Initial findings from the 2000 Cambodia National Micronutrient Survey

Supporting document to the Micronutrient Workshop held on February 20, 2001, in Phnom Penh, Kingdom of Cambodia

HELEN KELLER INTERNATIONAL
CAMBODIA

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Foreword

Since its founding in 1915, Helen Keller Worldwide (HKW) has always been at the forefront in the fight against avoidable blindness. Through the years, increased technical capacity has enabled the agency to develop innovative and sustainable solutions to combat this problem. Through increased scientific knowledge resulting from our program-oriented research into vitamin A deficiency (VAD) – a leading cause of blindness and mortality among children in underdeveloped countries – the agency has expanded the scope of its work into the field of nutrition.

Today, Helen Keller International (HKI), the program division of HKW, operates in three major regions of the world – the Americas, Africa and the Asia-Pacific. In the Asia Pacific region, we have given particular emphasis to nutrition activities, ranging from surveys on the prevalence of micronutrient deficiencies to micronutrient interventions. Having nurtured cutting-edge expertise in the field of nutrition, HKI/Asia-Pacific plays a leading role in providing technical assistance to governments in the region in assessing the nutritional status of the populations we serve and helping to establish and implement nutrition programs.

Helen Keller International began working in Cambodia in 1992, when the agency initiated its first project to assess the extent of VAD in the country. Early work focused on addressing the problem of VAD through the distribution of high-dose vitamin A capsules (VACs) to preschool-aged children. Additionally, in collaboration with UNICEF and the Royal Government of Cambodia (RCG), HKI was involved in pilot studies that resulted in the successful integration of VAC distribution through National Immunization Days (NIDs) for polio. Since 1995, with support from the United States Agency for International Development (USAID), the focus of HKI's program in Cambodia was expanded to include other sustainable nutrition interventions to improve micronutrient status, and to institutionalize primary eye care. HKI remains active as a member of the National Vitamin A Working Group (now the National Micronutrient Technical Working Group).

This document highlights some of the key findings and reports that have been generated as a result of Cambodia's first national micronutrient survey. This important first step toward establishing a system for the regular assessment of nutritional and health status in the country was made possible through close collaboration between the RCG and HKI, and with funding from USAID, whose long-standing support to HKI's work in the field of nutrition we could not have done without. Currently, HKI/Cambodia receives funding from the USAID/Cambodia Mission for activities related to supporting the national VAC distribution program, to providing technical assistance to NGOs in home gardening and nutrition education, and to institutionalizing primary eye care.

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Executive Summary

Background

Micronutrient malnutrition is increasingly being recognized as one of the main nutritional problems in the world because it affects more than 3 billion people and has serious, long-lasting consequences. It can increase morbidity and mortality among children and women of reproductive age, retard child growth and cognitive development, and reduce work productivity. The immediate causes of micronutrient deficiencies are inadequate intake of micronutrient-rich foods and severe and repeated illness. Underlying causes include poverty, general malnutrition, inadequate access to micronutrient-rich foods, less than optimal child care practices and limited access to health care services.

In Cambodia, vitamin A deficiency (VAD) and other nutrient deficiencies have been recognized as public health problems. A 1999 survey conducted by Helen Keller International (HKI) in five provinces showed that VAD and anemia were serious problems among preschool children and women. This was also found by surveys conducted by UNICEF and WFP. In addition, cases of xerophthalmia (clinical sign of VAD) were identified and reported regularly during 1999.

Since 1994, the Royal Government of Cambodia (RCG) has been implementing a national vitamin A capsule (VAC) distribution program. Until the end of 1997, VACs were distributed through National Immunization Days for Polio. Since then, the distribution channels for children aged 6-59 months have been routine immunization outreach activities, supplementary supplementation activities such as Sub-National Immunization Days (SNIDs), and measles outbreak response. For postpartum women, distribution is done through contact with health centers.

The 2000 micronutrient survey of rural Cambodia was conducted to (1) determine national prevalence of vitamin A deficiency and anemia among women and children, (2) identify key determinants of vitamin A and iron deficiency, and (3) assess coverage and effectiveness of Cambodia's initiative to integrate vitamin A capsule distribution into routine immunization services. In conjunction with this, an assessment of the national vitamin A capsule distribution program was conducted to (1) identify strengths and limitations of the national VAC program, and 2) identify possible mechanisms for achieving high VAC coverage among each target group. The findings of the survey and the VAC program assessment can be used to establish the basis for a long term micronutrient program in Cambodia which in turn reduces the risk of child and maternal morbidity and mortality. The survey and assessment were a collaborative effort between the Royal Government of Cambodia and Helen Keller International and were funded by the United States Agency for International Development (USAID).

Initial Findings

- Vitamin A deficiency is still a problem of public health significance among Cambodian children in many provinces.
- Vitamin A capsule coverage among children aged 6-59 months ranged from 10-55% and varied widely among and within provinces.
- Vitamin A capsules reduced a child's risk for nightblindness more than two times in all provinces, irrespective of the prevalence of nightblindness in the particular province.
- Nightblindness is a significant problem among pregnant and lactating women.
- Coverage of vitamin A capsule distribution to postpartum women is very low.
- A large proportion of Cambodian women do not consume adequate vitamin A through their diet.
- Anemia, wasting and other nutrition problems are also highly prevalent among women in Cambodia and these nutrient deficiencies co-exist.

Executive Summary

Recommendations

- The distribution of high-dose vitamin A capsules among Cambodian children aged 6-59 months should be continued nationwide and VAC coverage among children aged 6-59 months needs to be improved. Immunization outreach activities provide a good mechanism for delivering vitamin A capsules to children of all ages and should be continued.
- Expand programs to increase the intake of vitamin A rich foods through social marketing, home gardening, poultry raising, and animal husbandry.
- Explore the feasibility of fortifying foods with vitamin A or, preferably, with multiple micronutrients.
- Improve coverage of postpartum vitamin A capsule distribution program.
- Explore the feasibility of providing multi-micronutrients during pregnancy and adolescence.
- Acquire technical assistance to help translate the survey findings into a strategy and action plan to control vitamin A deficiency in Cambodia, particularly for the further development of the vitamin A capsule program.
- Organize and get financial support for workshops and meetings in order to make timely use of this information within Cambodia at the national and provincial levels.
- Continue monitoring and surveillance of VAD among women and children, and the effectiveness of programs.
- Share the findings from the National Micronutrient Survey of Cambodia on vitamin A capsule distribution and immunization outreach activities widely with other countries in Asia and Africa, because they are clearly 'lessons without borders.'

Financial Support

The Cambodia National Micronutrient Survey and Vitamin A Program Assessment were made possible through funding from the United States Agency for International Development (USAID) under the terms of Cooperative Agreement No. HRN-A-00-98-00013-00. Special thanks to Dr. Frances Davidson and Dr. Timothy Quick of the Health and Nutrition Office, USAID/Washington, who were instrumental in making this possible.

We are also grateful for the commitment and support shown to Helen Keller International/ Cambodia by Dr. Jeffrey Ashley (now with USAID/Angola), Dr. Lois Bradshaw and Mr. Carey Gordon of USAID/Cambodia. This project would not have been possible without it.

Cambodia Nutrition Bulletins (related to Micronutrient Survey)

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HELEN KELLER INTERNATIONAL

Vol. 2, Issue 1
October 2000

NUTRITION BULLETIN

Conducting the first Cambodia National Micronutrient Survey

By oxcart, by motorbike, by car, by plane and on foot, more than 130 enumerators, monitors and supervisors traveled throughout Cambodia, including to some of the most remote areas, to collect data from 15,000 households, which will provide insight into the magnitude and key determinants of micronutrient malnutrition in Cambodia. These data are very important for prioritizing health problems and directing future programming with the ultimate goal of reducing child and maternal morbidity and mortality.

Micronutrient malnutrition is increasingly being recognized as one of the main nutritional problems in the world because it affects more than 3 billion people and has serious, long-lasting consequences. It can increase morbidity and mortality among children and women of reproductive age, retard child growth and cognitive development, and reduce work productivity.

Vitamin A deficiency (VAD) and other nutrient deficiencies have been recognized as public health problems in Cambodia. A recent survey conducted by Helen Keller International (HKI) in five provinces showed that VAD and anemia were serious problems among preschool children and women. In addition, cases of xerophthalmia (clinical VAD) have been identified and reported regularly in the past year.

In light of the serious consequences of micronutrient malnutrition and the important need for information to advocate for and to formulate programs and policies to control malnutrition in Cambodia, HKI and the Royal Cambodian Government (RCG), with support from USAID, designed the first national micronutrient survey with the following objectives:

1) To determine the national prevalence of clinical and subclinical VAD and anemia among women and children.
2) To identify key determinants of vitamin A and iron deficiency among women and children in Cambodia.
3) To assess the current coverage and effectiveness of Cambodia's initiative to integrate vitamin A capsule distribution into routine immunization services.

The survey, conducted from February to September 2000, was a collaborative effort of the RCG, HKI and other key institutions in Cambodia. The survey was designed along the UNICEF conceptual framework for malnutrition. HKI has successfully conducted micronutrient surveys in other countries in the Asia-Pacific region, which have been used to guide policy and develop programs. Based on these experiences, information was collected on different nutritional outcomes (e.g. anemia, VAD, stunting, women's body mass index), food consumption and vitamin A intake, demographics and socioeconomic status, and program adequacy. Using a random multistage cluster sampling design, data were collected from 15,000 households in 10 rural provinces by trained interviewers. Blood indicators (e.g. hemoglobin, serum retinol, malaria) were collected from a random subsample of these households.

The timeline that follows outlines the key activities and experiences in implementing the survey, describes the successful collaboration and highlights how challenges encountered in carrying out the survey were transformed into opportunities and successes.

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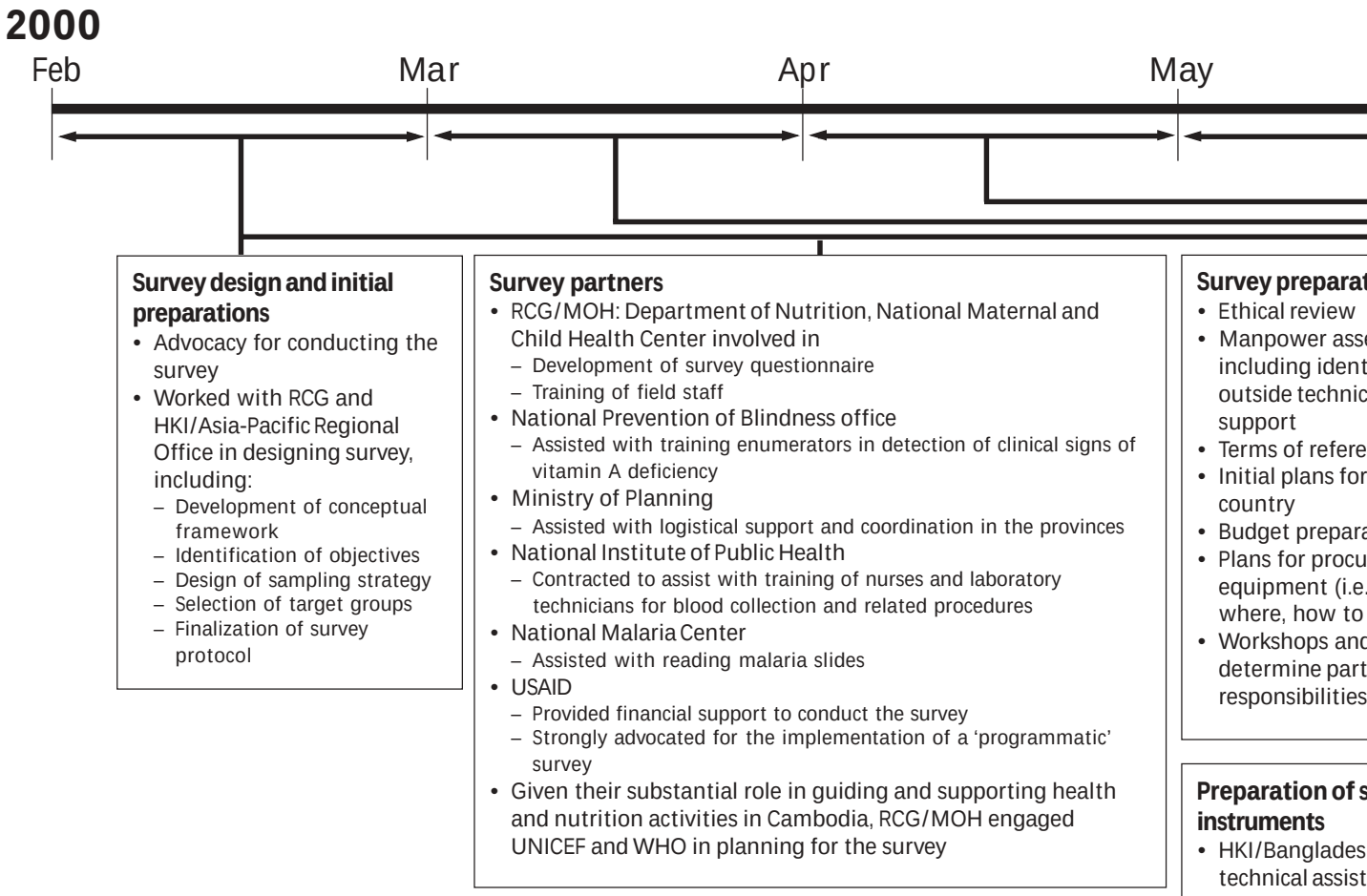
Figure 1. Timeline of activities (February-September 2000)



Challenges in the field

Necessity – the mother of innovation?

Obtaining serum from blood samples is no easy task, particularly in remote rural areas where blood collection teams do not have the luxury of a nearby laboratory. Serum is obtained from blood by means of a high-speed centrifuging process that, in a laboratory setting, would be performed by electrically-powered machines. In the field, where there is often a lack of electricity, HKI survey personnel had to resort to using hand-driven centrifuge devices from Bangladesh and Indonesia, which required operators to continually 'hand-crank' them.

The centrifuge devices were tried out a few times in field practice. Despite nearly an hour of operating the device, the blood collection teams found that it was almost impossible to obtain serum. Teams became discouraged and they grew worried about the effort required to hand-centrifuge and the prospect of getting poor results. It was, in fact, the case that serum could not really be obtained with these hand-driven devices.

In the face of a possible inability to obtain serum samples in the field, HKI/Bangladesh was consulted. Within a single day, the innovative Bangladesh office successfully converted the hand-driven devices to become battery-operated. Tests conducted on the converted devices proved they were effective in obtaining serum from blood samples. Enough of the devices were then converted and shipped to Cambodia in time for the implementation of the National Micronutrient Survey. Car batteries were purchased for the teams and these were relatively easy to charge, even in the most remote places. Thanks to the ingenuity of the HKI/Bangladesh's team of experts, the survey was carried out as planned.

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Micronutrient

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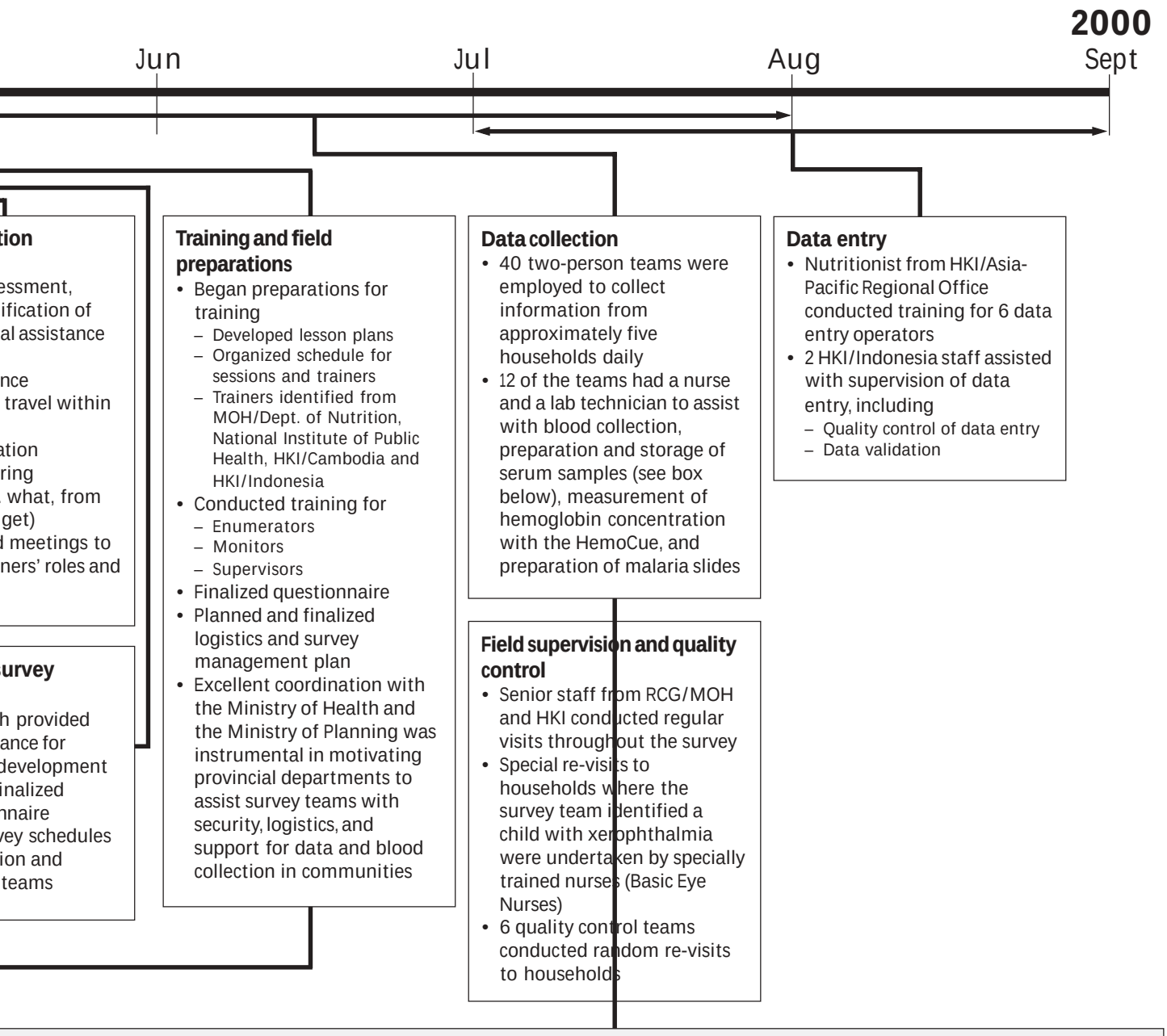

Challenges in the field

Delivering dry ice during the monsoon season

of work, Mr. Khim had never received such an odd request egular supply of dry ice to transport frozen serum obtained ertainly, he had never imagined that, through his job as a cream from Thailand to Cambodian supermarkets, he would o improve the lives of many fellow Cambodians. Yet it was led HKI/Cambodia to contract him to supply the dry ice lood sample collection activities for the National Survey.

ified carbon dioxide, which is often prefered for transporting obtained from blood samples because of its extremely cold nd the fact that it does not turn into liquid but evaporates state. Although it is usually quite easy to obtain in many t was not the case in Cambodia. Ice cream factories, the airport, breweries and supermarkets were scoured in search of dry ice. But when all conventional sources for obtaining it had turned up 'dry,' HKI staff had to look to the unconventional. That was when they found in Mr. Khim's seemingly mundane weekly deliveries a veritable goldmine of dry ice.

On his part, Mr. Khim was determined to ensure that the dry ice was delivered on time on the designated day to HKI field personnel responsible for collecting blood samples that will show how many mothers, fathers and children have anemia and vitamin A deficiency in Cambodia. Early monsoon rains and difficult roads meant that he had to be resourceful. In some cases, the dry ice had to be transported not just over land but also across rivers where bridges had collapsed. Despite the odds, Mr. Khim delivered his supply as scheduled each week, for more than 12 weeks.

Next Steps

- Given the successful design and implementation of the first national micronutrient survey in Cambodia, the next steps are to analyze and interpret the data. Working closely with the RCG/MOH and other survey partners, HKI will help to ensure timely analysis and dissemination of the findings.

- Now that the findings of the survey will become available, they should be shared and discussed with key players at both national and provincial level in order to set priorities to control and prevent micronutrient deficiencies. The findings will first of all become available through the Cambodia Nutrition Bulletin and should then be discussed by different fora.

- A systems review of the vitamin A capsule program was conducted in tandem with the micronutrient survey to provide detailed information on the vitamin A capsule (VAC) program, postpartum VAC distribution, and use of iron supplements. The analysis of this assessment is also ongoing and findings will be linked to the survey results to help guide program modifications.

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HELEN KELLER INTERNATIONAL

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November 2000

NUTRITION BULLETIN

The need for increasing coverage of vitamin A capsule program to reduce vitamin A deficiency among young children in Cambodia

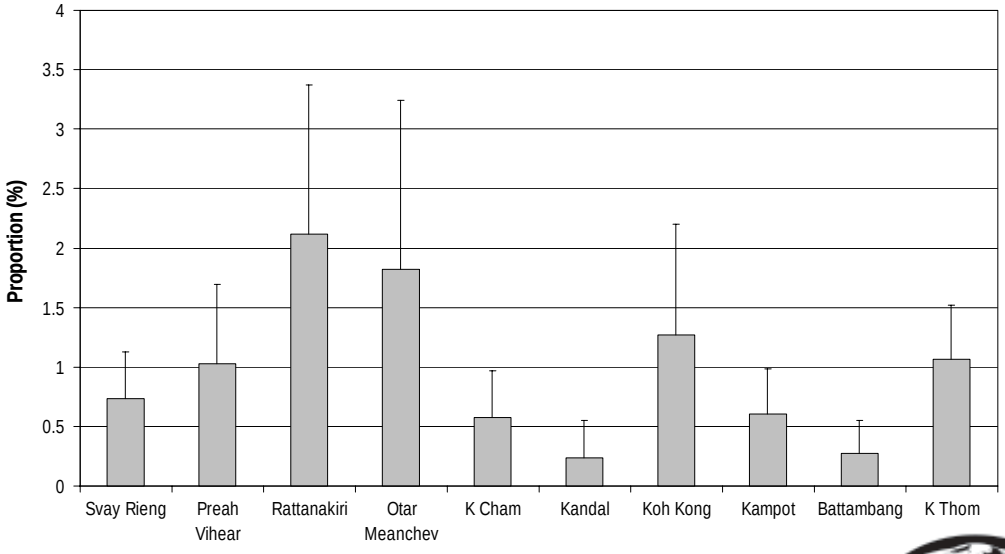
Since 1993, the Royal Government of Cambodia (RCG), in collaboration with UNICEF, WHO and Helen Keller International (HKI) have been actively involved in combating vitamin A deficiency through the distribution of vitamin A capsules (VAC). Results from the Cambodia National Micronutrient Survey (April – August 2000) reveal that night blindness is a problem of public health significance in many provinces and that VAC markedly reduce the risk of vitamin A deficiency and its consequences such as increased morbidity and mortality. Thus, VAC distribution must be continued nationwide and the current coverage of 10-55% needs to be increased.

Vitamin A deficiency

Vitamin A deficiency is a serious public health problem. It is associated with increased morbidity and mortality among preschool children and extensive evidence now shows that the survival chances of children aged 6 months to 5 years are increased by 20-25%[1] when vitamin A status is improved through twice yearly distribution of high-dose VAC. However, while night blindness is the first clinical sign of vitamin A deficiency, many more children, who do not yet show clinical signs of vitamin A deficiency, may already be at risk of increased morbidity and mortality. The prevalence of night

(cont'd on p2, col. 2)

Figure 1. Prevalence of night blindness among children aged 18-59 months, by province (n=12,820). *Bars indicate 95% CI (Confidence Interval) corrected for design effect.*



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Vitamin A

What vitamin A does[i]

Vitamin A stored normally in the liver, is crucial for effective immune-system functioning, protecting the integrity of epithelial cells lining the skin, the surface of the eyes, the inside of the mouth and the alimentary and respiratory tracts.

Signs and consequences of vitamin A deficiency

When the body's defense breaks down as a consequence of vitamin A deficiency (VAD), the person is more likely to develop infections, and the severity of an infection is likely to be greater. Also, in case of relatively severe deficiency, a range of abnormalities may appear in the eyes. In the mildest form, night blindness occurs. In more severe forms, lesions occur on the conjunctiva and cornea that if left untreated can cause irreversible damage, including partial or total blindness. Such lesions can be grouped together under the term xerophthalmia.

Night blindness

Night blindness, the first clinical sign of VAD, is a well recognized indicator of VAD. It was added to the classification of signs of VAD in 1980 when it was found that a mother or guardian's history of night blindness in a young child (from the age of 18-24 months), particularly one employing a locally recognized term, was highly reliable.[ii, iii] Field workers with adequate training can reliably identify a history of night blindness, especially when using local terms.

The World Health Organization (WHO) and IVACG have established that if night blindness prevalence among young children (18-59 or 24-59 months) in a community is greater than or equal to 1%, VAD constitutes a "problem of public health significance" within that community[iv, v]. And, a larger proportion of that community is thus likely to suffer other consequences of vitamin A deficiency such as increased morbidity and mortality.

[i] Partly reprinted from *The State Of The World's Children 1998*, UNICEF, Oxford University Press, 1998, p76

[ii] Sommer A, West K. Vitamin A Deficiency: health Survival and Vision. New York: Oxford University Press, 1996.

[iii] Sommer A, Hussaini G, Muhilal, Tarwotjo I, Susanto J, Saroso JS. History of night blindness: A simple tool for xerophthalmia screening. Am J. Clin Nutr 1980;33:887-891.

[iv] Control of vitamin A deficiency and xerophthalmia. Report of a joint WHO/UNICEF/USAID/Helen Keller International IVACG Meeting. WHO Technical Report Series 672. Geneva: World Health Organization 1982:1-70.

[v] Sommer A. Vitamin A Deficiency and Its Consequences: A Field Guide to Detection and Control. Third Edition. Geneva: World Health Organization 1994.

(cont'd from p1)

blindness is thus an indicator of whether vitamin A deficiency is a problem at community level. WHO and the International Vitamin A Consultative Group (IVACG) have established a cut-off for the prevalence of night blindness of 1%, which indicates that vitamin A deficiency is a public health problem.

Prevalence of night blindness

Results from the first national micronutrient survey of rural Cambodia show that vitamin A deficiency is still a problem of public health significance in at least five of the 10 provinces surveyed. **Figure 1** (p1) shows the prevalence of night blindness among children aged 18-59 months by province. Night blindness prevalence varies by province and in Preah Vihear, Rattanakiri, Otar Meanchey, Koh Kong and Kampong Thom it is above the cut-off indicating a public health problem. For the other provinces, where the overall prevalence is below the cut-off of 1%, the prevalence may still be above 1% in particular communes of the province, at other times of the year, or under less favorable agricultural or financial conditions. This particularly applies to Svay Rieng, Kampong Cham and Kampot. In fact, the survey was conducted shortly after the mango season, which may have caused a slight, seasonal, improvement of vitamin A status and therefore reduced the prevalence of night blindness.

VAC coverage

One strategy for combating vitamin A deficiency among children 6 – 59 months of age is to provide them with a high-dose vitamin A capsule twice a year. The RCG initiated a VAC distribution program in 1994. Initially, VAC were distributed through the National Immunization Days (NIDS) for polio. Since 1998, when the NIDS for polio were over, VAC have been distributed twice yearly during routine immunization outreach activities and through sub-NIDS[2].

Figure 2 shows the coverage of VAC during the March 2000 distribution, by province and child age group. Six years after the distribution of the first VAC and two years after a change of delivery strategy which

Figure 2. Vitamin A capsule coverage in March 2000, by province and child age group (n=16,121). *Bars indicate 95% CI (Confidence Interval) corrected for design effect.*

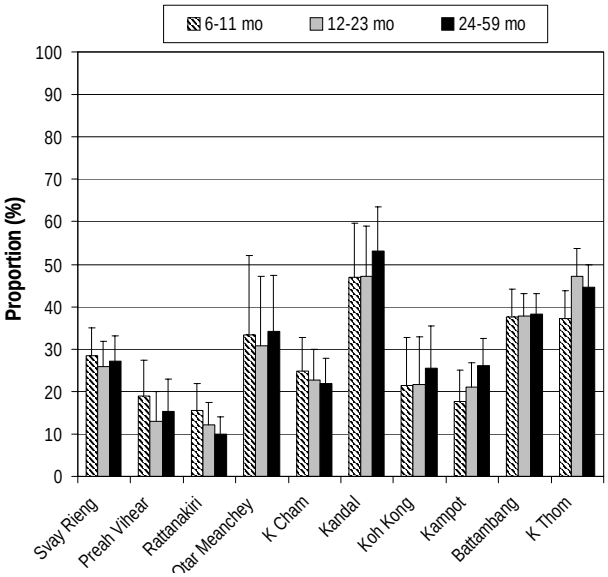
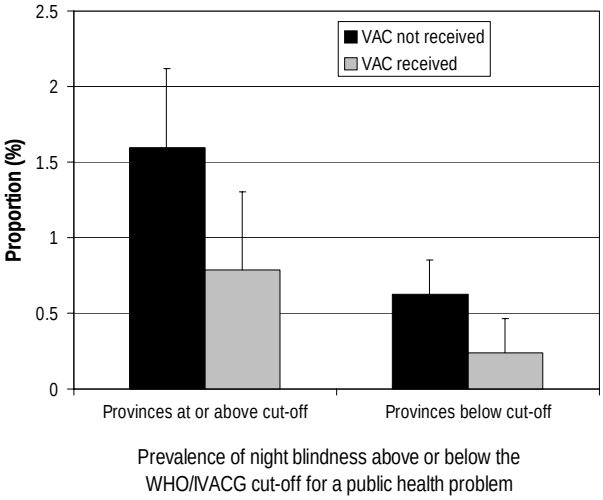


Figure 3. Prevalence of night blindness among children aged 6-59 months in provinces with night blindness prevalence greater or equal, or below the cut-off of 1% and by whether they received a VAC. *Bars indicate 95% CI (Confidence Interval) corrected for design effect.*



presented the RCG with a difficult challenge, nationwide coverage varied from approximately 10% to 55%. Given the circumstances, this level of coverage is a good achievement and it is likely that this has reduced the prevalence and severity of VAD in the country over the past years. Figure 2 also shows that coverage was very similar among the different age groups. More detailed analysis however also showed that at commune level, VAC coverage could be as low as 5% but also as high as 80%. The next *Cambodia Nutrition Bulletin* will assess VAC distribution in more detail, including its relationship with the immunization outreach activities.

Importance of VAC

The protection against night blindness provided by the VAC is shown in **Figure 3**. Both among the provinces where the prevalence of night blindness was equal to or greater than the cut-off of 1% as well as among the provinces where the prevalence of night blindness was below this cut-off, children that had received a VAC had a 2.2 - 2.3 times lower risk to be night blind[3] than those who had not received a VAC. This shows that VAC are protective against vitamin A deficiency, also in the provinces where the prevalence of night blindness was below the cut-off of 1%.

Thus, in order to reduce the risk of morbidity and mortality associated with vitamin A deficiency, and of clinical signs of vitamin A deficiency, VAC distribution should be continued nationwide, irrespective of the observed prevalence of VAD.

Conclusions

- **Vitamin A deficiency is still a problem of public health significance among Cambodian children in many provinces.**
- Vitamin A capsule coverage ranged from 10-55% and varied widely among and within provinces.
- Vitamin A capsules reduced a child's risk for night blindness more than two times in all provinces, irrespective of the prevalence of night blindness in the particular province.

Recommendations

- The distribution of high dose vitamin A capsules among Cambodian children aged 6-59 months should be continued nationwide.
- Factors associated with VAC coverage should be determined in order to try to improve coverage.
- Meetings should be held with health staff at the provincial- operational district- and health center-levels to share survey findings and discuss ways in which VAC coverage could be improved.

Endnotes

[1] Reference: Beaton GH, Martorell R, L'Abbe KA, Edmonston B, McCabe G, Ross AC, Harvey B. *Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries.* ACC/SCN Nutrition Policy Paper. Geneva: United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition, 1993.

[2] More details on the history of the VA program can be found in the *HKI/Cambodia Nutrition Bulletin* Vol. 1, Issue 2, January 2000.

[3] Logistic regression analysis controlling for other factors such as age, socio-economic status, remoteness of the commune, breastfeeding status, dietary vitamin A intake and morbidity.

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Helen Keller International Nutrition Bulletin

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HELEN KELLER INTERNATIONAL

Vol. 2, Issue 3
December 2000

NUTRITION BULLETIN

Routine immunization outreach is a good strategy for delivering vitamin A capsules to Cambodian children

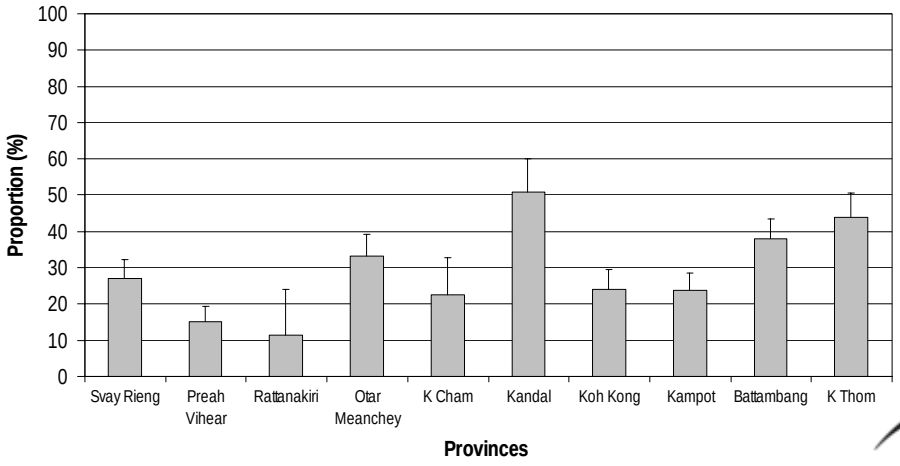
The national micronutrient survey by HKI (Apr-Aug 2000) found that coverage of the national vitamin A capsule (VAC) distribution program varies considerably, from 10-55% between provinces and from 0-100% between communes within provinces. Immunization outreach activities appear to be a good strategy for delivering VAC: VAC coverage is higher where immunization coverage is higher, and VAC coverage among older children (36-59 mo) is the same as coverage among younger children (6-11 mo). Therefore, VAC distribution through the immunization outreach activities should be continued and increased among all age groups.

VAC coverage by province and by communes

The Royal Government of Cambodia (RCG) has, as one of its goals, the elimination of vitamin A deficiency as a problem of public health significance by the year 2005. To achieve this target, the RCG has taken steps to distribute high dose vitamin A capsules (VACs) to children aged 6-59 months, through the following channels:

- Routine immunization outreach activities – This is carried out by health center staff who visit 10-20 villages, approximately three to four times per year, for immunization services. VACs should be taken by the outreach teams twice yearly, around the months of March and November
- Supplementary supplementation activities such as Sub-National Immunization Days (SNIDs), and
- Measles outbreak response.

Figure 1. Vitamin A capsule coverage in March 2000 among children aged 6-59 months, by province. Bars indicate 95% confidence intervals corrected for design effect.



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VAC distribution was started in 1994. The National Micronutrient Survey found, as shown in **Figure 1**, that in March 2000, VAC coverage by province ranged from 10-55%. Since VACs are protective against childhood night blindness and other consequences of vitamin A deficiency, such as more severe morbidity and increased mortality, VAC coverage should be increased throughout the country (see *Nutrition Bulletin*, vol. 2, issue 2, November 2000).

Between communes, VAC coverage varied from 0-100%. The map on pages 4-5 shows VAC coverage in March 2000 per commune for those communes that were included in the National Micronutrient Survey. It can be seen that the performance of the National VAC Distribution Program varies widely, even within provinces. Several factors could be contributing to this and are described in more detail later.

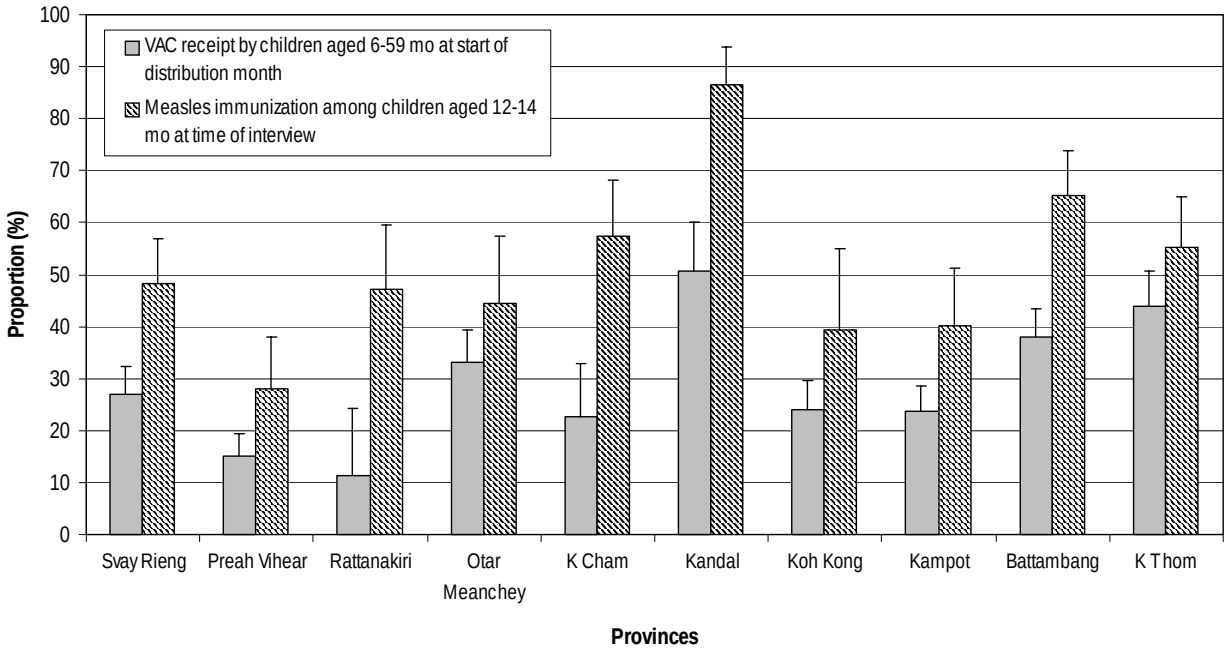
Immunization outreach and VAC distribution

The vitamin A program in Cambodia is fairly new. In 1998, the main strategy changed from linking it with National Immunization Days, to delivering VACs through routine immunization outreach. **Figure 2** combines VAC coverage from Figure 1 with measles immunization coverage, by province. VAC coverage was calculated for all children who were eligible to receive a VAC in the March 2000 distribution campaign (i.e. children aged 6-59 months), while coverage of measles immunization was calculated among children who were 12-14 months old at the time of the interview. That age was chosen because children should have been immunized against measles by the time they reach their first birthday. Figure 2 thus shows recent performance of immunization outreach, as indicated by coverage of measles immunization, and recent VAC coverage, as assessed for the March 2000 distribution round.

Measles immunization coverage ranged from 28-87%, and in all provinces it was higher than VAC coverage. However, in 2 of the 10 provinces (Otar Meanchey and Kampong Thom) measles immunization coverage and VAC coverage were very similar. This is a very good achievement, especially given the fact that immunization outreach only targets the younger children, while VACs need to be distributed to all children aged 6-59 months of age.

Figure 3 shows the relationship between VAC coverage and measles immunization coverage at commune level for different age groups of children. In communes where measles immunization coverage was higher, VAC coverage was also higher. And, interestingly, VAC coverage was not different among different ages; it was the same among the youngest children aged 6-11 months, as among the oldest children aged 36-59 months. Thus, while there has been much discussion that older children might not

Figure 2. Coverage of VAC distribution among children aged 6-59 mo in Mar 2000 and of measles immunization among children aged 12-14 mo at the time of interview in Apr-Aug 2000, by province. Bars indicate 95% confidence intervals corrected for design effect.



be reached very well through immunization outreach activities because they are not part of the immunization target group, these data show that this was not the case in Cambodia.

But the data collected also showed that coverage among children aged 6-11 months was more similar among different communes (a small design effect was found), than the coverage among older children, particularly those aged 36-59 months (a large design effect was found). This indicates that although overall VAC coverage of younger and older children was very similar, the differences of coverage among communes were larger for older children. Thus, for young children, the immunization program and VAC distribution perform more similarly across communes than for older children.

One of the main causes of the relatively good VAC coverage among older children may be that the village chief, who is often engaged in assisting the immunization teams with community mobilization, is doing a good job in getting all preschool-aged children to come for the health services being provided by the teams. This would also explain why VAC coverage among older children varies more widely between communes than VAC coverage among younger children, because some village chiefs put more efforts into mobilizing the older children than others.

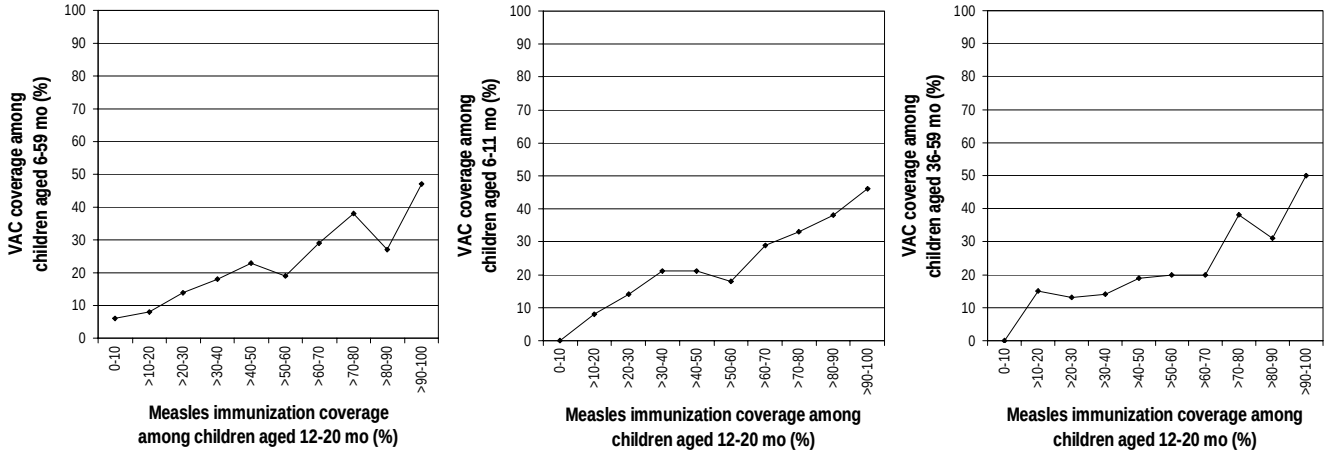
(cont'd on p6)

How the RCG/MOH national vitamin A and immunization programs are linked

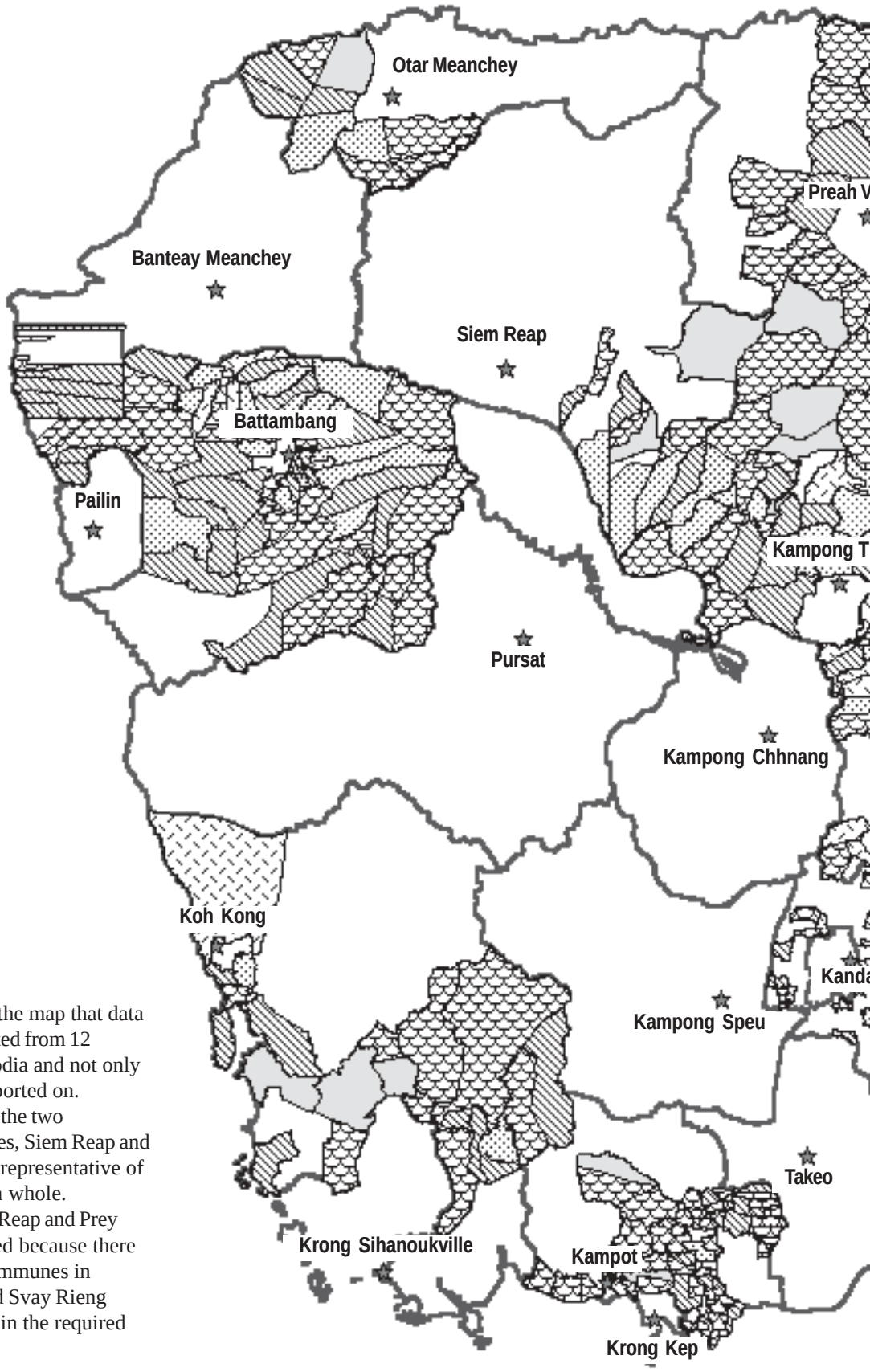
The national vitamin A program was initiated in Cambodia in 1994; in 1995 National Immunization Days (NIDS) for polio began. While the NIDS were being organized, it was recognized early on that it would be good for VAC distribution to "piggy-back" on to the NIDS. The National Vitamin A Working Group, consisting of members from the MOH/Departments of Nutrition, polio eradication and Expanded Program for Immunization (EPI), UNICEF, WHO, and HKI agreed to conduct a pilot to see how well distribution of VACs with NIDS would work. Results of the pilot were very promising and led to the RCG adopting VAC distribution via NIDs as one of the main strategies for distribution of VAC. By 1996 VAC distribution became fully integrated into NIDS.

Distribution of VACs via this strategy continued until the end of 1997 after which the NIDs for polio ended. It was then decided that VACs would be distributed through routine immunization services. In 1998, VAC distribution was integrated into the National Immunization Program (NIP) and is currently being distributed twice a year to children 6-59 months of age through routine immunization outreach and through special supplemental campaigns such as SNIDS.

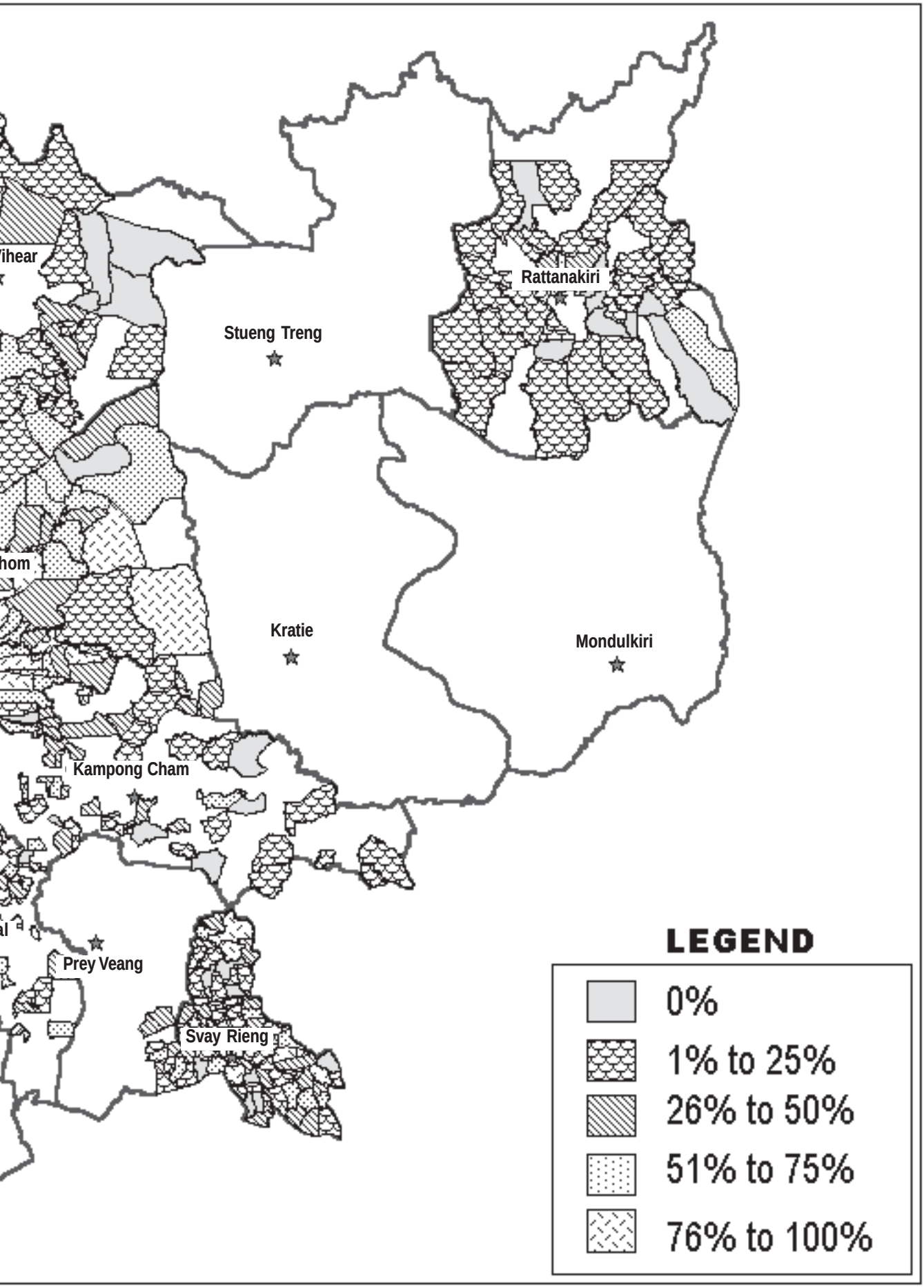
Figure 3. Relationship between VAC coverage and measles immunization coverage at commune level for different age groups of children (n=500 communes). Median VAC coverage in March 2000 at commune level by measles immunization coverage among children aged 12-20 mo at the time of the interview.



Map: Vitamin A capsule coverage among children aged 6-59 mo old in March 2000, by commune.
(Map courtesy of the World Food Programmme/Cambodia)



Note
It can be seen from the map that data were actually collected from 12 provinces of Cambodia and not only the 10 provinces reported on. However, data from the two 'additional' provinces, Siem Reap and Prey Veang, are not representative of those provinces as a whole. Communes in Siem Reap and Prey Veang were surveyed because there were not enough communes in Kampong Thom and Svay Rieng respectively, to obtain the required sample.


ihear
Rattanakiri
Stueng Treng
hom
Kratie
Mondulkiri
Kampong Cham
al
Prey Veang
Svay Rieng
LEGEND
0%
1% to 25%
26% to 50%
51% to 75%
76% to 100%

National Vitamin A Program Assessment

Methodology

The Cambodia National Vitamin A Program Assessment, conducted by HKI, was carried out in the same 10 provinces as the National Micronutrient Survey conducted by HKI, in an additional two provinces (Siem Reap and Preah Vihear), and in Phnom Penh. Data were collected during the months of July and August 2000. In each province, the provincial health department (PHD), 2 operational districts (ODs) and 4 health centers (HCs) were selected for semi-structured interviews in such a way that the widest possible range from poor to good program performance was covered. In addition, in-depth interviews were conducted with one or two NGOs working with the vitamin A program in these provinces. At the national level, MOH Units/Departments and UN organizations involved in the vitamin A program were selected for in-depth interviews.

The question guides were developed by HKI staff, with assistance from Cambodia's Micronutrient Technical Working Group, which consists of representatives of RCG, and national and international agencies. All question guides were developed in English and for the OD and HC levels, translated into Khmer. To ensure that translation was correct, guides were translated back into English and if necessary Khmer versions were corrected. The main topics of the interviews were vitamin A policy, VAC supply and distribution, personnel, training, supervision, reporting, and program costs.

Interviews with government and NGO representatives at national level were conducted by HKI staff at the interviewee's work place or at the HKI office, and recorded in English. Data collection at the PHD, OD, and HC levels was conducted in Khmer by 5 teams of 2 interviewers from the Ministry of Planning, MOH and HKI. The interviewers received a 5-day training. Interviews were held at the interviewee's work place, using face-to-face interview techniques and answers were recorded in Khmer.

After data collection, the interviewers tabulated the answers of interviews at the PHD, OD and HC level by topic, after which they were translated into English. Data were then analyzed by organizational level and separately for rural provinces and Phnom Penh.

(cont'd from p3)

Because VACs are very protective against childhood morbidity and mortality, and because their coverage was found to range from 10-55%, coverage should be increased among all children aged 6-59 months. Also, the performance of the distribution system has to become more similar across villages.

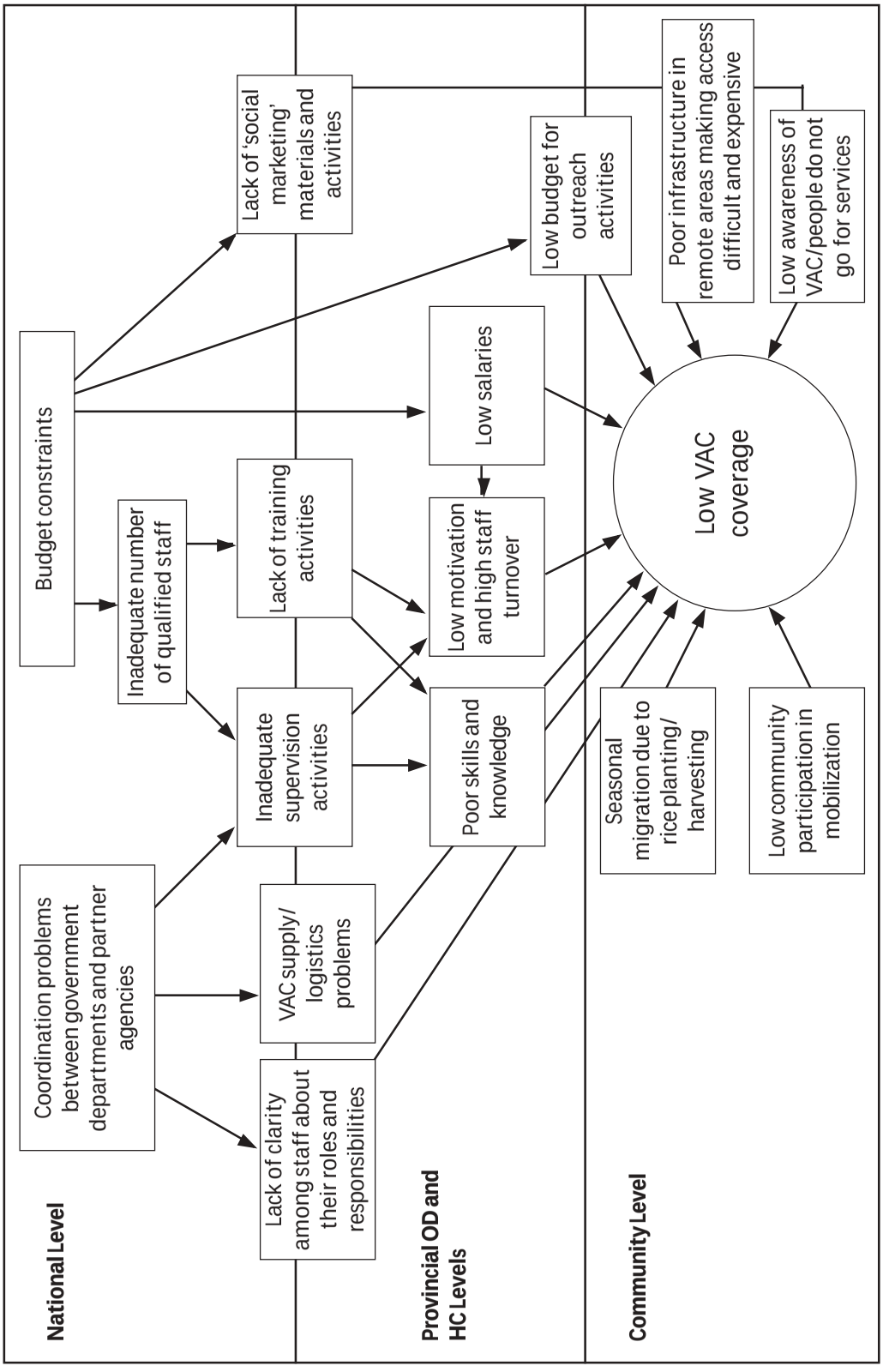
Factors affecting VAC coverage

In order to understand how VAC coverage can be improved, HKI conducted an assessment of the National Vitamin A Capsule Distribution Program in July and August 2000. Results indicate that poor coverage is due to a range of factors at different levels of the health system. These factors are shown diagrammatically in **Figure 4**.

VAC coverage varies widely between different communes within a province, because health centers face different challenges with respect to delivery of the capsules. The more remote areas are the most difficult to reach and are often neglected due to poor infrastructure and the high costs associated with getting there, which becomes increasingly difficult during the rainy season. Also, some health centers have a large turnover of staff, in which case new staff is often unaware of the VAC distribution policy and distribution schedule. Associated with this is an often poor understanding of staff roles and responsibilities, which could also be due to insufficient coordination at the national level. It often happens that VACs are not taken for immunization outreach activities because the immunization staff think that VAC distribution is not one of their responsibilities or because the health center staff think that VACs are not meant for distribution outside the health center.

Another important underlying factor related to poor VAC coverage is budget constraints faced by the national VAC program. This affects all stages of VAC distribution, including overall planning, training, supervision, outreach activities and social marketing of VAC. In addition, health worker salaries are low, which may result in low motivation and absenteeism.

Figure 4. Factors contributing to low VAC coverage in Cambodia



Recommendations

- Vitamin A capsule coverage among children aged 6-59 months needs to be improved. Immunization outreach activities provide a good mechanism for delivering vitamin A capsules to children of all ages and should be continued.
- The findings from this survey on VAC distribution and immunization outreach activities are clearly 'lessons without borders.' The information needs to be shared widely with other countries in Asia and Africa.
- Technical assistance is required to help translate the survey findings into a strategy and action plan to control vitamin A deficiency in Cambodia, particularly for the further development of the VAC program.
- Workshops and meetings will need to be organized and supported in order to make timely use of this information within Cambodia at the national and provincial level.

CAMBODIA

Helen Keller International Nutrition Bulletin

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HELEN KELLER INTERNATIONAL

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February 2001

NUTRITION BULLETIN

The need for multiple strategies to combat vitamin A deficiency among women in Cambodia

Results from the Cambodia National Micronutrient Survey reveal that night blindness is a major public health problem among pregnant and lactating women. Night blindness rates among lactating women were 1.0-6.8% and 2.5-8.4 % of women reported suffering from night blindness during their most recent pregnancy. Given the increased risk of morbidity and mortality, this problem should receive high priority for program planning and resource allocation in Cambodia. The most effective way to improve vitamin A status among women is through a combination of approaches, including improving vitamin A intake, promoting vitamin A and multi-micronutrient supplementation during pregnancy and adolescence, and improving the coverage of postpartum vitamin A capsule (VAC) supplementation.

Vitamin A deficiency among women

Vitamin A deficiency (VAD) has been characterized mainly as a problem among preschool children because of the increased risk of mortality and its clinical manifestations of xerophthalmia and blindness. The role of vitamin A in child morbidity and mortality, although originally discovered in the early 1900's, has been 're-established' over the past 15 years and this has increased efforts to control VAD among children. It has only been in the past five years however that the extent of VAD and its link to increased morbidity and mortality among women has been recognized and this information is just now being brought to international and national attention (see sidebar, p3).

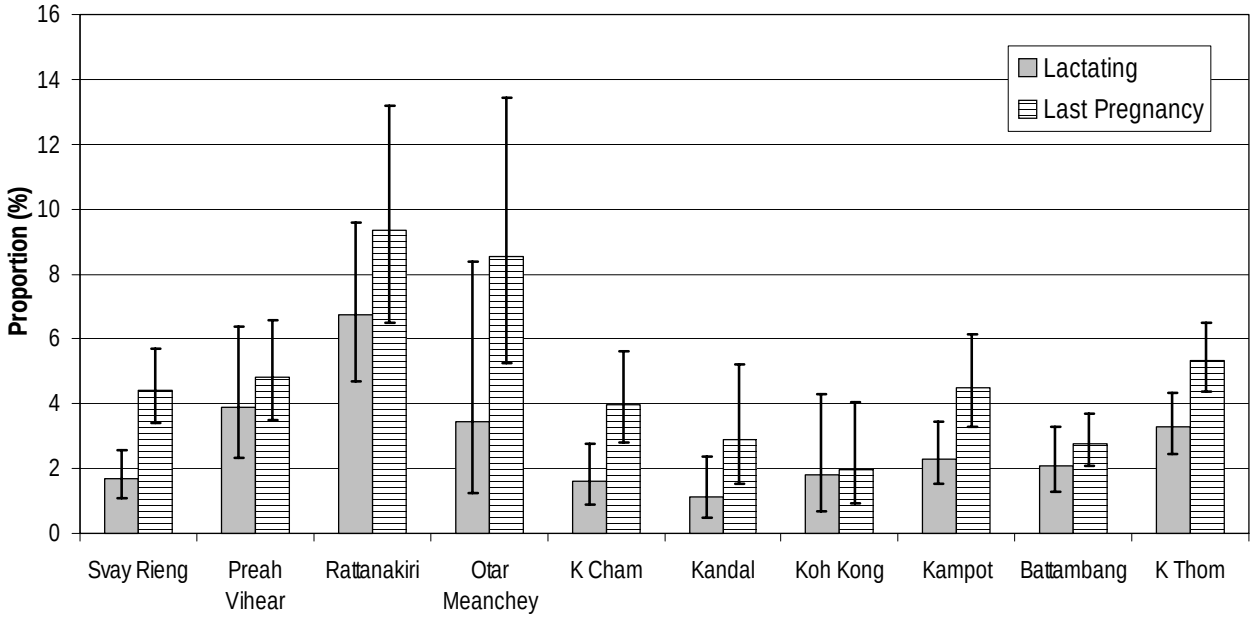
National or large-scale surveys of the magnitude of VAD among women, estimated by the prevalence of clinical or biochemical indicators (such as night blindness or low serum retinol concentration), are limited. With support from USAID and UNICEF, several surveys have been conducted recently in Asia, showing that the prevalence of VAD among women is very high in many countries.

The recent Cambodia National Micronutrient survey included functional and biochemical assessments of vitamin A status, as well as other indicators of nutritional status of women and children, and comprehensive information on dietary intake, morbidity and the coverage of nutrition and health programs. This bulletin provides information that can help to guide future policies and programs to improve vitamin A status of women in Cambodia. The data from this survey is also contributing to international discussions about the use of maternal night blindness as an indicator to monitor progress in controlling VAD.

The Cambodia Nutrition Bulletin is published by Helen Keller International – Cambodia

Helen Keller WORLDWIDE

Figure 1. Prevalence of night blindness among lactating women (child < 24 mos; n=9,050) and during the mother's most recent pregnancy (< 3 yrs ago; n=14,933), by province. Bars indicate 95% CI (Confidence Interval) corrected for design effect.



Prevalence of night blindness

Results from the Cambodia survey show that VAD is a large problem among lactating mothers and during pregnancy. **Figure 1** shows the prevalence of night blindness, the first clinical sign of VAD, by province. Night blindness among lactating women ranged from 1.1-6.8% in the 10 provinces included in the national survey. The reported prevalence of night blindness during the last pregnancy in the previous 3 years ranged from 2.0-9.3%. Provinces with the highest prevalence rates include Rattanakiri, Otar Meanchey, Preah Vihear, Kampot, Svay Rieng and Kampong Thom. Night blindness is only the tip of the iceberg and a much larger proportion of women in Cambodia probably suffer from VAD and would benefit from an increased intake of vitamin A.

Vitamin A programs for women

Programs to improve vitamin A status in a direct way are generally categorized into three approaches, supplementation, food fortification and diet diversification. These approaches were developed mainly to address VAD in children but with some modifications, can be applied to prevent and control VAD among women of reproductive age and other groups, such as adolescents and school-age children.

Daily low-dose supplements

Bi-annual high-dose VAC supplementation cannot be implemented for women of reproductive age because of the risk of teratogenic effects in the first trimester of pregnancy. However, a recent study in Nepal showed that daily, low-dose supplementation with vitamin A can effectively reduce VAD and its consequences among women. Other studies are being carried out to confirm the efficacy of daily supplementation as well as to test the feasibility of implementing these programs for women during pregnancy. In the meantime, supplementation with multiple micronutrients for women during pregnancy, for adolescent girls, and for preschool children is becoming accepted internationally as an important strategy to improve nutrition and is increasingly being discussed as a future program in many countries.

Postpartum high-dose VAC

Postpartum VAC supplementation is promoted to boost the vitamin A stores of women after pregnancy and to increase vitamin A content of breastmilk. Since 1994 the Royal Government of Cambodia has included postpartum women as one of the target groups for receiving a high-dose vitamin A capsule.[1] The survey data show that postpartum VAC coverage is still very low in all provinces, ranging from 1-10%. However, in Kandal, coverage increased from 8.7% by mid-1999 to 12.5% by mid-2000, suggesting that coverage can be increased if women have more contact with health centers or outreach activities. The post partum VAC program is important, but should not be the sole strategy to improve vitamin A status among women because it is difficult to reach women when births are not regularly attended by trained health staff and because the protection of

[1] WHO/IVACG recommend that high-dose vitamin A capsules can be provided without risk up to eight weeks postpartum

the VAC does not extend beyond several months after delivery.

Dietary vitamin A intake
Increasing vitamin A intake from natural sources can also be part of a strategy to improve vitamin A status. The survey showed that the majority of women in Cambodia consumed much less than the recommended daily allowance (RDA) of vitamin A. Less than 6% of lactating women consumed the RDA of 1200 retinol equivalents (RE) and less than 11% of pregnant women consumed the RDA of 1000 RE. Median vitamin A intake was 181 RE/day among pregnant women and 201 RE/day among lactating mothers.

Social marketing
In areas where there is adequate availability of vitamin A rich foods and these foods are within the economic reach of households, social marketing has been shown to be an effective way to improve vitamin A intake of women.[2] Similar activities may also be feasible and effective in specific provinces or among particular risk groups in Cambodia.

Home gardening
In areas where availability and access to vitamin A-rich foods are limited, homestead gardening, fisheries and small animal husbandry can increase their availability and consumption. An assessment of home gardening in Bangladesh using the data from the HKI/GOB national vitamin A survey showed that the risk of night blindness among women and children was lower in households with home gardens compared to those living in households without home gardens. Based on HKI's experience in Bangladesh, a home gardening program was recently initiated in several provinces in Cambodia. An assessment of this pilot program suggests that it can be further expanded. In addition to protecting against night blindness, these programs provide a way to reach women with other services and information, such as micro-enterprise opportunities, literacy programs, health education for HIV/AIDs, micronutrient supplementation, and child health programs.

Food fortification
Fortifying foods with vitamin A and other micronutrients has also been shown to be an effective and sustainable way to increase the intake of essential vitamins and minerals for special sub-groups of the population, such as infant foods, as well as for all household members, such as iodization of salt. The first step is to identify potential foods that can be fortified and a viable food industry. Because Cambodia relies heavily on neighboring countries for processed foods, regional initiatives will be required.

As found in other countries, VAD co-exists with other micronutrient deficiencies in Cambodia. Among pregnant women, 68% were anemic and more than 50% of non pregnant women were anemic. Similarly, children of mothers who were night blind were eight times more likely to be night blind than were children of mothers who were not night blind. This suggests that programs reaching multiple household members, such as food fortification and food-based approaches, and those that provide multiple nutrients simultaneously may be the most effective over the long-term.

Recent evidence from Asia about health consequences of vitamin A deficiency in women

1994: Risk of diarrhea was higher among night blind women. (Bloem et al. Vitamin A deficiency among women in the reproductive years: an ignored problem. IVACG Abstract)

1995: A large proportion of women in Nepal and Laos experienced night blindness during pregnancy and lactation. (Katz etal. Night blindness is prevalent during pregnancy and lactation in rural Nepal. J. Nutr 125:2122-7; Malyavin et al. National vitamin A survey of Laos)

1998: Morbidity was higher among night blind women during pregnancy. (Christian et al. Night blindness of pregnancy in rural Nepal – nutritional and health risks. Int J Epidemiol 1998;27:231-37)

1999: Maternal mortality was reduced by 42% when women of reproductive age received a daily low-dose of vitamin A. (West et al. Double-blind, cluster-randomized trial of low dose supplementation with vitamin A or ß-carotene on mortality related to pregnancy in Nepal. Br Med J;318: 570-5)

2000: Night blind women were more likely to die from infections. (Christian et al. Night blindness during pregnancy and subsequent mortality among women in Nepal: effects of vitamin A and beta-carotene supplementation. Am J Epidemiol 2000;152[6]:542-7)

[2] de Pee S, Bloem MW, Satoto, Yip R, Sukaton A, Tjiong R, Shrimpton R, Muhilal, Kodyat B. Impact of a Social Marketing Campaign in Promoting Dark-green Leafy Vegetables and Eggs in Central Java, Indonesia, Int J Vit Nutr Res 1998;68:389-98.

Conclusions

- Night blindness is a significant health problem among pregnant and lactating women.
- A large proportion of Cambodian women do not consume adequate vitamin A from their diet.
- Coverage of the VAC distribution among postpartum women is very low.
- Anemia, wasting and other nutrition problems are also highly prevalent among women in Cambodia and these nutrient deficiencies co-exist.

Recommendations

- Expand programs to increase the intake of vitamin A rich foods through social marketing, home gardening, poultry and small animal husbandry.
- Explore the feasibility of fortifying foods with vitamin A or preferably, with multiple micronutrients.
- Improve coverage of postpartum VAC distribution program.
- Explore the feasibility of providing multi-micronutrients during pregnancy and adolescence.
- Continue monitoring and surveillance of VAD among women and the effectiveness of programs.

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Other Cambodia Nutrition Bulletins

Iron Deficiency in Cambodia – A threat to the development of young Cambodian children and the country's future. Vol 1, Iss 1, October 1999 27

Vitamin A capsule distribution after the NIDs – lessons learned from Cambodia. Vol 1, Iss 2, January 2000 31

C A M B O D I A

HELEN KELLER INTERNATIONAL

Vol. 1, Issue 1
October 1999

NUTRITION BULLETIN

Iron Deficiency in Cambodia –
A threat to the development of young Cambodian children and the country's future

Cambodia is in a period of transition leaving behind a long history of conflict and struggle and is in the process of building a strong and viable society.

Cambodia has a rich culture and great economic potential; however, it still has a high underfive mortality (115 deaths/1,000 live births)[1], high population growth (2.5%)[2] and low GNP (US$300)[3]. To build a strong future, Cambodia cannot neglect the development of its children.

Several recent studies show that anemia among young children in rural Cambodia is a serious public health problem. According to a study conducted by Helen Keller International (HKI) in five rural provinces, almost 9 out of 10 children less than 24 months of age are anemic (hemoglobin less than 11 g/dl). This is alarming because research confirms that IDA (iron deficiency anemia) during childhood causes long-lasting impairments in cognitive development, ultimately resulting in lower school and work performance. Children with IDA are also at greater risk of becoming ill and may grow more slowly.[4]

In 1993, Cambodia joined other countries to commit to achieving the 1990 World Summit for Children goals to reduce IDA among women and children by one-third by the year 2000. In order to reach this goal, awareness of the magnitude of the problem must be raised among policy makers, program managers and communities. Simultaneously, multifaceted programs should be developed to tackle IDA among women, children and adolescents. Programs to control IDA, such as supplementation, food fortification, and increased consumption of iron-rich foods, are successfully implemented in other countries and have been shown to be highly cost-effective.[5] To prevent the loss of another future generation, infants and young children must be given the opportunity to grow and develop into healthy adults who will be able to contribute to Cambodia's future development.

IDA among children in rural Cambodia

The lack of programs to address childhood IDA is largely because data on the magnitude of IDA is not available in many countries and because decision-makers are not aware of the serious consequences of IDA during childhood. The HKI sur-

[1] National Health Survey 1998, National Institute of Public Health, Ministry of Health, Cambodia.
[2] General Population Census of Cambodia 1998, Final Census Results, National Institute of Statistics, MOP, Cambodia.
[3] IBRD. World Development Report 1998/99.
[4] Gillespie S. *Major Issues in the Control of Iron Deficiency*. Micronutrient Initiative/UNICEF, 1998.
[5] Murray C, Lopez A (eds). Global Burden of Disease and Injury (Vol. 1), 1996. Harvard University Press, Cambridge, MA, USA.

Common Facts about Iron Deficiency Anemia:

- Anemia is the most common nutritional deficiency in the world: Iron deficiency and its anemia affects more than 3.5 billion people.
- Although there are other causes, iron deficiency is the leading cause of anemia.
- Iron deficiency anemia has few signs and symptoms and therefore often goes unnoticed – by families of those affected, by health care professionals and by policy makers.
- Iron in the diet comes in two forms: *Heme iron* is found in animal foods and is well absorbed by the body. *Non heme iron* is found in plant foods and is less well absorbed. Eating animal foods and foods rich in vitamin C and avoiding foods that inhibit iron absorption, such as tea, can improve the iron absorption from plant foods.
- There are several stages of iron deficiency – what public health professionals most commonly measure, anemia, is the final stage. Some experts suggest that the prevalence of iron deficiency is almost twice the prevalence of IDA.
- The costs of iron or micronutrient supplementation programs are minimal and the benefits are enormous.
- Children often suffer from deficiencies of multiple micronutrients at the same time because their diets are simultaneously insufficient in many nutrients and calories. Vitamin A deficiency has also been shown to precipitate anemia.

Major consequences of IDA:

IDA can slow child physical development and motor skills.

IDA during childhood reduces IQ similar to iodine deficiency.

IDA has large economic costs:

– Current and future productivity is decreased.

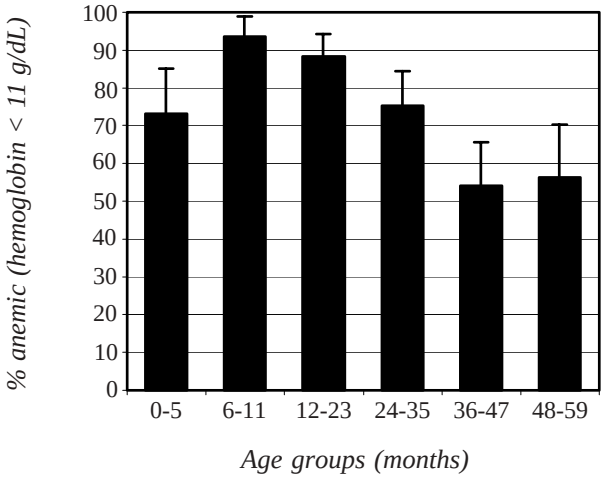
– Education investments are not maximized.

– The burden on the health care system is increased.

Severe IDA, particularly during pregnancy, can lead to mortality.

Source: Gillespie SR. *Major Issues in the control of iron deficiency.* The Micronutrient Initiative, 1998.

Figure 1. Prevalence of childhood anemia in Cambodia (n=344)



(continued from p1)

vey, conducted in five provinces of rural Cambodia in May 1999, found that 74% of children under five years of age suffered from anemia (hemoglobin less than 11.0 g/dl). Although the survey was not nationally representative, it suggests that anemia is a serious problem in Cambodia. These rates of anemia in children are considerably higher than even the high rates found in recent surveys by HKI in other countries in Asia.

In addition to highlighting the high prevalence of childhood IDA in rural Cambodia, the HKI study reveals several other important findings. As shown in Figure 1, IDA was already extremely high among children less than 6 months of age (73%). The prevalence of IDA rose even higher among children 6-11 months of age when more than 9 of 10 children were anemic. Rates were only slightly lower for children 12-35 months of age.

The high rates of anemia most likely reflect an inadequate consumption of iron-rich foods. The HKI study collected information on the dietary intake of children, as well as infant feeding and breastfeeding practices, revealing a number of important statistics. First, less than 20% of children 0-6 months of age in the study areas were being exclusively breastfed. Breastmilk is the most important source of iron for children less than 6 months of age. Second, the consumption of animal foods, such as fish, meat, and eggs, was also low among Cambodian children, particularly among children 6-23 months of age, among whom anemia rates were highest, and growth and development is greatest. Animal foods are crucial sources of iron and other micronutrients. When asked why they were not feeding micronutrient-rich foods to their children, the majority of mothers reported

that they could not afford to purchase these foods. In addition, mothers believed that giving certain foods to their children may cause illness or was not appropriate for younger children.

The HKI study reveals that childhood IDA is a serious problem in parts of rural Cambodia. Although food fortification and increased consumption of animal and plant foods high in iron and other micronutrients are the ultimate long-term solutions, immediate action is required to prevent the potentially irreversible slowed cognitive and physical development that is occurring among young children in rural Cambodia. In the immediate future, iron supplementation programs for infants and young children are needed.

Because the diets of mothers and children in these study areas are also low in other important micronutrients, supplementation with multi-micronutrients should be encouraged. More than 70% of pregnant women in the study areas had IDA, thus, mothers also need to receive multi-micronutrient supplements – to protect their own health and their children's as well. Iron and multi-micronutrient supplementation programs are not expensive and the immediate and future benefits of implementing these programs will be enormous.

Recommendations

- A **national survey** to assess anemia prevalence and to explore the etiology and key risk factors for childhood and maternal anemia in Cambodia is warranted.
- **Provision of iron or multi-micronutrient supplements to children and women** should be undertaken **to prevent IDA** in children and women. Supplements might be delivered through ongoing NGO programs or the health care system.
- Programs that **increase the production and availability of micronutrient-rich foods**, both animal and plants, should be expanded.
- Programs to **improve breast feeding practices and to improve the quality and timely introduction of appropriate foods for infants** are also needed.

History of HKI in Cambodia

In the early 1990s, HKI provided technical consultations to investigate the magnitude of vitamin A deficiency in Cambodia and provided technical assistance to international and local non governmental organizations (NGOs) to integrate vitamin A interventions into their ongoing programs. In 1993 HKI established an office in Phnom Penh. In 1995, the focus of the program was expanded to promoting sustainable nutrition interventions to improve micronutrient status and institutionalizing primary eye care. Specifically, in the area of nutrition, HKI has been involved in:

- Piloting vitamin A capsule coverage programs and recommending strategies for the national program
- Promoting food-based approaches to alleviating vitamin A deficiency
- Developing communications strategies for promoting vitamin A rich foods
- Supporting national efforts for the control of iodine deficiency disorders

HKI's work in Cambodia has been supported by the US Agency for International for International Development (USAID), the United Nation's Children Fund (UNICEF), the World Health Organization (WHO) and private donors.

History of RCG/HKI collaboration

Based on preliminary evidence from a hospital-based survey, HKI and the MOH conducted a vitamin A survey in 5 regions in 1993. The findings of the survey suggested that clinical vitamin A deficiency was a serious public health problem among preschool children in Cambodia. Subsequently, the collaboration between the RCG/MOH and HKI has included:

- Creating awareness of the link between VAD and child survival
- The start-up of a program to distribute VACs bi-annually, which was subsequently linked with the National Immunization Day campaigns
- The establishment of a national vitamin A working group consisting of members from the MOH, UNICEF, WHO and HKI
- Developing a National Food and Nutrition Policy
- Developing a National Vitamin A Policy

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C A M B O D I A

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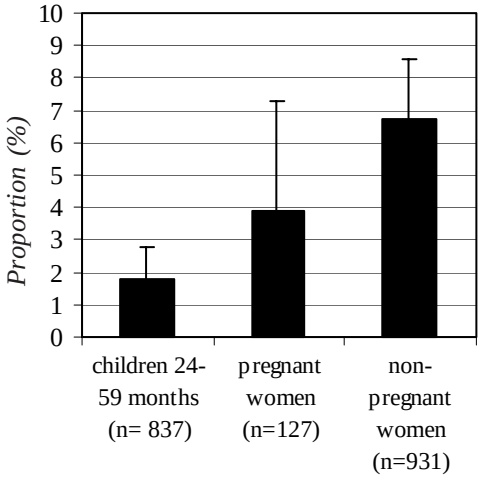
NUTRITION BULLETIN

Vitamin A capsule distribution after the NIDs – lessons learned from Cambodia

An alarming number of cases of nutritional blindness in the past year have brought into question the effectiveness of the current national vitamin A capsule (VAC) distribution program in Cambodia. From 1996-1997, when VAC distribution was integrated with the National Immunization Days (NIDs), coverage was high. However, now that VAC distribution has been integrated with routine EPI (Expanded Program for Immunization), because NIDS are no longer necessary, coverage has become much lower. Therefore, many Cambodian children are again at risk of going blind or dying from vitamin A deficiency.

Vitamin A deficiency (VAD) is still a problem of public health significance among Cambodian children and women. In 1999, Helen Keller International (HKI) conducted a survey in 5 provinces (Takeo, Kratie, Steung Treng, Seim Reap and Kampong Thom), which found a prevalence of nightblindness, the first clinical sign of VAD, of 1.8% among children aged 24-59 months and of 4.3% and 6.8% among pregnant and non-pregnant mothers, respectively (see figure 1). Furthermore, hospitals are reporting clinical cases of vitamin A deficiency. This high prevalence and severity of VAD calls for immediate action. Assessment of the prevalence of VAD in the different areas of the country is urgently needed, and efforts to combat vitamin A deficiency, particularly through the distribution of high-dose vitamin A capsules, need to be improved.

Figure 1. Prevalence of nightblindness among children and women.
Bars indicate 95% CI (Confidence Interval) corrected for design effect.



Royal Government of Cambodia committed to eliminating vitamin A deficiency

In 1993, the Royal Government of Cambodia (RCG) made a commitment to achieve the World Summit Goals for children which has, as a target, the virtual elimination of VAD by the year 2000. In 1994, the first National Vitamin A policy was adopted and in 1999, the RCG adopted the Resolution of the National Seminar on Food Security and Nutrition in Cambodia. As part of this, the Government made a commitment to adopt the Cambodian Nutrition Investment Plan (CNIP), with one of the objectives being the elimination of VAD over the next ten

(continued on p2, col 2)

Facts about vitamin A deficiency

What vitamin A does[1]

Vitamin A (VA), stored normally in the liver, is crucial for effective immune-system functioning, protecting the integrity of epithelial cells lining the skin, the surface of the eyes, the inside of the mouth and the alimentary and respiratory tracts. When this defence breaks down in a vitamin A-deficient child, the child is more likely to develop infections, and the severity of an infection is likely to be greater.

Depending on the degree of the deficiency, a range of abnormalities also appears in the eyes of vitamin A-deficient children. In the mildest form, nightblindness occurs. In more severe forms, lesions occur on the conjunctiva and cornea that if left untreated can cause irreversible damage, including partial or total blindness.

Consequences of vitamin A deficiency

Studies show that the survival chances of children aged 6 months to 6 years are dramatically increased by improving vitamin A status by twice yearly distribution of high-dose VA capsules. Risk of mortality from measles is reduced by about 50%, from diarrhea by about 40%, and overall mortality by 20-25%[2]. Improved vitamin A status among deficient children also reduces the severity of infectious illnesses, particularly measles and chronic diarrhea, and is associated with reduced need for outpatient services, and therefore lowers the overall cost of health services[3].

A recent study in Nepal found a reduction of maternal mortality by 40-50% when women of reproductive age received a daily low-dose of vitamin A[4]. This emphasizes the need to not only focus on VAD among children but also among women, especially during pregnancy and lactation.

[1] Reprinted from *The State Of The World's Children 1998*, UNICEF, Oxford University Press, 1998, p76

[2] Beaton GH, Martorell R, L'Abbe KA, Edmonston B, McCabe G, Ross AC, Harvey B. *Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries.* ACC/SCN Nutrition Policy Paper. Geneva: United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition, 1993.

[3] *Vitamin A Global Initiative – Strategy for Acceleration of Progress in Combating Vitamin A Deficiency.* (Consensus of an Informal Technical Consultation convened by UNICEF/MI/WHO/CIDA/USAID), December 1997.

[4] West Jr KP, Katz J, Khatry SK, LeClerq SC, Pradhan EK, Shresta SR, Conner PB, Dali SM, Christian P, Pokhrel RP and Sommer A. *Double-blind, cluster-randomized trial of low dose supplementation with vitamin A or B carotene on mortality related to pregnancy in Nepal*. British Medical Journal 1999; 318: 570-5.

(continued from p1)

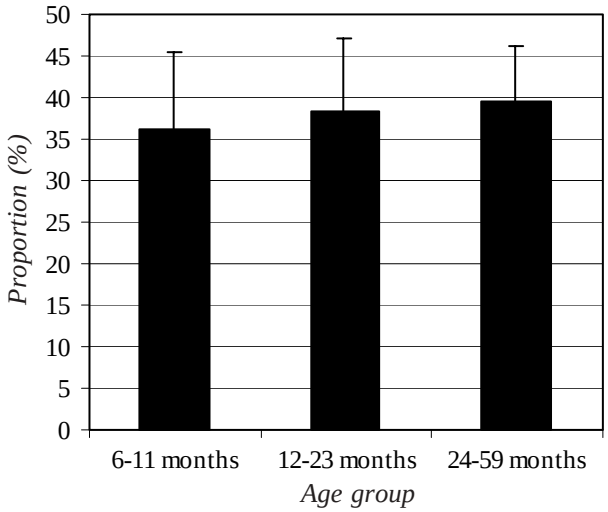
years. In order to reach this goal, awareness of the magnitude of the problem must be raised among policy makers, program managers and communities.

Vitamin A capsule distribution

Because the VAC distribution program in Cambodia already started in 1994, there is a general sense that the program is being implemented successfully. However, while coverage was high when distribution was integrated with the NIDS, it has become much lower since it became part of routine EPI in 1998. The 1999 HKI-survey found that only 35-40% of children aged 6-59 months had received a vitamin A capsule in the six months prior to the survey (see figure 2) and that less than 10% of the mothers interviewed had heard about vitamin A. Other data suggest that there is a strong relationship between place of residence and receipt of a capsule, with coverage being far higher in the capital city than elsewhere, and especially low in remote and isolated provinces.[5]

The data collected by HKI also showed that coverage among children aged 6-11 months was very similar among different villages (a small design effect was found), while the coverage among older children, particularly those aged 24-59 months, varied widely among different villages (a large design effect was found). Since the integration of capsule distribution with EPI, young children can be reached when they come for immunization, but older children need to be specifically targeted. The difference of design effect found indicates that among differ-

Figure 2. Vitamin A capsule coverage among children. Bars indicate 95% CI (Confidence Interval) corrected for design effect.



[5] *National Health Survey 1998*. National Institute of Public Health/ SAWA/Macro, 1999.

ent villages the performance of the EPI program is very similar, but that the exclusive targeting of older children varies widely among villages. Thus, VAC coverage has to increase among all children aged 6-59 months and the performance of the distribution system has to become more similar across villages.

Among mothers, who should receive a vitamin A capsule within 8 weeks of delivery, coverage was below 5%.

History of National Vitamin A Program

In 1993, a survey was conducted by the Ministry of Health/Center for Hygiene and Epidemiology (MOH/CNHE) and HKI in four rural provinces and in urban slums of Phnom Penh. In total, 10,116 children aged 12-71 months were examined for clinical signs of VAD. In every site, except Phnom Penh, their prevalence either matched or exceeded WHO cut-offs for classifying VAD as a public health problem: Bitot's spots, 0.6%, and night blindness, 5.6%[6]. The survey also found that consumption of vitamin A-rich foods was inadequate, especially during the dry season.

Immediately after the results of the 1993 MOH/HKI survey became known, a national VA workshop supported by HKI and UNICEF was held, which was attended by representatives from all provincial health departments. As a result of the workshop, a national vitamin A working group was formed, which drafted a National Vitamin A Policy that was adopted by the RCG in 1994. A national VA supplementation program was launched to provide VACs to all children 6-71 months of age every 3 - 6 months.

In 1996, following a pilot in 1995 by the MOH, WHO, UNICEF and NGOs, including HKI, VAC distribution became fully integrated into the National Immunization Days (NIDS). And in 1998, VAC distribution was fully integrated into the National Expanded Program for Immunization (EPI) in 15 major provinces with distribution three times per year and coordinated with SNIDS (sub-national immunization days). In 1999, a revised national vitamin A policy was drafted with target groups for universal supplementation being children 6-59 months of age and women up to eight weeks post partum. The strategy includes improving VAC coverage through routine immunization outreach twice a year.

[6] *Results of Vitamin A Deficiency Survey, May-August 1993*. MOH/CHNE/HKI. Phnom Penh, 1994.

Dietary vitamin A intake

With respect to dietary vitamin A intake, the 1999 HKI survey found that total vitamin A intake of children was around 80 RE/day, which is much lower than the recommended intake of 350 RE/d. Mothers' total vitamin A intake was found to be around 185 RE/day, which is also much lower than the recommended allowance of 500-850 RE/day (non-pregnant non-lactating, and lactating, respectively). The survey was conducted at the beginning of the rainy season, which coincided with the end of the mango season. During this time, vegetable consumption is low, consumption of foods of animal-origin is average, and fruit consumption, especially of mangoes, is high.

Conclusion

Vitamin A deficiency is a serious problem among pre-school aged children and women in Cambodia. Dietary vitamin A intake is far below the recommended daily allowance and vitamin A capsule distribution only reaches a small proportion of those that need it.

The best strategy for combating the problem is improving the national VAC distribution program. In order to do that successfully, information is urgently needed on the prevalence of VAD in different parts of the country, on current channels of VAC distribution, and on possible mechanisms for achieving high capsule coverage.

Recommendations

- A **national vitamin A survey** to assess the prevalence of vitamin A deficiency, capsule coverage and VAC distribution mechanisms is necessary.
- Effective strategies to **improve vitamin A capsule coverage among children aged 6-59 months** nationwide need to be developed and tested.
- Mechanisms to **improve vitamin A capsule coverage among women up to 8 weeks post partum** need to be piloted.

CAMBODIA

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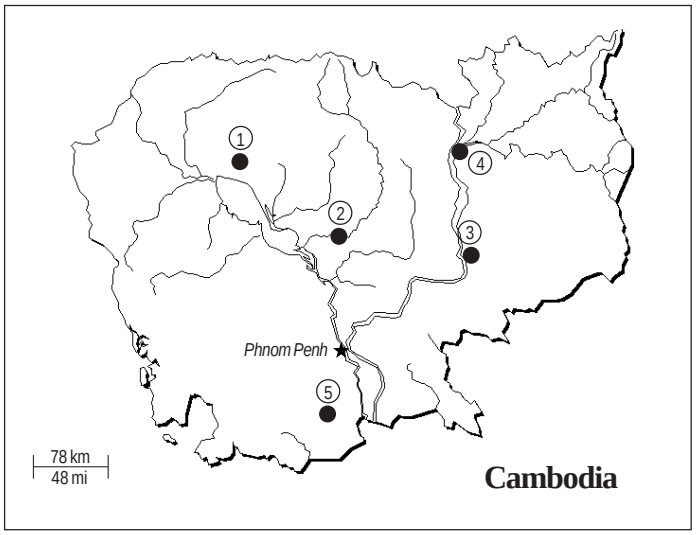

HKI survey areas:
1. Siem Reap
2. Kampong Thom
3. Kratie
4. Steung Treng
5. Takeo

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Helen Keller International Asia-Pacific Technical Team

Activities during 1999 and 2000

1. National vitamin A capsule distribution program

- As an active member of the National Micronutrient Working Group, HKI was very much involved in developing the revised *National Vitamin A Policy, 2000*. This policy provides clear guidelines for treatment and prevention of vitamin A deficiency and is to be used as a guide for health center staff.

2. Food-based approach to addressing vitamin A deficiency

- In partnership with seven NGOs, in nine provinces and one urban slum area of Phnom Penh, established 221 village model gardens and 6,532 household gardens. These gardens are important for household food security, health, income generation and empowerment of women.
- Monitoring reports show an improvement in the number of varieties of fruits and vegetables produced, consumed and sold and an improvement in consumption frequency per week. This is expected to positively affect the health and well being of family members.

3. Nutrition education materials development

- Developed and produced numerous nutrition education materials which are being used widely throughout Cambodia. Materials include posters, counseling cards, songs, games, leaflets and reference documents on topics such as the importance of vitamin A, good nutrition, food groups, infant and maternal feeding, home gardening, etc. The demand for these materials is high and reproduction of many materials has already occurred many times in order to meet the needs. We receive lots of requests not only for these materials but also for training in nutrition and home gardening.
- HKI was the main agency responsible for revising the Cambodian "Road to Health" or "Yellow Card". This card is now improved in that it has a space to record vitamin A capsules given to the child, it has nutrition education messages on the card and it is multi-color making it more attractive for mothers or caretakers and thus improving the likelihood of card retention.

4. Improving basic eye care services

- Approximately 380,000 persons have access to basic eye care services as a result of the training that HKI has conducted for health center staff and village health volunteers in basic eye care treatment and prevention.
- Various training materials, educational materials and reference manuals have been developed for use by health center staff and village health volunteers. These have formed part of the National Prevention of Blindness (PBL) Program of the Ministry of Health.
- The primary eye care curriculum, developed by HKI, HelpAge International and the PBL Office, has successfully been integrated into the MOH Minimum Package of Activities Training Curriculum.

5. Research studies/surveys

- Conducted a baseline survey for the home gardening program. Results from the survey were widely disseminated to raise awareness about micronutrient deficiencies through the publication, *HKI Cambodia Nutrition Bulletin*, which is disseminated within and outside Cambodia.
- Conducted a study on young child feeding in order to make recommendations for the "Counsel the Mother" card, which is part of the Integrated Management of Childhood Illnesses, a program the MOH is piloting.
- Conducted the first ever Cambodia National Micronutrient Survey and Micronutrient Program Assessment. Results from the survey and assessment will be important for assessing the current vitamin A program and for directing future programming in micronutrients in Cambodia.

CAMBODIA

Adapted from the UNICEF *Cambodia Country Profile*, December 13, 1999

Currency: 3900 Riel = US$ 1

Ethnic groups: Khmer 90%, Chinese and Vietnamese, small numbers of Mon Khmer hill tribes, Chams, Burmese.

Weather: Tropical monsoon

Political and administrative systems:

Sub-divisions: 24 provinces, 182 districts, 1,623 communes, 13,408 villages

Capital: Phnom Penh

Head of state: King Norodom Sihanouk

Head of govt.: Prime Minister Hun Sen

Legislative body: After the election of July 1998, ten out of 120 members of the National Assembly are women.

Highlights: Cambodia gained independence from France in 1953 and Prince Sihanouk became head of state. Prince Sihanouk was ousted in a coup in 1970. In April 1975, the Khmer Rouge captured Phnom Penh, establishing a radical agrarian society under which more than 1 million people died of executions, starvation, disease and overwork. In 1979, the Vietnamese Army ousted the Khmer Rouge and established a new Cambodian government against which for the next decade a guerrilla war was waged by a coalition of the Khmer Rouge and non-communist resistance groups. In 1991, the warring Cambodian factions signed a United Nations sponsored peace agreement. UN-organized elections took place in 1993, following which a coalition government was formed. The stability of the government was threatened by the power struggle between the ruling parties (FUNCINPEC & CPP), which reached a crisis in July 1997. The crisis led to the departure of the first Prime Minister, Prince Ranariddh. No party gained a sufficient majority to govern alone in the July 1998 elections and a coalition government was formed in November 1998 with the CPP of Prime Minister Hun Sen as the biggest party. Cambodia became a member of ASEAN in 1999.

Major determinants underscoring the health situation of children and women:

- Infrastructure and social services have been destroyed by decades of war, civil strife, political instability and economic depletion. These problems are most pronounced in rural areas.
- 36% of households live below the poverty line. Illness continues to push large numbers deeper into debt and destitution because of the high cost of health care.
- Cambodians who are poor, illiterate, lack schooling and live in remote areas, are the most likely to have higher malnutrition and mortality rates, suffer more from diarrhea, benefit less from health care (vaccination, antenatal care, trained birth attendance) or education.
- An unusual high proportion (2%) of the population is disabled by war and civil strife. The number of amputees, widows, neglected and exploited children, and victims of recurrent flood and drought is large.
- HIV/AIDS is spreading dramatically with almost 50% of prostitutes and 2.4% of married women infected with HIV. An estimated 241,000 people are infected with HIV, 5,000 have died already of AIDS and a further 5,000 are expected to die this year, out of which 1,000 children.
- Basic education faces serious problems with access, achievement and quality, high drop-out rates and pronounced disparities between socio-economic levels, geographic areas and gender.
- Among 1-4 year olds, ARI, malaria and diarrhea are the main causes of death.
- Resources are scarce; key departments such as Education, Health, Rural Development and Women's Affairs lack minimum qualified staffing, basic equipment, supplies and operational funds.
- 22% of households are headed by women. Women have, on average, 20% lower literacy rate than men.

STATISTICAL DATA

Demography		
Population ('000')[1]	11,426	(1998)
Population under 5 ('000')[1]	1,463	(1998)
Population under 18 ('000')[1]	5,747	(1998)
% Population growth rate[1]	2.5	(1998)
Land area ('000' km^2)[2]	177	(1995)
Density (per km^2)[1]	64	(1998)
% urbanized[1]	16	(1998)
Total fertility rate (per woman)[3]	4.1	(1998)
Life expectancy (male/female; years)[4]	50/59	(1995)
Crude birth rate[3]	29	(1998)
Crude death rate[5]	13	(1996)
Number of births ('000')[4]	330	(1998)
Number of under-5 deaths ('000')[4]	38	(1998)

Socio-economic environment		
GNP per capita (US$)[4]	300	(1997)
Human development index[6]	0.422	(1995)
Health exp. (% of planned govt. exp.)[7]	6	(1997)
Education exp. (% of planned govt. exp.)[7]	10.3	(1998)
Military exp. (% of actual govt. exp.)[7]	50	(1997)
Radio sets per 1000 pop.[5]	40	(1997)
TV sets per 1000 pop.[5]	20	(1997)
% female participation in labor force[5]	65	(1997)
% child labor force (% of age 10-14 yrs)[5]	17	(1997)

Health		
Maternal mortality rate[8]	473	(1996)
Infant mortality rate (per 1,000 live births)[3]	89	(1998)
Under five mortality rate[3]	115	(1998)

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7. Common Country Assessment, UNDP, 1998.
8. Health Statistics, Ministry of Health, Kingdom of Cambodia

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