Prevalence of Bitot's spots in 1-<5yr



Source: NNMB reports

A comparison of the prevalence of Bitot's spots and night blindness between 1985 and 2006 NNMB surveys is shown in Figure 7.2.3. Data from NNMB and ICMR surveys indicate that prevalence of Bitot's's spots is less than 1%. Data from NNMB survey showed that prevalence of Bitot's spots is higher in children of illiterate mothers; prevalence of Bitot's spots is lowest in children from small families (Figure 7.2.4).

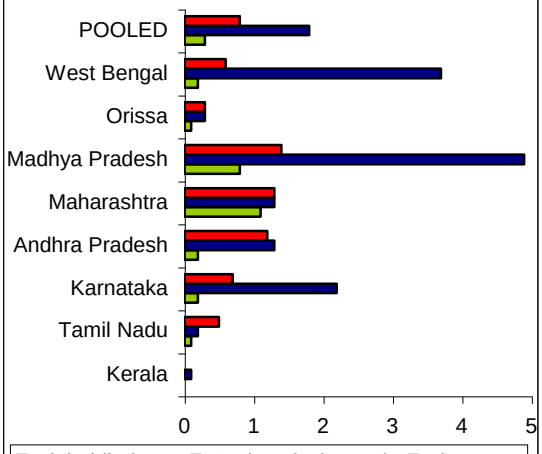
Figure 7.2.5: Proportion of children (per 1000) experiencing day & nighttime vision difficulties



Source: DWCD and UNICEF 2001

There are large interstate variations in the prevalence of VAD among children. In the 1950s, prevalence of night blindness and Bitot's spots in pre-school children ranged between 5 per cent and 10 per cent in most states. The number of children with vision problems has fallen below 10 per 1,000 children in states such as Gujarat and Punjab but in many North-East states, such as Tripura, Sikkim, Manipur, Assam, and Mizoram, as well as Jammu and Kashmir, West Bengal, and Goa prevalence is more

Figure 7.2.6: Prevalence (%) of signs & symptoms of VAD (1-<5 yr children)



Source: NNMB MND, 2003

than 30 per 1,000 children (Figure 7.2.5). The prevalence of different signs and symptoms of VAD among 1-<5 yr old children in the different states of NNMB is shown in Figure 7.2.6.

National Prophylaxis Programme Against Nutritional Blindness

In the fifties and sixties many of the states reported that blindness due to Vitamin A deficiency was one of the major causes of blindness in children below five years. A five-year long field trial conducted by NIN showed that if massive dose Vitamin A (200,000 units) was administered once in six months to children between one and three years of age, the incidence of corneal xerophthalmia is reduced by about 80 per cent. In view of the serious nature of the problem of blindness due to Vitamin A deficiency, it was felt that urgent remedial measures in the form of massive dose Vitamin A supplementation covering the entire population of susceptible children should be undertaken. In 1970, the National Prophylaxis Programme Against Nutritional Blindness was initiated as a centrally sponsored scheme. Under this scheme, all children between ages of one and three years were to be administered 200,000 IU of Vitamin A orally once in six months.

This programme had been implemented in all the states and union territories during the last thirty-five years. The major bottleneck during the 1970s was lack of infrastructure at the peripheral level to ensure timely administration of the dose. In the 1980s there was considerable improvement in the infrastructure. The lack of adequate supply of Vitamin A, which came in the way of improved coverage, was also corrected. Data on coverage under massive dose Vitamin A programme in different states reported in different surveys are shown in Annexure 7.2.1. While coverage in a few states was satisfactory, coverage in majority of states was low. Data from NNMB shows a similar trend in the nine states covered by NNMB (Annexure 7.2.2).

In an attempt to improve the coverage, especially of the first two doses, it was decided to link Vitamin A administration to the ongoing immunization programme during the Eighth Plan period. Under the revised regimen a dose of 100,000 IU of Vitamin A was administered to all infants at nine months along with measles vaccine and a second dose of 200,000 IU was administered at 18 months of age along with booster dose of DPT and OPV. Subsequently, the children were to receive three doses of 200,000 IU of Vitamin A every six months until 36 months of age. The reported coverage figures under the modified regimen indicate that there has been some improvement in coverage with the first dose (50 –75 per cent). However, the coverage for subsequent doses is low.

In an attempt to improve the coverage, some states like Orissa linked administration of Vitamin A with the pulse polio immunization campaign. It is reported that the state took precautions to prevent overdosing by stopping Vitamin A administration in the preceding six months. The state reported improved coverage. Following this report several states embarked on a similar

exercise. Planning Commission, the Department of Family Welfare and the Indian Academy of Pediatrics stated that this strategy is inappropriate.

During the campaign mode administration of Vitamin A, along with pulse polio, in Assam in November 2001, deaths among children who were administered massive dose Vitamin A were reported. Some of these deaths could be coincidental where Vitamin A had been administered to ill children, but the possibility that some of the deaths could have been due to Vitamin A toxicity (either due to administration of higher dose or a massive dose Vitamin A administration earlier) cannot be ruled out.

The Tenth Five Year plan recommended that the second and subsequent doses of massive dose vitamin A may be administered biannually in the pre summer (April-May) and pre winter (Sept-Oct) period. This strategy was operationalised successfully in states like U.P with UNICEF assistance and resulted in improved coverage for all the doses. In 2006-07, a policy decision has been taken to cover all children in the 1-6 yr age group under the massive dose vitamin A programme. Clinical Vitamin A deficiency often coexists with other micronutrient deficiencies and hence, there is a need for broad-based dietary diversification programmes aimed at improving the overall micronutrient nutritional status of children.

Vitamin A deficiency during pregnancy and lactation

It is estimated that the prevalence of Vitamin A deficiency during pregnancy and lactation range between 1 and 5 per cent. Small-scale studies have reported large inter state and inter district variation in prevalence of clinical symptoms of VAD. However, nation-wide comparable data is not available. There are reports of night blindness occurring during pregnancy and disappearing after delivery without any treatment. Sub-clinical Vitamin A deficiency might perhaps be more widespread. It may not be feasible to undertake large-scale studies to estimate prevalence of sub clinical Vitamin A deficiency. There is very little data on the prevalence of Vitamin A deficiency during lactation. In spite of continued secretion in breast milk, available limited data does not suggest increased prevalence of Vitamin A deficiency during lactation. Unlike anaemia, Vitamin A deficiency in pregnant and lactating women is not associated with any increase in morbidity and mortality. There is no ongoing programme for the prevention, detection and treatment of Vitamin A deficiency in pregnant and lactating women.

Detection and management of clinical Vitamin A deficiency in pregnant women has been included as a component of antenatal care under RCH programme. Night blindness and Bitot's spot are readily identifiable clinical entities. Women with these symptoms / signs will be identified by the ANM and 10,000 IU of Vitamin A administered daily for four weeks. Efforts to promote cultivation and consumption of micronutrient rich vegetables for prevention of clinical deficiency have to continue.

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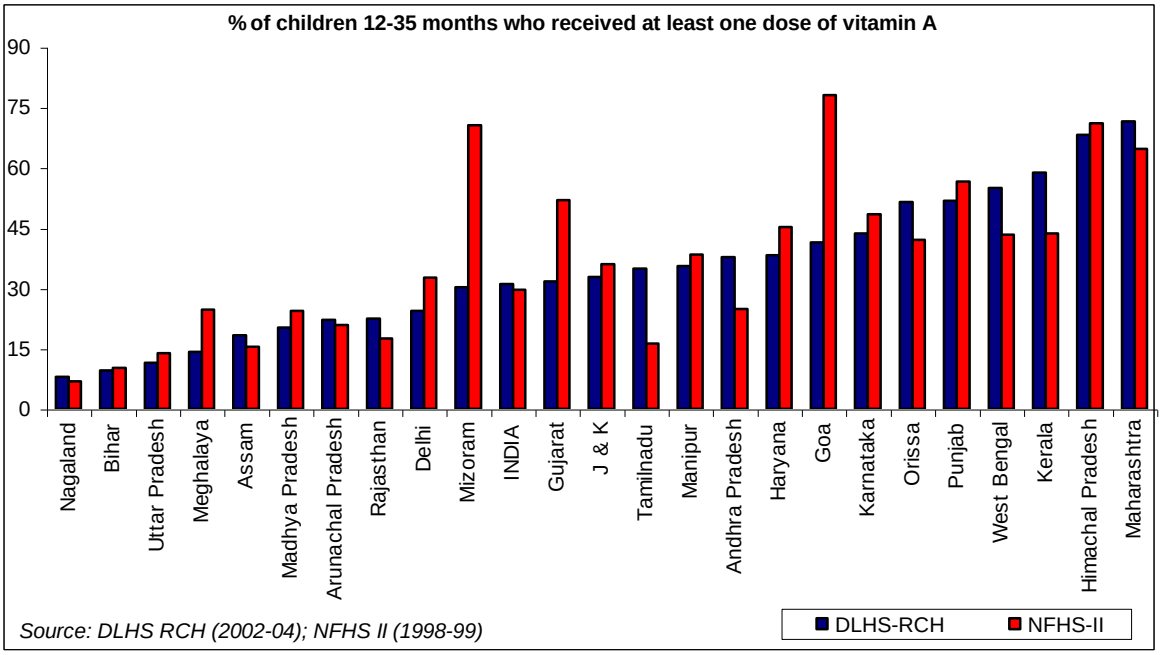
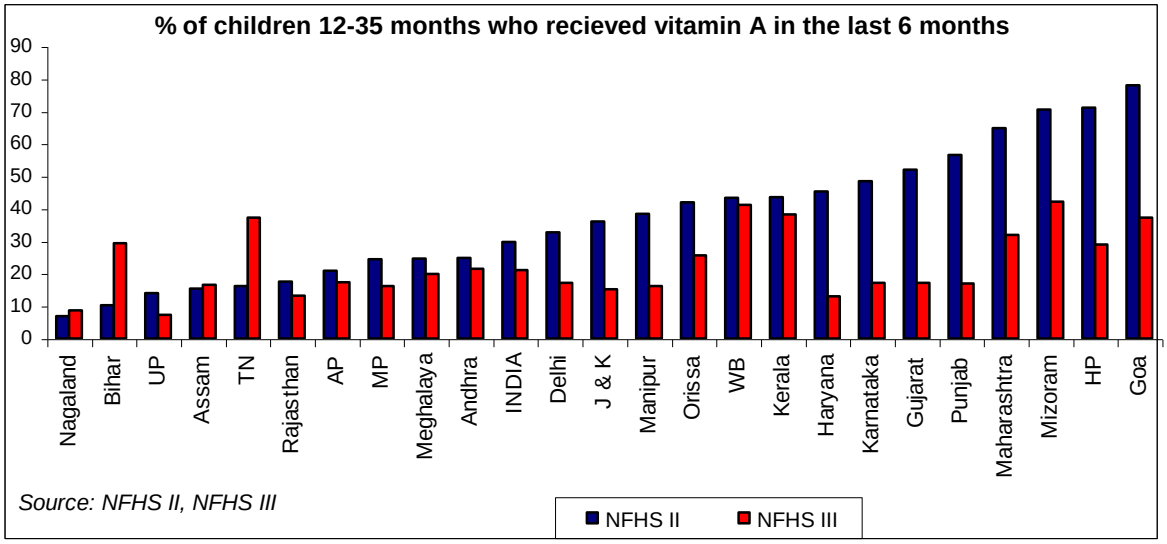
Annexure 7.2.1





Annexure 7.2.2

Distribution (%) of Index children according to particulars of receipt of massive dose vitamin A during the previous one year

Particulars	States								
	Kerala	Tamil Nadu	Karnataka	Andhra Pradesh	Mahara-shtra	Madhya Pradesh	Orissa	West Bengal	**Pooled**
N	148	322	337	402	295	284	410	391	**2589**
Received massive dose vitamin A during previous one year									
Yes	43.9	63	55.8	50.7	52.2	52.8	80	51.9	**57.7**
No	39.2	24.8	38.9	36.1	35.6	43	13.9	46.8	**34**
Do not know	16.9	12.1	5.3	13.2	12.2	4.2	6.1	1.3	**8.2**
Total number of doses received									
One dose	28.4	20	41.8	14.2	29.5	20.4	38.8	46.8	**30.6**
Two doses	10.1	30.4	13.9	35.1	22.4	32	41.2	3.8	**24.8**
Do not know	5.4	12.4	0	1.5	0.3	0.4	0	1.3	**2.4**
Time of receipt of last dose									
<6 mths ago	11.5	43.8	25.8	18.4	40	30.3	69.3	34.3	**36.3**
6-11 mths ago	12.8	5.6	30	30.1	11.5	19.4	10.5	15.6	**17.5**
Do not know	14.2	1.2	0	0.7	0.3	2.8	0.2	0.8	**1.6**
Place of administration of massive dose of vitamin A									
Home	0	16.1	7.4	2.7	4.1	5.3	15.9	2	**7.3**
AWC	11.5	30.4	30	21.9	22	41.9	31.5	1.8	**24.1**
Sub-centre	5.4	2.2	5.3	17.7	13.6	1.1	10.2	46	**14.3**
PHC	7.4	0.3	11.6	4.2	10.2	0.4	6.6	0	**4.9**
Others	0	0.3	1.5	2	1.7	1.1	15.6	0	**3.3**
Massive dose of vitamin A administered by									
AWW	5.4	31.4	4.5	1.5	2.4	11.6	32.9	2.3	**12.1**
MPHW (F)	7.4	14.9	25.5	42.3	48.5	33.8	43.7	21.7	**31.6**
MPHS (F)	1.4	3.1	25.8	3.7	0.3	3.2	2	25.8	**9**
Others	0	0	0	0.7	0.3	0	1.2	0	**0.3**
Do not know	10.1	0	0	0.2	0	1.1	0	0	**0.7**