

How to add deworming to vitamin A distribution



© World Health Organization 2004

All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

The World Health Organization does not warrant that the information contained in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use. The named authors alone are responsible for the views expressed in this publication.

Cover image: *Preschool child receiving a deworming tablet in Lao People's Democratic Republic,*
©WHO/D. Engels

How to add deworming to vitamin A distribution

This document was compiled by:

Antonio Montresor

Public Health Specialist, Vectorborne and other Parasitic Diseases, World Health Organization, Viet Nam

Pragya Mathema

Project Officer, Nutrition, United Nations Children's Fund, Nepal

Henrietta Allen

Technical Officer, Parasitic Diseases and Vector Control, Communicable Disease Control, Prevention and Eradication, World Health Organization Switzerland

Karen Codling

Regional Nutrition Project Officer, United Nations Children's Fund, East Asia and Pacific Regional Office

Per Blomquist

Chief, Nutrition and Care Section, United Nations Children's Fund, Nepal

Kevin Palmer

Regional Adviser in Vectorborne and other Parasitic diseases, World Health Organization, Western Pacific Regional Office, Manila, Philippines

Nagi Shafik

Project Officer, Health, United Nations Children's Fund, Democratic People's Republic of Korea

Maurice Hours

Mother and Child Health /Expanded Programme of Immunization Health Project Officer, United Nations Children's Fund, Cambodia

Chum Aun

Assistant Project Officer EPI, United Nations Children's Fund, Cambodia

Lorenzo Savioli

Team Coordinator, Parasitic Diseases and Vector Control, Communicable Disease Control, Prevention and Eradication, World Health Organization, Switzerland

Acknowledgements

The invaluable input of the following colleagues is gratefully acknowledged:

Sharada Pandey, Chief of the Nutrition Section, Child Health Division, Ministry of Health, Nepal

Maaïke Arts, Project Officer, Nutrition/Early Childhood Care, UNICEF, Viet Nam

Tommaso Cavalli-Sforza, Regional Advisor in Nutrition and Food Safety, World Health Organization, Regional Office for the Western Pacific, Philippines

Williamina Wilson, Editor, Communicable Diseases, World Health Organization, Geneva, Switzerland

Financial support for the production of this manual was generously provided by the Bill & Melinda Gates Foundation.

Contents

Summary	5
Aim of this manual	6
I. Benefits of deworming	
Soil-transmitted helminths	7
Global distribution of STH infections	7
Why treat children for worms?	8
Why give children vitamin A supplements?	8
Practical reasons for simultaneous delivery of vitamin A supplements and deworming tablets	9
II. Practical issues about deworming drugs	
Drug safety	12
Drug distribution	12
Deworming drugs	13
III. Country experiences	
Nepal: the national Vitamin A <i>Plus</i> programme	17
Democratic People's Republic of Korea: National Child Health Days	24
Cambodia: using outreach services	28
References	32
Annex 1: Global estimates of soil-transmitted helminth infections in children aged 0–4 years	34
Annex 2: Vitamin A supplementation: data for countries reporting over 70% coverage in 2000	35
Annex 3: How to request WHO support for drug quality assessment	37
Annex 4: Contact addresses for drug procurement	38
Annex 5: How to obtain WHO assistance for drug procurement	39

Summary

Deworming drugs:

- are safe,
- are single dose,
- cost less than US\$ 0.02/dose,
- are simple to administer.

Why delivering vitamin A capsules and deworming tablets together makes sense... for health reasons:

- Worm infections contribute to vitamin A deficiency.
- Deworming reduces anaemia: anaemia is associated with increased vitamin A deficiency.
- Worm infections and vitamin A deficiency both have serious health repercussions for a growing child and therefore both should be prioritized in endemic countries.

... and for logistic reasons:

- Worm infections and vitamin A deficiency are public health problems in the same geographical areas.
 - The target age groups for vitamin A distribution and deworming are very similar.
 - Training to administer deworming drugs is straightforward and can easily be integrated into the training for vitamin A distribution.
 - Adding deworming to vitamin A distribution does not disrupt the vitamin A distribution programme – in fact, it appears to increase the attendance since deworming is extremely popular with children and parents.
-

Aim of this manual

This manual is written for health planners and aims to promote the deworming of preschool children where vitamin A distribution campaigns are conducted.

In this manual, *preschool children* are defined as all children older than 1 year who are not yet attending school.

Attention is focused on this group because while school-age children (classified from the age of around 6 years onwards) are normally dewormed through school health programmes, preschool children are often not reached by deworming interventions.

In recognition of the constant demands made on health planners to prioritize health interventions, often with limited financial and human resources, this manual describes some of the advantages of combining two programmes which are often delivered separately: vitamin A distribution and deworming.

The manual is divided into three main sections that describe:

- the benefits of deworming preschool children;
- practical information about deworming drugs;
- experiences from three countries where deworming has been added to existing vitamin A distribution programmes.

1. Benefits of deworming

Soil-transmitted helminths

Soil-transmitted helminths (STHs), more commonly known as intestinal worms, represent a serious public health problem wherever the climate is tropical and inadequate sanitation and unhygienic conditions prevail. Three types of worm are the most prevalent and have the most damaging effect on the health of preschool children:

- roundworms (*Ascaris lumbricoides*),
- hookworms (*Ancylostoma duodenale* and *Necator americanus*),
- whipworms (*Trichuris trichiura*).

Other parasitic worms, such as schistosomes, which have their most severe impact on school-age children, are not discussed here because they do not cause significant morbidity in preschool children.

Global distribution of STH infections

The global distribution of STH infections is shown in Figure 1. Intense transmission of infection is represented in the areas shaded in dark grey. New estimates have calculated that as many as 230 million children aged 0–4 years are infected (1) (Annex 1).

Figure 1: Global distribution of soil-transmitted helminth infections



Why treat children for worms?

Worm-free children have a better nutritional status, grow faster and learn better

Treating children of any age for worms is one of the simplest and most cost-effective interventions for improving that child's health.

The evidence demonstrating how worm infections damage a child's health is unambiguous: worm infections are associated with a significant loss of micronutrients (2). Roundworms are the most prevalent STH infection in preschool children and cause significant vitamin A malabsorption (3), which can aggravate malnutrition and anaemia rates and contribute to retarded growth (4). A child's physical fitness and appetite are negatively affected (5) and his or her cognitive performance at school is compromised (6). The constant and life-long immune activation due to worm infections reduces the body's capacity to resist to other infections.

Preschool children are extremely vulnerable to the deficiencies induced by worm infections: they are in a period of intense physical and mental development and particularly need the vitamins and micronutrients that are lost through worm infections.

Why give children vitamin A supplements?

Vitamin A-replete children have an enhanced chance of survival and less severe childhood illnesses

Vitamin A deficiency also does its worst damage during childhood and is a major contributor to childhood mortality and illness. The most commonly known effect of vitamin A deficiency is blindness. Less well known is that vitamin A is also essential for the functioning of the immune system. Even before blindness occurs, vitamin A-deficient children are at increased risk of dying from infectious diseases such as measles, diarrhoea and malaria. As a result, vitamin A supplementation of vitamin A-deficient populations can reduce child mortality by as much as 23–34% (7).

Practical reasons for simultaneous delivery of vitamin A supplements and deworming tablets

Several similarities between these two health programmes, both in terms of programme logistics and an added health impact, make it logical to deliver both interventions at the same time. One of the clearest advantages is simply the coverage opportunity offered by vitamin A programmes: Over 167 million children are reached every year by vitamin A supplementation programmes (Annex 2) in countries across the world (Fig. 2). These activities represent a unique opportunity to provide deworming at the same time and at very low cost (8). The reasons for simultaneous delivery are listed below.

1. Vitamin A-deficient children usually have worms

Vitamin A deficiency and worms both thrive in communities that are poor and therefore the two problems often coexist. In other words, children living in these environments are invariably vitamin A deficient *and* infected with worms. Delivering deworming tablets and vitamin A supplements at the same time therefore makes logistical sense, particularly for remote communities that are difficult to reach.

Figure 2: Global distribution of vitamin A supplementation programmes



2. Simple delivery – simple training

The drugs used for deworming are regarded as so safe that non-medical staff, such as village health workers or teachers, can be trained to deliver them. This means that the deworming training is so simple that it can easily be added onto the training sessions for vitamin A distribution programmes. The main difference is the target age group:

- vitamin A supplements are given from the age of 6 months;
- deworming tablets are given from the age of 1 year.

3. Worm-free children have a better vitamin A status

Research has shown that there is a clinical link between worm infection and reduced vitamin A levels. Roundworms live in the gut and need vitamin A to grow. A competition is set up between the parasite and the child, in which it appears that the worms may be more efficient at absorbing vitamin A than their host. Where vitamin A-rich foods are already marginal in the diet, roundworm infections can tip the balance towards vitamin A deficiency (3). In Nepal, where vitamin A deficiency and STH infections are both high, the intensity of roundworm infection in children with xerophthalmia was found to be three times that found in an uninfected control group (9). Chronic roundworm infection also leads to malabsorption of vitamin A, a different mechanism which has the same end result of worsening the vitamin A status of the child (10, 11).

4. Deworming is popular and can increase vitamin A supplementation coverage

Deworming is an extremely popular intervention with communities and parents in particular. This is partly because it has an immediate and highly visible effect: the worms – especially roundworms, which are the most prevalent STH in preschool children – are expelled and are visible in the faeces and children feel better in just a few days. The popularity of this programme also means that a community's trust in its health personnel increases – which in turn makes it a popular programme for health staff to deliver.

5. Multiple health products can increase campaign coverage

Offering multiple health products can boost campaign attendance. Thus in the same way that offering vitamin A supplements during immunization campaigns can increase the number of mothers bringing their children for services (12), offering deworming along with vitamin A also increases coverage.

2. Practical issues about deworming drugs

Drug safety

Deworming drugs are extremely safe

Deworming drugs reach and kill the parasites in the digestive tract and, because they are poorly absorbed, cause no significant side-effects. Minor side-effects such as nausea and abdominal discomfort are rare (occurring in 1–5% of individuals, according to different statistics), transient and well tolerated by children.

Deworming drugs can be given to children from the age of 1 year

According to a recent WHO consultation, it is safe and recommended in highly endemic areas to start deworming children from the age of 1 year (13). If a child younger than 1 year is treated by accident, or if a child is given several repeated doses (for example, if he or she has recently been treated at a health clinic and then receives another tablet during a mass campaign), no harm will be caused (for other parasitic diseases, higher doses of albendazole or mebendazole are given daily for between 30 days and 6 months without reported side-effects).

Drug distribution

No special training is needed for distributors

Administering deworming drugs is very simple. With only a few hours of training, non-medical personnel such as village health volunteers or teachers can easily and safely give the drugs and provide clear simple education on the benefits of deworming. Because the drugs are safe, mothers can also take tablets home to deworm children who were unable to attend for treatment. Deworming training can therefore be easily combined with the training for vitamin A distribution.

Deworming drugs

Types of drugs

There are four drugs to treat STHs (14). The doses for different age groups are shown in Table 1. Albendazole and mebendazole tablets are chewable and normally fruit flavoured, which means it is not difficult to persuade children to take them. The tablets can be crushed between two spoons and given with a glass of water for children that have difficulties in swallowing the tablets.

Table 1: Recommended deworming drugs

Drug	Dose for preschool children		Comment
	12–23 months	24 months and older	
Albendazole <i>400 mg tablet</i>	½ tablet	1 tablet	These are particularly attractive because they are single dose and there is no need to weigh the children
Mebendazole <i>500 mg tablet</i>	1 tablet	1 tablet	
Levamisole <i>40 mg tablet</i>	2.5 mg/kg	2.5 mg/kg	The correct dose of levamisole and pyrantel is calculated according to the child's weight in kg. Scales are therefore needed
Pyrantel palmoate <i>250 mg tablet</i>	10 mg/kg	10 mg/kg	

All these drugs have excellent therapeutic efficacy.

The cost of deworming drugs

The deworming drugs in Table 1 are in the *WHO Model list of essential medicines (15)* and can be procured from generic producers at very low cost.

STH deworming drugs cost less than US\$ 0.02 per tablet

If large quantities of tablets are purchased, an even lower price can normally be negotiated.

How to purchase deworming drugs

Many countries manufacture deworming drugs and using local producers can be the easiest way to procure the drugs and support local economies at the same time. WHO can assist with drug quality testing if necessary (Annex 3).

All the drugs in Table 1 can also be procured through non-profit organizations such as the International Dispensary Association or the United Nations Children's Fund (UNICEF) (Annex 4).

WHO can also assist with procurement through its own procurement services and will guarantee drug quality and the best prevailing prices (Annex 5).

It is recommended to buy drugs in packages of 100 or 200 tablets. Containers with 100 or 200 tablets make it easier to give each distributor the correct quantity of tablets without the need to open the containers and recount the tablets into smaller quantities. This also saves a great deal of time and avoids wastage. For large-scale programmes, containers of 500 and 1000 tablets are also normally available.

Additional materials

No additional materials are needed if mebendazole or albendazole are chosen, except possibly water to help the children to swallow the tablets. If levamisole or pyrantel is used, scales are needed to calculate the number of tablets required – which will increase the distribution costs.

Transporting drugs

Transporting deworming drugs is easy. No special precautions are necessary beyond storing them in a closed container and keeping them out of extreme heat and humidity. In terms of the space needed, a container of 200 tablets is about the same size as a soft-drink can, so, according to the estimated need, one or more such containers can easily be sent out with vitamin A supplements to each distribution site.

Calculating the cost of adding deworming drugs to a vitamin A distribution round

Drugs are the main additional cost when deworming is added to a vitamin A distribution round. Calculating the number of tablets needed is straightforward (Box 1) once you have information on your target group.

BOX 1

CALCULATING THE NUMBER OF DEWORMING TABLETS REQUIRED

It is important to remember that the target group for vitamin A distribution will be children aged 6–59 months whereas the target group for deworming will be those aged 12–59 months. There are therefore two ways of calculating the number of deworming tablets needed, based on:

I. Vitamin A capsule order

If blue 100 000 International Units (IU) vitamin A capsules are being provided to children aged 6–11 months and red 200 000 IU vitamin A capsules are being provided to children aged 12–59 months, simply order the same number of deworming tablets as the red 200 000 IU vitamin A capsules, for each round of distribution.

II. Calculation of population size

1. Calculate the population of children 6–59 months (e.g. from national census data).
2. From this, calculate the number of children aged 12–59 months – your target group for deworming. This is usually 88% of children aged 6–59 months.
3. Multiply the target population (12–59 months) by the coverage you expect to reach.
4. Add 5%, for wastage.
5. This gives you the number of tablets per distribution round.
6. If you are ordering for two doses per year, double the amount.

Example

- The population aged 6–59 months is:

$$1\ 000\ 000$$

- The target population for deworming (12–59 months) is:

$$1\ 000\ 000 \times 0.88 = 880\ 000$$

- You expect your coverage to be 75%, so:

$$880\ 000 \times 0.75 = 660\ 000$$

- The total amount of deworming tablets needed *per round* is:

700 000 (including a wastage factor of 5%)

- if mebendazole is used, the number of tablets needed is:

$$700\ 000 \text{ (1 tablet per child)}$$

- if albendazole is used, since only ½ a tablet is needed for 12–24 month-old children, the total number of tablets needed is:

$$700\ 000 \times 0.87 = 612\ 500$$

Calculating the cost of deworming tablets

To calculate the cost of the drugs, multiply the number of tablets required by US\$ 0.02 (the current cost of one tablet, including transport and insurance).

Additional costs

When financial resources are available, additional training for distributors and/or health education activities could be considered (see page 23 for programme costs in Nepal). Health education is particularly important because it reduces the risk of reinfection.

3. Country experiences

Until recently, the deworming of preschool children has received limited attention because it was believed that children of this age group were unlikely to be heavily infected. There is, however, increasing evidence that preschool children can already be carrying heavy worm loads and would benefit from treatment before they start school. Here, three country programmes are described – each has taken a different approach to deworm their preschool children:

- Nepal added deworming to its national vitamin A campaign.
- The Democratic People's Republic of Korea added deworming to its National Child Health Days.
- Cambodia is providing deworming with vitamin A as part of its routine outreach activities.

Nepal's programme is described in some detail – the other two are only briefly outlined. We hope that these experiences will encourage decision-makers in other countries to be convinced of the benefits of such combined programmes and prompt them to follow suit.

Nepal: the national Vitamin A *Plus* programme

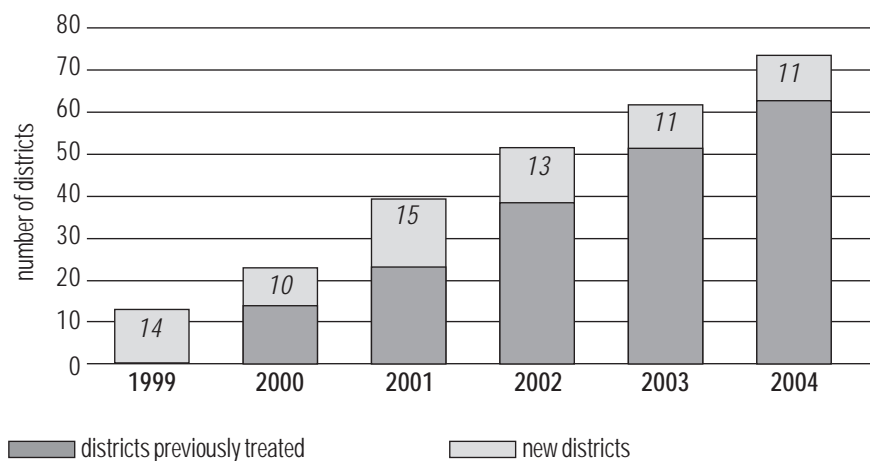
Background

Nepal's story dates back to 1998 when a national micronutrient survey was carried out which found that 78% of the preschool children were severely or moderately anaemic (defined as haemoglobin (Hb) levels <7.0 g/dl for severe anaemia and <10.9 g/dl for moderate anaemia) and 32% were subclinically vitamin A-deficient (defined as serum retinol levels <0.70 $\mu\text{mol/l}$)¹. In 2000, an STH survey found a similarly worrying picture with infection rates over 60% (16). Other studies have independently shown hookworm infection to be one of the major contributory factors to anaemia in Nepal (8). In 1993, a national vitamin A capsule distribution campaign was launched which now successfully reaches over 90% of children

¹ *Nepal micronutrient status survey 1998*. Ministry of Health, His Majesty's Government, UNICEF, WHO, The Micronutrient Initiative, New ERA Ltd.

aged 6–59 months every year, twice a year (in April and October). With this level of coverage and the infrastructure already in place, the vitamin A campaign was an ideal channel for deworming. In October 1999 the two treatments were delivered together for the first time in 14 districts, under the “Vitamin A Plus” programme. Over the years, the programme has been gradually expanded and is now covering 74 of the 75 districts (Fig. 3), which means that 3.3 million children aged 6–59 months receive vitamin A and 2 million preschool children are successfully dewormed with albendazole twice a year.

Figure 3: Number of districts covered by deworming in Nepal by year



Who delivers the intervention?

Nepal has 75 districts; each is divided into Village Development Committees, which in turn are divided into nine wards – the smallest administrative units in the country. In each ward there is at least one female community health volunteer (FCHV) who carries out various outreach health services. For vitamin A distribution, more than 45 000 FCHVs are mobilized and with the help of other health workers, local governing bodies, nongovernmental organizations (NGOs) and schools, they set up distribution points in each village where mothers or caregivers bring their children.

Integrated training

Each time the Vitamin A *Plus* programme was launched in a new district, a cascade type of training was carried out from the district health officers to the FCHVs (Table 2). Immediately after the campaign, the FCHVs also conducted follow-up group discussions within their communities to emphasize that in addition to the deworming drugs, good hygiene and sanitary practices are also extremely important to prevent reinfection.

Table 2: Cascade training for vitamin A distribution and deworming

Level of training (duration)	Who does the training?	Who is trained?	Objectives
National (2 days)	Staff from the Nutrition Section and Child Health Division of the MoH ^a	District Health Officers from new districts to which deworming is to be included	<ul style="list-style-type: none"> • Review existing nutrition programmes and brief District Health Officers on deworming programme: <ul style="list-style-type: none"> – how to plan its integration, and – how to calculate the number of deworming tablets required • Establish dates for the next FCHV^b Review Meeting • Develop a detailed implementation plan for each district
District (2 days)	District Health Officers Staff from the Child Health Division of the MoH Nepal's Technical Assistance Group ^c	Staff from health posts and subhealth posts	<ul style="list-style-type: none"> • Enable peripheral health staff to organize orientation for FCHVs on how to carry out vitamin A distribution and deworming activities • Establish dates for the next FCHV Review Meeting • Estimate the number of deworming tablets required
Village Development Committee (4 hours)	Health post and subhealth-post staff	FCHVs	<ul style="list-style-type: none"> • Build the skills and capacity of the FCHVs for vitamin A distribution and deworming; FCHVs receive a short introduction on deworming covering: <ul style="list-style-type: none"> – why deworming is important – how to organize its integration in the vitamin A campaign – how to estimate the number of deworming tablets required

^a MoH = Ministry of Health.

^b FCHV = Female community health volunteer.

^c Nepal's Technical Assistance Group is a nongovernmental organization hired by the MOH to support the vitamin A programme by providing training and monitoring support.

Training tools; information, education and communication materials; and using the media

The Vitamin A *Plus* programme in Nepal paid special attention to the following points:

- Training tools (manuals, a deworming guidebook) and information, education and communication (IEC) materials to make the training sessions more effective and clear were designed for the FCHVs.
- In districts where deworming is taking place for the first time, promotional activities to ensure maximum coverage are carried out in the community, such as rallies, and house-to-house visits by health workers, FCHVs, NGOs, local governing bodies, teachers and students.
- Two to three weeks before the treatment day, an intensive media campaign is launched to inform communities about the forthcoming distribution and to encourage them to assist the FCHVs in their work.

Choice of drug and procurement

For its deworming programme, Nepal's Ministry of Health (MoH) chose to use albendazole (400 mg) tablets, which are produced locally by a government factory at a cost of US\$ 0.01 per tablet. The drugs are orange flavoured, chewable and packed in aluminium-foil strips (which simplifies distribution for the FCHVs). WHO carries out periodic drug quality checks. Until 2001, the MoH Nutrition Section procured the drugs for the April round and UNICEF procured the drugs for the October round. Since then, however, the Government of Nepal has taken over the sole responsibility for procurement, reflecting its commitment to the programme – which bodes well for long-term sustainability.

Advance planning for the drug procurement is vital: nearly 4 million doses of albendazole are needed for each round, making a total of nearly 8 million doses annually. Each year, the MoH Child Health and Logistics Management Divisions develop a requirement list and a dispatch plan and the drugs are then delivered to the FCHVs using the existing government channels. To ensure that the tablets arrive on time, the procurement process starts four months before the distribution.

Monitoring and evaluation

Several different systems are used in Nepal to monitor and evaluate the Vitamin A *Plus* programme.

1. Post-campaign coverage survey

Immediately following the campaign, a survey is conducted in 10–15 randomly selected districts, in each of which 25 wards (clusters) are chosen. In each ward, seven households that include a child of 6–59 months are randomly selected and the mothers are interviewed on various health issues including vitamin A supplementation, salt iodization, iron supplementation and deworming treatment. These surveys have consistently reported that the deworming programme achieves a coverage of 85–95%.

“I was so happy when my daughter also got deworming tablet with vitamin A. After getting the tablet, I feel she has become stronger. I am extremely thankful to our FCHV Didi.”

– Indria Gurung, a mother in Syangia district

“In the past distributions, I had to do house visits to provide vitamin A capsule so no child is missed. With deworming added, the number of house visits I have to make has declined. It has made my work lot easier.”

– Sita Chaudhary, an FCHV in Rupendhi district

2. Monitoring drug coverage

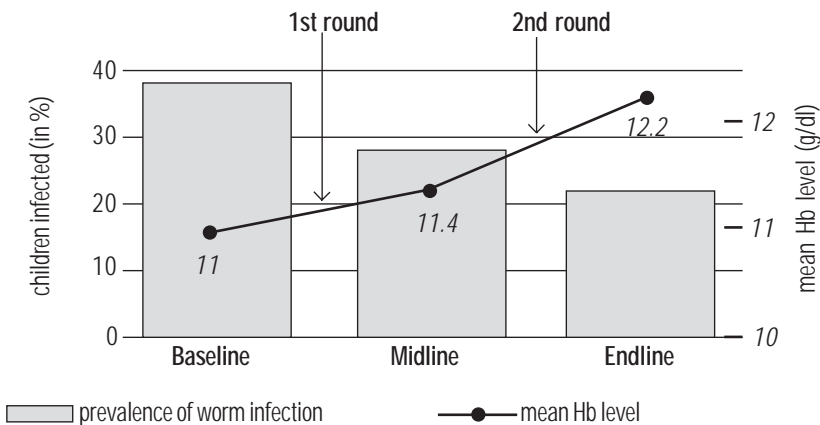
Two systems are used to monitor drug coverage. One is the Health Management Information System, through which districts report on the use of the tablets; the other is the Logistics Management Information System, which tracks how many tablets are dispatched from the regional medical stores. Together these systems monitor the quantity of drugs dispatched and how the drugs were used. The figures are then verified during government annual review meetings and used as the basis for calculating the quantity of tablets to be ordered for the next round.

3. Deworming impact evaluation study

To measure the health impact of the programme, UNICEF coordinated a study, in collaboration with WHO. The aim was to document the impact of the twice-yearly deworming on anaemia levels in a group of 2000 children from four districts over a 12-month period. The results were as follows (see also Fig. 4):

- The prevalence of worm infections fell from 39% to 22% – a reduction of 43%.
- Hb levels increased by an average of 1.2 g/dl.
- The percentage of anaemic children (Hb <12 g/dl) fell from 47% to 11% – a reduction of 77%.
- The percentage of children with moderate or severe anaemia fell from 21% to 2% – a reduction of 90%.

Figure 4: Prevalence of worm infection and haemoglobin (Hb) levels after two rounds of deworming



Adding deworming has not disturbed the vitamin A campaign

Post-campaign surveys have also demonstrated that adding deworming has not adversely affected the performance of the vitamin A campaign, which has maintained a coverage of >95% in all the districts irrespective of whether deworming has been added or not. In fact, there is evidence that adding deworming has made the twice yearly vitamin A distribution more popular and FCHVs have

reported that distributing deworming tablets has strengthened their recognition in the community.

Programme costs

The key costs involved in the Nepalese programme are those of the tablets and the training sessions. Each tablet costs US\$ 0.01 in Nepal and the initial training (including IEC materials) cost US\$ 0.16, making the total cost of integrating twice-yearly deworming just US\$ 0.17 per child reached. After the initial round, the only recurring cost is that of the tablets.

Conclusions

Why has Nepal's programme proved to be so successful? Four key lessons can be learnt from the Nepalese experience, showing why the Vitamin A *Plus* programme proved to be a cost-effective and sustainable approach to deworming preschool children.

1. Adopt a long-term vision and review and adjust it

From the outset of this programme, the key stakeholders recognized the importance of adopting a long-term vision. Thus in 2001, when the MoH and UNICEF first met, they developed a 5-year workplan outlining how the programme would be scaled up, the quantity of tablets required and the funds needed to maintain the programme. This philosophy has continued to the present: every year, in close consultation with all the partners, the MoH Nutrition Section develops a detailed plan of action for the programme's expansion and holds regular meetings to review the current status of implementation and discuss any important changes or policy issues.

2. Importance of political support

Related to the point above is that the Vitamin A *Plus* programme has enjoyed high-level political support. This has meant that it has remained securely on the agendas of policy-makers and government officials. The MoH Nutrition Section and the Child Health Division is now entirely responsible for the programme's implementation. UNICEF continues to provide technical and financial support for

the training sessions and IEC components, and Nepal's Technical Assistance Group is responsible for training and monitoring.

3. Involve the community – no need for medically trained personnel

Community volunteers, rather than health workers, have achieved the high coverage rate. Illiterate, non-medically trained women are responsible for the success of the programme.

4. Demonstrate the benefits

Last, but not least, studies like the deworming impact evaluation study have been extremely useful in demonstrating that deworming has a clear impact on health: after only two rounds of treatment, anaemia levels dropped by over 75%.

Democratic People's Republic of Korea: National Child Health Days

Adapting national immunization days

In 1988, WHO resolved to eradicate polio and launched a strategy which was centred around National Immunization Days (NIDs). NIDs were scheduled to take place twice a year with a one-month gap in between and their goal was to reach and immunize every child under 5 years of age. NIDs were only scheduled to run for 3–5 years, after which they were to be gradually phased out. However, they generated a massive momentum, which many countries harnessed for other health issues. In the Democratic People's Republic of Korea, where NIDs originally took place in October and November, they are now called National Child Health Days and have a much wider health focus than polio eradication.

Covering the children with a package of health

Administratively, the Democratic People's Republic of Korea has nine provinces, three cities and a total of 206 counties or districts, each of which is divided into subunits called *Ri* (rural) or *Dong*

(urban). The National Child Health Days are organized at the same posts as used by the immunization campaign at the *Ri* and *Dong* clinics and also at “baby homes” (established for orphans aged up to 4 years) and nurseries.

Adding vitamin A

In 1999, the remit of the twice-yearly NIDs was broadened to include the delivery of vitamin A supplements to children aged 6–59 months. To ensure that each child received a minimum of two vitamin A doses each year, a third “vitamin A day” in May was added. Since 1999, three National Child Health Days have therefore taken place annually and the number of children aged under 5 years who have received two vitamin A doses annually has risen from 80.5% in 1999 to 95% today.

Adding deworming

In 2002, in recognition of the success of the National Child Health Days, deworming was added to the package. On the treatment day, children between the age of 2 and 5 years now receive a single mebendazole tablet, which is crushed and given with a glass of water.

Today, approximately 2 million children – 98.6% of the total population of 2–5-year-olds in the Democratic People’s Republic of Korea – are reached with this package of vitamin A supplements and deworming tablets:

- vitamin A is given to all children aged 6–59 months;
- mebendazole is given to all children aged 24–59 months.

Community mobilization

Two weeks before each National Child Health Day, the Ministry of Public Health (MoPH) launches an awareness-raising campaign to ensure that communities and families are informed about the forthcoming health activities. National and local media, schools and section (household) doctors are all used to convey the message to each area.

Programme costs

- *Drug costs*

The Democratic People's Republic of Korea chose mebendazole for its deworming programme because it is produced by a local government factory. An estimated 2 600 000 tablets of mebendazole are required for deworming each year. Half a ton of the raw materials required to make the tablets is donated by a German non-profit NGO (Diakonie). The local factory produces about 980 000 tablets/year at a unit cost of <US\$ 0.01; the extra tablets needed are imported by UNICEF and cost <US\$ 0.02/tablet, including freight and insurance.

- *Operational and training costs*

To train its staff, the MoPH developed a protocol using a cascade approach and since the programme is administered by its own staff, there are no additional staff costs. Despite a very limited health budget, all operational costs for organizing the National Child Health Days are borne by the government; UNICEF support for social mobilization is now limited to the printing of posters.

Interestingly, although combining the two campaigns has proved to be logistically straightforward, the major constraint faced by the MoPH has been the transport of supplies from the central medical warehouse in the capital across the country. Assistance with this task has been requested from UNICEF when necessary.

Monitoring and evaluation

Monitoring on the day is carried out by teams made up of staff from the MoPH, donor countries (Germany, Italy, Sweden and the United Kingdom), United Nations agencies, the country representative of Humanitarian Aid Office of the European Commission (ECHO) – the biggest donor in the Democratic People's Republic of Korea – and the International Federation of the Red Cross. Under UNICEF coordination, these teams visit at least 20 posts across the country and collect data on various indicators. The data are then compiled by the MoPH and collated into a single coverage report. A separate system is run through the central medical warehouse which tracks the distribution of the drugs and all the medical items, with the assistance of a UNICEF team which visits the warehouse each week.

Interviews with mothers in the course of the monitoring visits showed a high awareness of the impact of vitamin A supplements and mebendazole treatment, and an immense appreciation for the National Child Health Days. Some mothers indicated that their children had improved appetites and were generally healthier after receiving the vitamin A and mebendazole.

Conclusions

The experience of the Democratic People's Republic of Korea's National Child Health Days contains three important lessons:

1. Capitalize on what already exists

Despite the country's economic problems and a severe decline in the quality of the regular health services, the Democratic People's Republic of Korea's experience demonstrates that the momentum of an existing programme can be harnessed and redirected to deliver other health treatments very efficiently.

2. Deliver a package of health, not just single interventions

If the target group is the same and if resources are tight, it is possible and logical to deliver multiple treatments at the same time rather than launching separate campaigns for each one. Moreover, with such an approach it is possible to achieve nearly universal coverage at a very low cost.

3. Importance of political support

As with Nepal, political support has been an essential ingredient of this programme. The MoPH recognized the success of the National Child Health Days and saw that with minimal extra resources and training, they were a system which existing health staff could use to deliver several treatments simultaneously. On each National Child Health Day, an astounding 60 000 health workers and nursery caregivers are mobilized, who reach the most peripheral levels of the community. The campaign has been so successful that the MoPH recently renewed its commitment by confirming that two such days will be held each year, which will ensure that the delivery of vitamin A

and deworming will be sustained well beyond the polio programme which catalysed it. Moreover, a proposal to further broaden the remit of these health days to include mothers and provide more services and information is now being discussed.

Cambodia: using outreach services

Background

The health and nutritional status of Cambodia's children and women are still among the poorest in the region. According to the 2000 Cambodia Demographic Health Survey, the infant mortality rate is 95 per 1000 live births and the under-5 mortality rate is 124 per 1000 live births. Stunting (low height-for-age) as well as being underweight (low weight-for-age) affects 45% of children under 5 years of age and 58% of pregnant women and 63% of under-5-year-olds are reported to be anaemic.² Vitamin A deficiency, as assessed by night blindness, was reported to be 5.6% in four rural provinces,³ well above the WHO cut-off point of 1% for defining vitamin A deficiency as a public health problem.

Using outreach services to deliver a minimum package of activities

One of the Cambodian MoH's goals in addressing the extremely high infant and under-5 mortality rates is to improve the quality of and access to health services, especially for children, women and the poor. In order to do this, Cambodia has instituted monthly outreach activities (once every two months for very remote areas) from its health centres – the lowest level of the health structure in this country. These outreach services deliver a minimum package of activities, mostly preventive and some curative health services, that include immunization, antenatal care, distribution of oral rehydration salts, family planning, health education, postpartum vitamin A supplementation, and tuberculosis and leprosy follow-up. During these outreach sessions, in March and November deworming tablets and vitamin A supplements for children under five years are also provided.

² *Cambodia Demographic Health Survey 2000*. Ministry of Health.

³ 1993 population-based survey on nutrition carried out by Ministry of Health and Helen Keller International.

The MoH has provided vitamin A supplements to children under five years since 1996. Initially, the supplementation was “piggy-backed” onto NIDs, but when NIDs stopped in 1999, distribution started to take place through routine outreach. Between 1999 and 2003, vitamin A was also provided through subnational immunization days and supplementary immunization activities, such as measles campaigns. But as of 2004, routine outreach is the sole method of delivery.

In 2001, the MoH finalized its *Guidelines for outreach services from health centres*, which formalized the distribution of vitamin A supplements and deworming tablets through outreach services into policy. In 2002, the distribution of deworming tablets began through this channel. The Cambodian Government purchases all vitamin A and deworming tablets through its budget.

Mass media announcements are made on television and radio before each distribution round to encourage families to attend the outreach sessions during the vitamin A and deworming months. Participation is indeed higher during these months and it is believed that deworming is a particular draw for families.

Managing and monitoring the coverage of vitamin A and deworming

Currently, staff from the National Nutrition Programme monitor the distribution of vitamin A capsules during these outreach activities and staff of the National Malaria Centre monitor the deworming. However, the outreach activities per se are to some extent “owned” and managed by the National Immunization Programme since this programme provides much of the financial and technical support. To date, planning, supply management and reporting are all done separately for each service delivered. This creates confusion and duplication of work, and affects the quality of services. The MoH is therefore trying to clarify roles and responsibilities in order to improve coordination and collaboration.

Coverage rates for vitamin A supplementation in recent years are shown in Table 3. From 2003, deworming coverage is considered to be about the same as that of vitamin A.

Table 3: Coverage of preschool children with vitamin A supplements

Year	Round 1		Round 2	
	Coverage (%)	Distribution mechanism	Coverage (%)	Distribution mechanism
1999	55	Routine outreach	79	SNIDS ^a
2000	63	Routine outreach and SIA ^b	30	Routine outreach and SIA
2001	57	Routine outreach and SIA	57	Routine outreach and SIA
2002	57	Routine outreach and SIA	34	Routine outreach and SIA
2003	70	Routine outreach and SIA	47	Routine outreach

^aSNIDs = subnational immunization days.

^bSIA = supplementary immunization activities.

As the figures show, coverage is far from optimal but as the management and quality of outreach services improve, there is huge potential for increases in coverage.

Conclusions

Cambodia's experience provides three lessons:

1. Deliver a package of health, not just single interventions

Cambodia's story demonstrates one of the same lessons learnt from the Democratic People's Republic of Korea: delivering multiple key services at the same time is efficient in terms of staff time and training, but is also cost effective, particularly for remote communities. It also contributes to higher coverage because communities see greater value in attending.

2. Despite the ending of NIDs, there are alternative distribution mechanisms

During the period of NIDs and supplementary immunization activities, good coverage was achieved with vitamin A supplementation by piggy-backing it onto these mass immunization campaigns. Cambodia has illustrated that in the post-NIDs era, even with a limited health budget and weak infrastructure, it is still possible to achieve reasonable coverage through routine primary health care activities that are intensified twice per year for the delivery of vitamin A and deworming.

3. Intersectoral collaboration is necessary

Although there are clearly advantages of providing a package of health interventions through one distribution channel, close collaboration between the various programmes involved is needed in planning, supply management, supervision and monitoring, if the efficiencies of an integrated package are to be realized. This is not always easy to achieve and strong support and guidance is needed from the central level.

References

1. De Silva NR et al. Soil-transmitted helminth infections: updating the global picture. *Trends in Parasitology*, 2003, 19:547–551.
2. Stoltzfus R et al. Hemoquant determination of hookworm-related blood loss and its role in iron deficiency in African children. *American Journal of Tropical Medicine and Hygiene*, 1996, 55:339–404.
3. Mahalanabis D et al. Vitamin A absorption in ascariasis. *American Journal of Clinical Nutrition*, 1976, 29:1372–1375.
4. Awasthi S, Pande VK. Six-monthly deworming in infants to study effects on growth. *Indian Journal of Pediatrics*, 2001, 68:823–827.
5. Stephenson LS et al. Physical fitness, growth and appetite of Kenyan school boys with hookworm, *Trichuris trichiura* and *Ascaris lumbricoides* infections are improved four months after a single dose of albendazole. *Journal of Nutrition*, 1993, 123:1036–1046.
6. Kvalsvig JD et al. The effects of parasite infections on cognitive processes in children. *Annals of Tropical Medicine and Parasitology*, 1991, 85:551–568.
7. Beaton GH et al. *Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries*. Administrative Committee on Coordination/ Sub-Committee on Nutrition (ACC/SCN) State-of-the-Art Series: Nutrition Policy Discussion Paper No. 13. Geneva, United Nations, 1993.
8. Nossal GJ. The Global Alliance for Vaccines and Immunization – a millennial challenge. *Nature Immunology*, 2000, 1:5–8.

9. Curtale F et al. Intestinal helminths and xerophthalmia in Nepal: a case-control study. *Journal of Tropical Paediatrics*, 1995, 41:334-337.
10. Sivakumar B, Reddy V. Absorption of vitamin A in children with ascariasis. *Journal of Tropical Medicine and Hygiene*, 1975, 78:114-115.
11. De Silva NR. Impact of mass chemotherapy on the morbidity due to soil-transmitted nematodes. *Acta Tropica*, 2003, 86:197-214.
12. Ching P et al. Childhood mortality impact and cost of integrating vitamin A supplementation into immunization campaigns. *American Journal of Public Health*, 2000, 90:1526-1529.
13. *Report of the WHO informal consultation on the use of praziquantel during pregnancy/lactation and albendazole/mebendazole in children under 24 months. Geneva 8-9 April 2002.* Geneva, World Health Organization, 2002 (WHO/CDS/CPE/PVC/2002.4).
14. *Prevention and control of schistosomiasis and soil-transmitted helminthiasis. Report of a WHO Expert Committee.* Geneva, World Health Organization, 2002 (Technical Report Series, No. 912).
15. *WHO model list of essential medicines.* Geneva, World Health Organization, 2003.
16. Bordignon GP Shakya DR. A deworming programme in Nepal supported by the World Food Programme. In: *Controlling diseases due to helminth infections.* Geneva, World Health Organization, 2003.

Annex 1

Global estimates of soil-transmitted helminth infections in children aged 0–4 years^a

Type of worm (area or country)	Population at risk (in millions)	Infection prevalence (%)	No. of infected children aged 0–4 years (in millions)
Roundworm			
Latin America and the Caribbean	514	16	8
Sub-Saharan Africa	571	25	28
Middle East and North Africa	158	7	3
South Asia	338	27	13
India	808	14	15
East Asia and Pacific Islands	560	36	20
China	1262	39	35
Total	4211		122
Whipworm			
Latin America and the Caribbean	523	19	10
Sub-Saharan Africa	516	24	26
Middle East and North Africa	52	2	1
South Asia	188	20	10
India	398	7	8
East Asia and Pacific Islands	533	28	16
China	1002	17	15
Total	3212		86
Hookworm			
Latin America and the Caribbean	346	10	1
Sub-Saharan Africa	646	29	9
Middle East and North Africa	73	3	0
South Asia	188	16	2
India	534	7	2
East Asia and Pacific Islands	512	26	4
China	897	16	3
Total	3195		21

^a Source: (7). Reprinted from *Trends in Parasitology*, 19, De Silva NR et al., Soil-transmitted helminth infections: updating the global picture, 547–551, Copyright (2003), with permission from Elsevier.

Annex 2

Vitamin A supplementation: data for countries reporting over 70% coverage in 2000^a

Countries reporting >70% Vitamin A supplement coverage	Population under 5 years (in thousands)	No. children covered (in thousands)	% of population under 5 years covered in 2000
Afghanistan	3 807	2 398	63
Angola	2 592	2 333	90
Bangladesh	18 652	14 269	77
Benin	1 108	957	86
Bhutan	327	274	84
Bolivia	1 211	796	66
Burkina Faso	2 210	1 850	84
Burundi	1 114	962	86
Cameroon	2 344	2 110	90
Central African Republic	608	547	90
Chad	1 491	1 235	83
Congo	563	507	90
Democratic People's Republic of Korea	1 932	1 669	86
Democratic Republic of the Congo	10 027	8 393	84
Eritrea	617	411	67
Gabon	195	176	90
Gambia	206	161	78
Ghana	2 819	2 258	80
Guinea	1 448	1 290	89
Guinea-Bissau	210	172	82
India	116 399	40 374	35
Indonesia	21 782	13 919	64

Countries reporting > 70% Vitamin A supplement coverage	Population under 5 years (in thousands)	No. children covered (in thousands)	% of population under 5 years covered in 2000
Kenya	4 696	3 804	81
Liberia	550	411	75
Maldives	47	39	83
Mali	2 142	1 349	63
Marshall Islands	7	5	71
Mauritania	470	343	73
Micronesia (Federated States of)	18	12	67
Mongolia	271	212	78
Mozambique	3 178	2 631	83
Namibia	281	205	73
Nepal	3 564	2 630	74
Niger	2 284	1 891	83
Nigeria	19 683	13 995	71
Pakistan	22 210	18 990	86
Philippines	9 831	7 255	74
Senegal	1 592	1 333	84
Sierra Leone	806	559	69
Somalia	1 787	1 608	90
Sudan	4 728	4 213	89
Togo	767	690	90
Yemen	3 909	3 342	85
Zambia	1 887	1 461	77
Total	–	167 869	–

^a Source of coverage data: United Nations Children's Fund country offices and data from World Health Organization National Immunization Days.

Annex 3

How to request WHO support for drug quality assessment

WHO can organize drug quality testing. Please contact:
wormcontrol@who.int

To test the quality of a drug, a laboratory needs at least 100 tablets, preferably in the original sealed packaging. If the package contains more tablets it is preferable to send the full package rather than open it.

The following information will also be needed:

- date and place of collection;
- condition and duration of storage;
- reason for quality control (e.g. routine, new producer, reported problems of efficacy);
- the producer's certificate of analysis;
- the quantity of tablets produced in the lot (if known).

Annex 4

Contact addresses for drug procurement

International Dispensary Association

P.O. Box 37098

1030 AB Amsterdam

The Netherlands

Tel. +31 (0)20 403 3051; Fax: +31 (0)20 403 1854;

Telex: 13566 IDA NL

E-mail: info@ida.nl

UNICEF

Supply Division

Procurement and Assembly Centre

UNICEF Plads – Freeport

DK-2100 Copenhagen

Denmark

Tel. +45 (0)35 273527; Fax: +45 (0)35 269421

Annex 5

How to obtain WHO assistance for drug procurement

WHO Contracting and Procurement Service (CPS)

Department of Informatics and Infrastructure services

General Management

World Health Organization

1211 Geneva 27

Switzerland

Fax: +41 (0)22 791 4196 or +41 (0)22 791 4166

Current conditions related to drug procurement through CPS are as follows:

- CPS guarantees competitive prices and consistent quality.
- For orders over US\$ 70 000, CPS issues an international tender.
- For orders below or equal to US\$ 70 000, CPS uses a simplified form of competitive bidding.
- CPS charges 3% overhead costs, calculated on the cost of goods and freight.
- Pre-payment is requested and can be made through the WHO Representative or WHO regional office.
- Payment in local currency can be discussed with the WHO Representative.