IFSP - Health Component

School Programme Activities Report

and

School Anthropometric,
Hemoglobin and Stool Survey

in 1999 and Follow up Survey in 2000

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IFSP - Health Advisor
IFSP - Health Component - R5
School programme activities report
Period: April 1999 to December 1999

and

School Anthropometric,
Hemoglobin and
Stool survey - July 1999

and

Follow-up survey - July 2000

TABLE OF CONTENT

1. SUMMARY 2
2. BACKGROUND 5
3. INTRODUCTION TO IFSP SCHOOL HEALTH PROGRAMME 6
4. ACTIVITIES AND FINDINGS 8
5. SCHOOL ANTHROPOMETRIC, HEMOGLOBIN AND STOOL SURVEY 12
6. FOLLOW-UP SCHOOL SURVEY IN 2000 28
7. SCHOOL FEEDING PROGRAMME 41
8. RECOMMENDATIONS 43
9. CONCLUSIONS 44
10. ACKNOWLEDGMENT 45
11. TABLE OF ABREVIATION 46
12. ANNEX 47
1. SUMMARY

1.1. Regular School Health Program

In April 1999, IFSP started a School Health Programme in 10 schools belonging to the catchment's area of two HC: Dang Tung (DT) and Trapeang Reang (TR) in OD Chhuk. Each school session started with health education information. 4527 children have been seen during the first round of school activity during Q2 1999. This represents 82.4% coverage of registered pupils. (see details page 10)

All pupils have been treated with one dose of Vitamin A and 500 mg of Mebendazole. All students, from grade 1 to grade 6, passed through a quick medical screening. 471 pupils (10-4%) were affected with angular gingivitis, sign-of vitamin B2-deficiency and have been treated With Vitamin B complex. Bad hygiene, scabies and other skin diseases were the other main problem seen.

In December 1999, 4088 children, belonging to 9 schools, have been seen during the second round of school activity. Problems seen are similar to those found during the first round.

In June 2000: third round of activity. 4,465 pupils screened

In December 2000: fourth round of activity, with extension to the 9 schools of Champey HC. A total of 8,998 kids are screened in the 18 schools now supported by our programme.

1.2 July 1999 School Survey

School survey has been prepared during Q2 1999. Only pupils from grade 1 from two cluster schools in Dang Tung (DT) and Trapeang Reang (TR) have been included in this survey. First task: to prepare a questionnaire for proper age evaluation (annex 4). VHW visited 418 households in 11 villages to assess the real pupil's age.

To increase chance of follow-up in 2000, all kids present on the survey day have been included in the study: 234 in TR and 217 in Dang Tung.

Real age and school age registration: major discrepancy was found compared with school age registration (annex 8). The real age mean of grade 1 students is 9.36 years old, while mean of school age is 7.375 years. Difference between two means is almost 2 years!

Hemoglobin survey: 451 blood samples were analyzed with the Levibond method. Following WHO guideline, hemoglobin (Hb) cut-off to define anemia is set at <11.5 gr. Hb. per 100 ml. of blood for age group 5 to 11 years and at <12 gr. Hb for age group 12 years and over.

In average, 64% of children were found affected by anemia. (see annex 10 to 13)

In age group 6 to 11 year old, 59.7% (228/382) of the children were found to be anemic (61.6% in TR and 57.3% in DT). (see table page 16)

In age group 12 and more, 88.4% (61/69) were found anemic. (82.6% in TR and 91.3% in DT). 13.3% of children (29/218) in Dang Tung school and 9% (21/234) in Trapeang Reang school were found to suffer from severe anemia with a level of Hb below 10 gr. per 100 ml. of blood.

Anthropological survey: The cut-off point to define malnutrition has been setup at < -2 s.d. 233 pupils in TR and 207 in DT have had their weight and height measured. Chronic malnutrition is hyper-prevalent with 59.7% of grade 1 pupils affected by stunting in TR and 45.4% in DT. (annex 14 and table page 18)

The prevalence of stunting is increasing with the age an indication that the chronic malnutrition persists over the years. Almost 80% of 11-year-old kids are stunted!

Acute malnutrition is found in 9.4% of pupils in TR and 4.4% in DT.

Stool survey: 162 stool specimens have been analyzed for parasites in Dang Tung (annex 15). 62.3% were found positive. 68 kids out of 162 (42%) were contaminated by hookworm and 20 (13.3%) by strongyloide. Prevalence of ascaris was quite low: 1.9% or 3 specimen only.
Our survey found out that 83.7% of households don't have a latrine and that 90.1% of children don't wear shoes during defecation. This may explain the high prevalence of infestation with hookworm and strongyloide. Little consumption of green vegetable may explain the law prevalence of ascaris.

Conclusion: This first survey confirms the dramatic level of malnutrition among children. Prevalence of stunting is very high and acute malnutrition is a real concern as well. Anemia is hyper-endemic and concrete measure has been taken. A mass distribution of Iron-Folic Acid tablets in our nine schools has started in November 1999.

1.3 July 2000 Follow-up Survey


Over 90% of kids included in 1999 have been follow-up in 2000. They are now in grade 1 and 2. Class repetition: in DT, more kids repeat grade 1 (98) than pass to grade 2 (96)! (see Annex 16)

Age: kids being one year older, 31% are now in the age group 12 year old or more (151% in 99). (see annex 17)

Hemoglobin survey: blood sample 215 in TR and 197 in DT.

We notice a major decrease in anemia prevalence: (see table page 25)

- in age group 6-11: 11.91% only in TR, but 26.21% in DT, respectively 61.91% and 57.31% in 1999
- in age group 12 and +: 44.21% in TR and 54.31% in DT, respectively 82.61% and 91.31% in 1999

Problem of compliance is noticed in DT. Mean of iron tablets taken is 14 in DT, but 17.9 in TR.

All severe cases of anemia have been washed out. (50 cases in 1999 with Hb. from 7.3 to 9.7 gr.) Moderate anemia is remarkably down. In TR, it is down from 78.61% in 1999 to 391% in 2000. "Healthy kids" with Hb > 11.7 gr. are up from 12.4% in 1999 to 62% in 2000. (annex 21)

Graphics in annex 22 show a major shift to the right of the Hb. distribution curves in TR and DT.

Iron Therapy:
The main outcome of this study is to demonstrate that "Weekly Iron Therapy" works very well even when there is some compliance problem. A regimen of 20 tablets gives great results. This is cheap and easy to handle with collaboration of school director.

Follow-up of anthropological survey: no major significant change found.
Levels of acute malnutrition (10.1% in TR and 41% in DT) are almost the same than in 1999. In 2000, we notice a non-significant mild decrease of chronic malnutrition. In CK, 55.31% of kids at < - 2 s.d. for Height/Age, for 59.71% in 1999. As in general, chronic malnutrition increases with age, we can presume that there is some improvement since the last survey. (see page 27 & annex 23)

Follow-up of stool survey: from the 162 kids checked in 1999, 146 could be follow-up and have their stool analyzed by the same staff and with the same method.
In 2000, 491% of stools are infected for 62.31% in 1999 (see table page 29, 30 and annex 24)
In 2000, 40.41% (59) are infected with hookworm, for 421% (68) in 1999, BUT the infestation level has much decreased. Because of lack of latrine, hookworm re-infection is quick to happen.

Regarding strongyloide, 6.81% are infected (12.31% in 1999); efficiency of Mebendazole is questionable?
Only one kid (0.7%) is found with ascaris (1.91% in 1999), but consumption of vegetable is still low.
1.4 Recommendations:

? School health program should become the norm in Cambodia. Priority should be given to the first three grades of primary school. Bad hygiene, malnutrition, anemia, angular gingivitis, scabies and other skin diseases are the main problems.

? Vitamin A should be part of School Health program, in combination with mass deworming.

? Vitamin B: sign of vitamin B deficiency are very common, (up to 161% of pupils with Angular Gingivitis in some school in 1999). Vitamin B complex supplements are recommended.

? Mass iron therapy should become the norm in any School Health Program in Cambodia.

? Deworming program is very effective in decreasing the level of parasite infestation among school children.

? Other study should be designed to evaluate the respective part of deworming programme and iron mass therapy in the eradication of anemia in this population.

? Latrine development program should be supported for school and household, as high level of hookworm re-infection has been demonstrated.

? Shoes: to wear shoes during defecation should be an important topic during health education.

? School feeding program is strongly recommended, considering malnutrition level and all nutrient deficiencies found among Khmer children.

? Recommendation to Ministry of Education:

- Registration school age: Ministry of Education should change its policy, to exclude "older children" from school registration. This just encourages, many parents to register in grade 1, their 10-year-old kid as a seven year old. It must be understood that many national data and survey on school are biased with the present system. Real age must become the standard.

- Delayed school registration: in TR only 2.1 1% of grade 1 kids are 6 years old. Community education is needed to educate parent on proper age for school registration.

1.5 Conclusion:

Since its beginning in 1999, 22,078 children have passed through the IFSP school health program. Following this intervention, bi-annual Mebendazole, Vitamin A distribution and weekly mass iron therapy program significant changes have been seen in our school population. Pupil's hygiene has improved, sign of Vitamin B deficiency has decreased, and remarkable results have been achieved in the elimination of anemia.

We encourage other OI - NGO to develop such program in their target area. This is a simple action, a cheap investment for great benefits.

We hope that this report will motivate an initiative from Ministry of Health and Ministry of Education to set up of School Health Programme in Cambodia for the whole benefice of the Khmer Children.
2. BACKGROUND

Kampot province is located in the southern part of Cambodia. The West and North of the province are covered by forest. The western part is mainly a lowland area with some hills. The majority of the population lives in the lowland.

As the rest of the country, Kampot province suffered from more than 20 years of civil war. Most of the infrastructure was destroyed and the population suffered from immense social and economical damages. Until the end of 1994, Kampot was one of the hot spots of civil war in the country. Only since 1995, the Province is considered as relatively safe and accessible again. Although in "good year", the country almost reaches self-sufficiency at national level, substantial parts of the population still face food deficiency and suffer from acute and chronic malnutrition.

Due to the prevailing insecurity, few national and international Non-Governmental Organizations had supported the Province. This limited external assistance, with a large part of the estimated 500,000 inhabitants of the Province facing food security, made the Cambodian Government seek German assistance for a GTZ - supported Integrated Food Security Programme in Kampot.

The province is divided in 8 administrative districts. The IFSP programme covers areas in four districts of the province: Chum Kid and Angkor Chey in the North-East, Dang Tung and Kompong Trach in the East. The population covered in the project is estimated to be around 90,000.

In 1996, IFSP carried out an extensive Baseline Survey in 17 villages, including 371 households and mothers and 570 under-five-year old children. An exhaustive report was published in July 96. This report confirmed the high prevalence of malnutrition, which in 7 of the 17 villages where the survey was done, exceed 50 % for children below five years old. In those villages, more than 50% of the children were found to suffer from either stunting, wasting or even
Data collected on health and nutrition from various surveys in Kampot:

<table>
<thead>
<tr>
<th>&lt; -2.0 s.d.</th>
<th>Other published survey</th>
<th>IFSP survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wasted</td>
<td>Weight-for-Height</td>
<td>acute malnutrition</td>
</tr>
<tr>
<td>Stunted</td>
<td>Height-for-Age</td>
<td>chronic malnutrition</td>
</tr>
<tr>
<td>Underweight</td>
<td>Weight-for-Age</td>
<td>general under nutrition</td>
</tr>
</tbody>
</table>

3. INTRODUCTION TO IFSP SCHOOL HEALTH PROGRAM

Many surveys related to under-5 children have been done in Cambodia, but very few, if any, regarding school children.

An UNICEF survey has demonstrated the high prevalence of anemia among under-5 children. With a cut-point for hemoglobin of 11 g/dl (or about 33% of hematocrit), the survey shows that 82% of 1348 children aged 6 to 59 months were anemic with a mean of hemoglobin of 9.65 g/dl.

As a result, IFSP has included iron therapy in its under-5 children programme and has made plan for hemoglobin survey among school children.

Many surveys have confirmed the dramatic level of malnutrition among under-5 children. Working groups set up by IFSP in Kampot province identified that food taboos are an important factor of malnutrition among young children in our villages.

Children from 6 to 24 months are only fed with white rice soap containing a little salt and sugar only. One duck egg may be given about once a week.

Most other foods may not be given: no vegetable, no meat and fish, and no fruit. Villagers believe that meat and fish will give worms to children. Ripe fruits are forbidden: papaya and mango, rich in Vitamin A, would give diarrhea, the same applies to vegetable and to ripe banana, which are available everywhere.

More studies are needed to understand the origin of those taboos and proper way to remove them.

As a result of those taboos, the little amount of nutrient food that poor families have at home is not given to the children. Health Education is the main tool to decrease this problem. Working groups between mother and Village Health Workers - HC staffs are being developed to get more understanding about food taboo problems.

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1 sum of CASD + WFP + UNICEF + PFD survey
2 indicator of poverty
3 indicator reported on growth monitoring chart (yellow card)
Among the many other factors responsible for the high prevalence of malnutrition, parasite infestation is surely an important one. Surveys done in Cambodia and in Kampot have shown an infestation rate around 70%. So, a deworming programme is wise to be considered.

IFSP survey and other surveys have shown also a high prevalence of Vitamin A deficiency (3% for IFSP survey, 3.6% for other survey). So, Vitamin A supplement should be added in our school program as well. Regarding Vitamin B deficiency, no published data seems available. Nevertheless, it is a real concern to see a significant number of children with angular ginvitis, sign of Vitamin B deficiency. As in general, Vitamin B deficiencies are global, the appropriate treatment for Vitamin B2 deficiency is treatment with Vitamin B complex. The other IFSP components help to solve other related problems by digging wells, promoting latrines construction, developing vegetable and fruit gardening, fish pound, pig and poultry rising, improved rice seed, fertilizer, cattle vaccination, etc., which, with other additional income activities and access to credit, will provide better income and access to food.

Since 1998, IFSP health component (R5) supported the development of two HC in Chhuk OD: (ANNEX 1):

- Dang Tung HC with a population of 17,203 people in 20 villages and 5 schools (3,573 pupils)
- Trapiang Reang HC (former Chum Kiri) with a population of 9,175 people in 8 villages and 4 schools (1,938 pupils).

In 2000, two more HCs have been supported in Angkor Chey OD:

- Champey with a population of 14,980 inhabitant in 15 villages and 9 schools (4,248 pupils)
- Dang Kaum with a population of 9,445 inhabitant in 9 villages and 5 schools (3,886 pupils)

The IFSP Health School programme is the perfect opportunity to analyze the nutritional status of primary school children. Observation in the field shows a high prevalence of stunting among school children. It seems that few, if any, studies have been carried out regarding this particular problem, as up to now all efforts have focused on under-five-years old children only.

Our school programme will enable us to monitor the output of our action on this target population on the condition that proper data collection and analysis will be developed.

The association of iodine and vitamin A and B deficiency, high prevalence of anemia, of intestinal parasites, of chronic and acute malnutrition are among the main factors that undermine the growth of children, affect their intellectual development and are responsible of poor learning capacity.

4 Other survey has shown that malnutrition affect a large part of children of "well being" family in city, as the same rules of bad nutrition apply too often.
5 WHO guideline regarding vitamin A deficiency: prevalence of night blindness of 3 - 5% shows deficiency.
6 R1: infrastructure; R2: agriculture; R3: income generating; R4: rice bank; R6: community development
The health component of the IFSP programme has developed an integrated approach at village level, to provide basic health services through outreach activities supported by HC staff and village health workers (VHW).

Our activity includes: (see annex 1 bis)

- monthly EPI, health education, ANC and birth spacing services at village,
- quarterly growth monitoring of under-five children, provision of Vitamin A (children from 6 months to 5 years), deworming (children from 2 years to 5 years), special porridge demonstration.
- Bi-annual health screening programme, deworming and Vitamin A distribution to children attending primary schools. Healthy education is also provided during activity. Children not attending school are encouraged to join the programme as well.

4. ACTIVITIES AND FINDINGS

4.1 Implementation of the School Health Program

During the second quarter of 1999, a school programme has been implemented in all the schools belonging to the catchment area of our two HC (ANNEX 2). Six schools in the catchment area of Dang Tung HC and four schools in the catchment area of Trapeang Reang HC (former Chum Kiri), both in Chhuk OD.

This programme has been a real success, as we could cover 82% of the registered school children.

Each session started with health education messages, video and at some occasion theater drama have been performed.

Each school in our programme has been provided with one Health Education Board, where are displayed posters on hygiene, nutrition, etc....

Health screening: all pupils are seen one by one for a quick medical examination: eyes, ears, mouth, hands, feet and skin are inspected. Shirts are removed 7 to ensure proper skin and chest inspection. For minor medical problems, treatment is given on the spot, while some severe cases are referred to the HC.

All pupils receive one dose of Vitamin A (200,000 Unit) and one dose of 500 mg. Mebendazole (see next page).

Bad hygiene is the main problem. Many children look dirty and as a result scabies is common, other skin diseases (fungus) are quite common as well.

7 Because of lack of privacy, girls 10 years old and more keep their shirt on. As a result, a girl with TB of the spine passed undetected through our medical screening.
4.2 Results of School Health Screening Programme

First round of school activity: Q2 -1999:

4,527 pupils seen out of 5,511 registered students: 82 % coverage
Vitamin B deficiency is an important problem among children in school age. Out of 4517 school children seen, 471 (10.4%) are suffering from angular gingivitis, caused by Riboflavin deficiency. This Vitamin B2 is mainly found in milk, egg, liver, meat fish, also in whole grain cereal and vegetable, which are lacking in the daily diet of the majority of those children. 30 tablet of Vitamin B complex is given to all the affected children.

A high number of children in school age are not registered at school. There is a problem to reach those children. Many belong to the poorest families and are in great need for medical attention. To solve this problem, during quarterly under-five year old activity at the village, children over-5 years not attending school are encouraged to come to be seen and get medicine.

Second round of activity: December 1999:

4,088 pupils seen out of 4,962 registered students: 82 % coverage
In Dana Tung, Damnak school has not been covered, as this area has been taken over by Kompong Trach OD, following minor change in the coverage plan. Pupils screening coverage has been high, except in Ang Svay school, which has been done during the harvest time. There is significant improvement regarding the prevalence of Vitamin B deficiency, except in Ang Svay school.

In Chum Kiri schools, coverage is still high, but cannot be assessed properly as data regarding the number of children registered for the year 1999-2000 are still missing
Children suffering form angular gingivitis has increased. More efforts are needed on health education to improve household diet.

Third round of activity: June - July 2000

4,465 pupils seen out of 5,482 registered students: 81.4% coverage.
In both areas, a real decrease in Vitamin -B2 deficiency is observed.

Fourth round of activity: December 2000

8,998 pupils seen out of 10,437 registered students: 86.2 % coverage.
For the first time, the 9 schools belonging to Champey HC have been covered. Champey's pupils seem to be better off than in Trapiang Reang (former Chum Kiri) or Dang Tung pupils.
Students from grade 4 to 6, many of them already older teenagers, seem in better health. As a result, during our fifth round of activity, students from grade 4-6 will not been seen. In the future, grade 1-3 will be seen twice a year and student grade 4-6, only once a year.
Trapaing Raing Health Center (former Chum Kiri Hospital)
Reporting of school health activity in TR HC in June 99

<table>
<thead>
<tr>
<th>School</th>
<th># student</th>
<th>student</th>
<th>%</th>
<th>village</th>
<th>Vit.B</th>
<th>Prevalence</th>
<th>Benzyl.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>registered</td>
<td>seen</td>
<td>coverage</td>
<td>children</td>
<td>student</td>
<td>child</td>
<td>vit B defic.</td>
</tr>
<tr>
<td>Phum Au</td>
<td>230</td>
<td>204</td>
<td>88.7%</td>
<td>180</td>
<td>18</td>
<td>8.8%</td>
<td>18</td>
</tr>
<tr>
<td>village children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ang Montrey</td>
<td>236</td>
<td>247</td>
<td>104.7%</td>
<td>31</td>
<td>7</td>
<td>3.9%</td>
<td>5</td>
</tr>
<tr>
<td>village children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tapul primary</td>
<td>310</td>
<td>233</td>
<td>75.2%</td>
<td>33</td>
<td>3</td>
<td>14.2%</td>
<td>7</td>
</tr>
<tr>
<td>village children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ang Chork gr.2 - 6</td>
<td>862</td>
<td>678</td>
<td>78.7%</td>
<td>27</td>
<td>3</td>
<td>4.0%</td>
<td>6</td>
</tr>
<tr>
<td>Ang Chork grade 1</td>
<td>300</td>
<td>246</td>
<td>82.0%</td>
<td>34</td>
<td>3</td>
<td>13.8%</td>
<td>7</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>1938</strong></td>
<td><strong>1603</strong></td>
<td><strong>83.0%</strong></td>
<td><strong>291</strong></td>
<td><strong>143</strong></td>
<td><strong>10</strong></td>
<td><strong>8.9%</strong></td>
</tr>
</tbody>
</table>

Reporting of school health activity in TR HC in December 99

<table>
<thead>
<tr>
<th>School</th>
<th># student</th>
<th>student</th>
<th>%</th>
<th>Vit.B</th>
<th>Prevalence</th>
<th>Other diseases</th>
<th>% with diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>registered</td>
<td>seen</td>
<td>coverage</td>
<td>Deficiency</td>
<td>vit B defic.</td>
<td>diseases</td>
<td></td>
</tr>
<tr>
<td>Phum Au</td>
<td>230</td>
<td>212</td>
<td>92.2%</td>
<td>36</td>
<td>16.98%</td>
<td>34</td>
<td>16.0%</td>
</tr>
<tr>
<td>Ang Montrey</td>
<td>236</td>
<td>305</td>
<td>129.2%</td>
<td>30</td>
<td>9.84%</td>
<td>6</td>
<td>2.0%</td>
</tr>
<tr>
<td>Tapul primary</td>
<td>310</td>
<td>252</td>
<td>81.3%</td>
<td>43</td>
<td>17.06%</td>
<td>42</td>
<td>16.7%</td>
</tr>
<tr>
<td>Ang Chork gr.1 - 6</td>
<td>1162</td>
<td>890</td>
<td>76.6%</td>
<td>188</td>
<td>21.12%</td>
<td>121</td>
<td>13.6%</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>1938</strong></td>
<td><strong>1659</strong></td>
<td><strong>94.8%</strong></td>
<td><strong>297</strong></td>
<td><strong>16.25%</strong></td>
<td><strong>203</strong></td>
<td><strong>12.1%</strong></td>
</tr>
</tbody>
</table>

Other diseases: Such as Fever, Scabies, Diarrhea, Conjunctivitis, Skin diseases,...

Note: all the students passed through the health screening and received one dose of Vitamin A and Mebendazole.
Data of registered students are from 1998-99 and need to be up-date.
Reporting of school health activity in Champey HC
for December 2000.

<table>
<thead>
<tr>
<th>Primary School Name</th>
<th>Total Student</th>
<th>student seen</th>
<th>Percentage of coverage</th>
<th>Vit. B</th>
<th>Prevalence of vit B defi</th>
<th>Others***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doem Po Primary school</td>
<td>303</td>
<td>209</td>
<td>88.98%</td>
<td>3</td>
<td>1.44%</td>
<td>7</td>
</tr>
<tr>
<td>Ang Chout Primary school</td>
<td>257</td>
<td>206</td>
<td>93.68%</td>
<td>13</td>
<td>4.82%</td>
<td>13</td>
</tr>
<tr>
<td>Stitchesa Primary school</td>
<td>546</td>
<td>540</td>
<td>99.09%</td>
<td>20</td>
<td>3.70%</td>
<td>73</td>
</tr>
<tr>
<td>Kvar Primary school</td>
<td>451</td>
<td>351</td>
<td>77.83%</td>
<td>11</td>
<td>3.12%</td>
<td>36</td>
</tr>
<tr>
<td>Tonie Neam Primary school</td>
<td>556</td>
<td>556</td>
<td>100.00%</td>
<td>41</td>
<td>7.35%</td>
<td>37</td>
</tr>
<tr>
<td>Samlagn Primary school</td>
<td>556</td>
<td>391</td>
<td>59.08%</td>
<td>35</td>
<td>6.66%</td>
<td>34</td>
</tr>
<tr>
<td>Ang Sduk Primary school</td>
<td>771</td>
<td>673</td>
<td>74.32%</td>
<td>19</td>
<td>3.32%</td>
<td>48</td>
</tr>
<tr>
<td>Kiri Ampovon Primary school</td>
<td>400</td>
<td>367</td>
<td>91.75%</td>
<td>35</td>
<td>9.54%</td>
<td>32</td>
</tr>
<tr>
<td>Kiri Chumpouvon Primary school</td>
<td>386</td>
<td>352</td>
<td>96.17%</td>
<td>20</td>
<td>6.08%</td>
<td>15</td>
</tr>
<tr>
<td>Grand Total</td>
<td>4248</td>
<td>3607*</td>
<td>84.31%</td>
<td>197</td>
<td>5.46%</td>
<td>295</td>
</tr>
</tbody>
</table>

Three schools (Kiri Ampovon, Samlagn and Tonle Neam Primary school) have high prevalence of vit. B deficiency (around 9%), followed by Kiri Chumpouvon and Ang Chout Primary school only 5%.

Before the activity started, health education is provided to all students.

... Scabies, fever, conjunctivitis, skin siseases, cough....

Soap is provided to clean the body and as a part of hygiene education.
Reporting of school health activity in Dang Tung HC for June and July 2000.

<table>
<thead>
<tr>
<th>Primary School Name</th>
<th>Total Student</th>
<th># student seen</th>
<th>Percentage of coverage</th>
<th>Vit. B</th>
<th>Prevalance vit B defic</th>
<th>Others ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prey samnang primary school</td>
<td>475</td>
<td>314</td>
<td>66.11%</td>
<td>10</td>
<td>3.18%</td>
<td>15</td>
</tr>
<tr>
<td>Srechea primary school</td>
<td>842</td>
<td>620</td>
<td>73.63%</td>
<td>9</td>
<td>1.45%</td>
<td>11</td>
</tr>
<tr>
<td>Khchey khang Tbong Prima. sch.</td>
<td>350</td>
<td>330</td>
<td>94.29%</td>
<td>5</td>
<td>1.52%</td>
<td>25</td>
</tr>
<tr>
<td>Ang Svay primary school</td>
<td>780</td>
<td>614</td>
<td>78.72%</td>
<td>11</td>
<td>1.79%</td>
<td>16</td>
</tr>
<tr>
<td>Dang Tung Prima. (cluster school)</td>
<td>855</td>
<td>839</td>
<td>98.13%</td>
<td>57</td>
<td>6.79%</td>
<td>181</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>3302</strong></td>
<td><strong>2717</strong></td>
<td><strong>82.28%</strong></td>
<td><strong>92</strong></td>
<td><strong>3.39%</strong></td>
<td><strong>248</strong></td>
</tr>
</tbody>
</table>

Reporting of school health activity in Dang Tung HC for December 2000.

<table>
<thead>
<tr>
<th>Primary School Name</th>
<th>Total Student</th>
<th># student seen</th>
<th>Percentage of coverage</th>
<th>Vit. B</th>
<th>Prevalance vit B defic</th>
<th>Others ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prey samnang primary school</td>
<td>537</td>
<td>514</td>
<td>95.72%</td>
<td>0</td>
<td>0.00%</td>
<td>15</td>
</tr>
<tr>
<td>Srechea primary school</td>
<td>890</td>
<td>678</td>
<td>76.18%</td>
<td>0</td>
<td>0.00%</td>
<td>31</td>
</tr>
<tr>
<td>Khchey khang Tbong Prima. sch.</td>
<td>416</td>
<td>345</td>
<td>82.93%</td>
<td>3</td>
<td>0.87%</td>
<td>28</td>
</tr>
<tr>
<td>Ang Svay primary school</td>
<td>912</td>
<td>861</td>
<td>94.41%</td>
<td>19</td>
<td>2.21%</td>
<td>6</td>
</tr>
<tr>
<td>Dang Tung Prima. (cluster school)</td>
<td>959</td>
<td>889</td>
<td>92.70%</td>
<td>40</td>
<td>4.50%</td>
<td>69</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>3714</strong></td>
<td><strong>3287</strong></td>
<td><strong>88.50%</strong></td>
<td><strong>62</strong></td>
<td><strong>1.89%</strong></td>
<td><strong>149</strong></td>
</tr>
</tbody>
</table>

The prevalence of Vit. B deficiency in Dang Tung in December 2000 has remarkably decreased from 3.39% in June 2000 to 1.89% December 2000.

...Scabies, Fever, Conjunctivitis, Sore and other skin diseases, cough...
Reporting of school health activity in Dang Tung HC
First round of activity: Second quarter of 1999

<table>
<thead>
<tr>
<th>School</th>
<th>Total Student</th>
<th># student seen</th>
<th>Percent coverage</th>
<th>Vit. B</th>
<th>Prevalance vit B defic</th>
<th>Benzyl Benz. (scabies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre sampan</td>
<td>479</td>
<td>338</td>
<td>70.56%</td>
<td>17</td>
<td>5.03%</td>
<td>8</td>
</tr>
<tr>
<td>Damnak</td>
<td>549</td>
<td>413</td>
<td>75.23%</td>
<td>49</td>
<td>11.86%</td>
<td>11</td>
</tr>
<tr>
<td>Srechea</td>
<td>704</td>
<td>585</td>
<td>83.10%</td>
<td>95</td>
<td>16.24%</td>
<td>0</td>
</tr>
<tr>
<td>Khche khan Tbon</td>
<td>336</td>
<td>305</td>
<td>90.77%</td>
<td>42</td>
<td>13.77%</td>
<td>20</td>
</tr>
<tr>
<td>An Sva</td>
<td>784</td>
<td>672</td>
<td>85.71%</td>
<td>75</td>
<td>11.16%</td>
<td>20</td>
</tr>
<tr>
<td>Dan Tung gr. 2 - 6</td>
<td>449</td>
<td>378</td>
<td>84.19%</td>
<td>31</td>
<td>8.20%</td>
<td>4</td>
</tr>
<tr>
<td>Dan Tung grade 1</td>
<td>272</td>
<td>228</td>
<td>83.82%</td>
<td>19</td>
<td>8.33%</td>
<td>0</td>
</tr>
<tr>
<td>Grand Total</td>
<td><strong>3573</strong></td>
<td><strong>2919</strong></td>
<td><strong>81.70%</strong></td>
<td><strong>328</strong></td>
<td><strong>11.24%</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

Dang Tung School grade 1 is the group involved in our anthropometric survey, which occurred on a later date.

Reporting of school health activity in Dang Tung HC:

<table>
<thead>
<tr>
<th>School</th>
<th>Total Student</th>
<th># student seen</th>
<th>Percent coverage</th>
<th>Vit. B</th>
<th>Prevalance vit B defic</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre samnan</td>
<td>479</td>
<td>351</td>
<td>73.28%</td>
<td>13</td>
<td>3.70%</td>
<td>22</td>
</tr>
<tr>
<td>Srechea</td>
<td>704</td>
<td>672</td>
<td>95.45%</td>
<td>82</td>
<td>12.20%</td>
<td>49</td>
</tr>
<tr>
<td>Khche khan Tbon</td>
<td>336</td>
<td>301</td>
<td>89.58%</td>
<td>28</td>
<td>9.30%</td>
<td>38</td>
</tr>
<tr>
<td>An Sva</td>
<td>784</td>
<td>436</td>
<td>55.61%</td>
<td>68</td>
<td>15.60%</td>
<td>84</td>
</tr>
<tr>
<td>Dan Tun all grade</td>
<td>721</td>
<td>669</td>
<td>92.79%</td>
<td>32</td>
<td>4.78%</td>
<td>41</td>
</tr>
<tr>
<td>Grand Total</td>
<td><strong>3024</strong></td>
<td><strong>2429</strong></td>
<td><strong>80.32%</strong></td>
<td><strong>223</strong></td>
<td><strong>9.18%</strong></td>
<td><strong>234</strong></td>
</tr>
</tbody>
</table>

All pupils have been treated with Mebendazol and Vitamin A.

During School health activity, we collected information that most of the students eat only twice a day. Rarely they eat meat, fruit and vegetable. Many reported to eat meat only once a month. Nevertheless, it was noticed that they seem healthier than last year. Vitamin B deficiency is still very prevalent, even if there are some improvement in Kchey Kang Tbong and Dang Tung school.
### Reporting of school health activity in Trapaing Raing HC for June and July 2000.

<table>
<thead>
<tr>
<th>School</th>
<th>Total Student</th>
<th># student seen</th>
<th>Percentage of coverage</th>
<th>Vit. B</th>
<th>Prevalance of vit B defic</th>
<th>Others ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Chork Prima</td>
<td>1127</td>
<td>876</td>
<td>77.73%</td>
<td>47</td>
<td>5.37%</td>
<td>17</td>
</tr>
<tr>
<td>Ta ul Prima school</td>
<td>367</td>
<td>268</td>
<td>73.02%</td>
<td>7</td>
<td>2.61%</td>
<td>8</td>
</tr>
<tr>
<td>AU Prima school</td>
<td>280</td>
<td>240</td>
<td>85.71%</td>
<td>22</td>
<td>9.17%</td>
<td>5</td>
</tr>
<tr>
<td>Angmontrey stharam</td>
<td>406</td>
<td>364</td>
<td>89.66%</td>
<td>13</td>
<td>3.57%</td>
<td>4</td>
</tr>
<tr>
<td>Grand Total</td>
<td>2180</td>
<td>1748</td>
<td>80.18%</td>
<td>8.9</td>
<td>5.09%</td>
<td>34</td>
</tr>
</tbody>
</table>

### Reporting of school health activity in Trapaing Raing HC for December 2000.

<table>
<thead>
<tr>
<th>School</th>
<th>Total Student</th>
<th># student seen</th>
<th>Percentage of coverage</th>
<th>Vit. B</th>
<th>Prevalance of vit B defic</th>
<th>Others ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Chork Prima</td>
<td>1383</td>
<td>1138</td>
<td>82.28%</td>
<td>80</td>
<td>7.03%</td>
<td>51</td>
</tr>
<tr>
<td>Ta ul Prima school</td>
<td>379</td>
<td>318</td>
<td>83.91%</td>
<td>30</td>
<td>9.43%</td>
<td>89</td>
</tr>
<tr>
<td>AU Prima school</td>
<td>288</td>
<td>273</td>
<td>94.79%</td>
<td>25</td>
<td>9.16%</td>
<td>13</td>
</tr>
<tr>
<td>An montrey stharam</td>
<td>425</td>
<td>375</td>
<td>88.24%</td>
<td>32</td>
<td>8.53%</td>
<td>23</td>
</tr>
<tr>
<td>Grand Total</td>
<td>2475</td>
<td>2104</td>
<td>85.01%</td>
<td>167</td>
<td>7.94%</td>
<td>176</td>
</tr>
</tbody>
</table>

Note that the prevalence of Vit B deficiency among the students in this cluster school for this session is going up from 5% in June 2000 to 7.9% for December 2000. But this maybe because of unclear identified of Vit B deficiency signs by the health center staffs.

HC staffs are taking more responsibility in the implementation of the school programme in 2000.

...Scabies, Fever, Conjunctivitis, Sore, fungus and other skin diseases, cough
Soap to clean the body is also provided as a part of hygiene education.
Since its beginning in 1999, 22,078 children have passed through the IFSP school health programme. Availability of drug:

- Mebendazole 500 mg: 48,000 tablets have been provided by CNM in 1999 and 2000
- Iron-Folic acid: 320,000 tablets, provided from CMS through the N-MCH for our 2000 Outreach Activity programme and school programme
- Vitamin A capsules: 34,500 capsules provided to IFSP, through N-MCH in 1999 and 2000. A large part of this will be used for our School Health Programme.

4.3 Other related activities:

Well and latrines construction are under development in 9 schools belonging to our IFSP School Programme in 1999, but this is behind schedule because of administrative and communication problems. Construction extension to the nine schools of Champey is under consideration. Moringa trees, which dried leaves and pods are very rich in protein and amino acids, in vitamin (Vitamin A, B1, B2, B3, C, E), and in minerals (Ca, Mg, P, K, Cu, Fe, S) will be planted in those schools. (see ANNEX 3) Moringa is becoming an important tool to eradicate malnutrition in our target area and those trees are planted in our schools and pilot HCs as part of our health education programme. Health education boards have been erected in all villages and in all primary schools supported by IFSP.

4.4 Conclusions:

Considering the poor health of school children, school health programme is not a must and should be developed as a normal activity in Cambodia. This programme doesn't request large investment. It is easy to be organized and implemented. After a minimum of practice under the guidance of IFSP, HC staffs, assisted by VHW, become quickly able to run this programme by themselves. Drug (Vitamin A and Mebendazole) can be obtained from N-MCH and CNM. Only per diem for HC staff, support to VHW and additional drug (Vitamin B complex, scabicide, soap, gentian violet, etc....) and material for health education need to be provided.
5.1 Preparation of the School Survey:

The project survey was finalized with nutrition department from National MCH, parasitology department from NM, and UNICEF.

- Survey profile: prospective study, where two cohorts will be followed forward with an interval of 12 months.
- Variable: age, sex, weight, height, hemoglobin level, stool parasites.
- Nutrition status is calculated with the same anthropometric reference tables used during previous surveys.
- Clear definition of monitoring indicators and data to be collected:
  
<table>
<thead>
<tr>
<th>Weight-for-Height</th>
<th>Acute malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height-for-Age</td>
<td>Chronic malnutrition</td>
</tr>
<tr>
<td>Weight-for-Age</td>
<td>General under nutrition</td>
</tr>
</tbody>
</table>

- Weight to be measured with UNICEF SECA scale, height to the nearest 0.5 cm.
- Determination of the exact AGE is a problem for school children. School age is only available in rounded year, while nutrition survey needs more accurate age to be entered in months. It is also well known that many children enter primary school when they are "too old", to be accepted according to policy from Ministry of Education. As a result, parents change the age of their children. Because of the very high prevalence of chronic malnutrition, this practice has been mainly unnoticed. Many kids in age of school look so small, that it seems "normal" to delay entry at school. School registration age is lower than the real age of children. This is a major problem as school registered age cannot be used for an anthropometrical study.

- Anemia has been assessed by measure of Hemoglobin level using the "Lovibond" method, which is reliable, cheap and easy to cant' out.

- Analyzing computer tools: EPI INFO for nutrition.

School selected:

- cluster schools selected are:
  
  = Wat Ang Chork primary school in Trapiang Reang (Chum Kiri): 1083 pupils
  = Dang Tung primary school in Dang Tung: 609 pupils

- classes selected: in view to increase the chance of follow up of children included In this survey, only grade 1 pupils have been selected, as early drop out from school is a main problem (see annex 5)

- The survey was prepared with our HC IFSP counterpart, who had
coordinated the planning of activity with school direction
selected HC staff and VHW who have participated to the activity

a registration system of data for analysis & monitoring has been developed:

individual child registration is not needed for monitoring population nutrition status, but for practical purpose, the following system has been implemented.

- All grade 1 pupils present on the day of the survey have been included in the survey. Pupils from grade 2 to 6 have been treated as pupils of ordinary schools on a separate day.
- A registration book containing the following entries has been developed:
  - school, class #, date, pupil's name, school age, surveyed age converted in months and activity done:
    - health screening (same as screening done for ordinary school)
    - weight and height recorded by HC staff and VHW
    - hemoglobin measurement
    - stool analysis
    - mebendazole, Vitamin A have been given to each child and swallowed under supervision of VHW.

A Monitoring:

deworming in selected schools will be carried out every 6 months for a period of at least two years.
data collections forage, Wt., Ht., Hemoglobin and stool have been collected on the first intervention. Indicator regarding prevalence of acute and chronic malnutrition, of anemia and prevalence of stool infestation will be monitored after one year.

Prevalence of Vitamin B2 deficiency, of scabies and skin infection will be also monitored.

Data analysis: will be carrying out after the first screening (July 1999), third screening (July 2000).

Nutritional status classification:
According to the measured weight and height, the respective indicators have been analyzed with computer software program EPI-Info 6. All pupils below the cut-off point of - 2 s.d. (standard deviation) are considered as malnourished compared to the international reference population. EPI-Info presents the percentage of malnutrition in Z-Scores, which refers to the standard deviation (s.d.) of the frequency distribution of this reference population. The nutritional status for stunting (H/A), wasting (W/H) and general under nutrition (W/A) are classified in the following table.
Nutritional status classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Qualitative classification</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>&gt; -2 Z-score</td>
</tr>
<tr>
<td>2</td>
<td>mild malnutrition</td>
<td>&lt; -2 &amp; &gt; -3 Z-score</td>
</tr>
<tr>
<td>3</td>
<td>moderate malnutrition</td>
<td>&lt; -3 &amp; &gt; -4 Z-score</td>
</tr>
<tr>
<td>4</td>
<td>severe malnutrition</td>
<td>&lt; -4 Z-score</td>
</tr>
</tbody>
</table>

5.2 Implementation of the 1999 survey and findings

The school survey has been implemented at the end of our school programme, before the school holiday. 234 students in Trapiang Reang and 217 in Dang Tung have been included in our survey (see ANNEX 6). To improve our chance of follow-up of this target group during the next two years, only pupils from grade 1 have been selected. The pupils are coming from several villages around the surveyed schools (see ANNEX 7).

5.2.1 Age assessment: Accurate pupil’s age has been assessed by home visiting survey. In general, at village level, information regarding age is available from traditional calendar only. This required unto find old
The first task has been to get the school registration list with school age. Using the prepared questionnaire and Khmer calendar specially prepared, our VHW spent over a week to assess the real age of children during home visit. Then, results were evaluated with all personnel involved. Children, for whom the data didn't match, have been re-evaluated during a second interview. Matching system was developed: as example the Khmer month of the birth has to match with question on special event happening at the birth period (see last row on the calendar in ANNEX 4).

This study has confirmed our impression that a major discrepancy exists between school registration age and age identified from our surveying questionnaire, which we call "real age" in this survey.

In Trapiang Reang (TR), 228 kids had their age assessed and 184 in Dang Tung (DT). As we can see, in Trapiang Reang, there is a major shift to the right of the "real age" curve compared with "school registered age" curve, with a mean's difference of 1.988 year between the 2 curves or almost 2 years! (see graphic page 14).

In Dang Tung, the problem is less acute, but the difference between the two means is 1.05 year! (annex 8)

This problem is mainly ignored and undetected because of the high prevalence of stunting (see further).

Delayed school registration: Only a very few children start the school at the recommended age of 6 year old, while a few older kids aged 12 to 15 are still attending grade 1!! In DT, only 2 kids (0.92%) are 6 years old in grade 1, while in TR only 5 (2.1 %). Community education on proper age for school registration is needed.

5.2.2 Sex distribution: sex distribution is quite homogeneous, with a mild advantage for boys!

The age's mean for boy is higher than for girl, in Trapiang Reang and in Dang Tung.

<table>
<thead>
<tr>
<th></th>
<th>Boy</th>
<th>Girl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dang Reang</td>
<td>10,204</td>
<td>9,913</td>
</tr>
<tr>
<td>Trapiang Reang</td>
<td>9,471</td>
<td>9,248</td>
</tr>
</tbody>
</table>

We can guess than boys "study longer" or repeat more grade 1, than girls, who drop out more easily.

This is confirmed when comparing pupils by age and sex:

A traditional Khmer year has 12 months. From year to year, a specific Khmer month doesn't always fall on the same Western calendar month.
As we can see sex repartition is almost the same for < 10 year old, but more boys over 10 years old continue to study than girls.

5.2.3. Hemoglobin level survey:
Blood sample was collected from finger for direct measurement with the Movibond method. in Trapiang Reang, 234 blood samples were collected and 217 in Dang Tung.
WHO guideline has been followed for determination of anemia. The Hemoglobin (Hb.) cut-off to define anemia

---

**Table: Age and Sex Distribution**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Boy</th>
<th>Girl</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 years</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>≥ 10 years</td>
<td>73</td>
<td>63</td>
</tr>
</tbody>
</table>

**Diagram: Anemia per age groups in grade 1**

Anemia per age groups in grade 1
in Trapiang Reang and Dang Tung schools in July 1999

- **Trapiang Reang: age 5-11**
  - Anemia: 98
  - No anemia: 4

- **Trapiang Reang: age 12-14**
  - Anemia: 19
  - No anemia: 4

- **Dang Tung: age 5-11**
  - Anemia: 30
  - No anemia: 20

- **Dang Tung: age 12-14**
  - Anemia: 12
  - No anemia: 6

Hb cut-off point: 6-11 y: < 11.5 g Hb/100 ml; 12-14 y: < 12 g Hb/100 ml
### Prevalence of anemia among grade 1 school children in Trapiang Reang' and Dang Tung schools - July 1999
OD Chhuk, Kampot Province

<table>
<thead>
<tr>
<th>School</th>
<th>Trapiang Reang (former Chum Kiri)</th>
<th>Dang Tung</th>
<th>Hb cut-off</th>
<th>&lt; 11.5g</th>
<th>&lt; 12.0g</th>
<th>&lt; 11.5g</th>
<th>&lt; 12.0g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 - 11 y</td>
<td>12 - 14 y.</td>
<td>all</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>Anemia</td>
<td>130</td>
<td>61.6</td>
<td>19</td>
<td>82.6</td>
<td>149</td>
<td>63.7</td>
<td>98</td>
</tr>
<tr>
<td>No anemia</td>
<td>81</td>
<td>38.4</td>
<td>4</td>
<td>17.4</td>
<td>85</td>
<td>36.3</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>211</td>
<td>100</td>
<td>23</td>
<td>100</td>
<td>234</td>
<td>100</td>
<td>171</td>
</tr>
</tbody>
</table>

This is Ang Chork school in Trapeang Veng village of Khum Trapeang Reang, former Chum Kiri HC.
set up at < 11.5 gr. of Hb. per 100 ml of blood for children from age 5 to 11 and the Hb. cut-off is set up at < 12.0 gr. Hb. per 100 ml of blood for children 12 year old and over.

Figure below shows the finding of the study: 63.7% of children in Trapiang Reang (TR) have anemia and 64.5% in Dang Tung (DT). Within the age group 12-14, more pupils are affected: 82.6% in TR and 91.3% in DT. Among the age group 5-11, anemia affects 61.6% of pupils in Trapiang Reang and 57.3% in Dang Tung.

The figure above shows the distribution of Hemoglobin level among surveyed pupils in Trapiang Reang and Dang Tung schools. As we can see, very few have a level of 13-14 gr. of Hb, which is considered as a normal level in developed country.

More worrying, the above figure shows that a significant number 21 in TR (9.2%) and 29 in DT (12.5%) are suffering of severe anemia with level below 9.8 gr. of Hb or about 29.4% of hematocrit.
This figure shows the prevalence of anemia by age group. As we can see the two schools, 40 km apart, show parallel curves. This Hemoglobin survey at school is among the first one to have been done in Cambodia and shows the major impact that such dramatic results may have on the health of school children and their performance at school.
5.2.4. Anthropological survey:

233 children, attending grade 1, in Dang Tung and 204 in Trapeang Reang have had their weight and height measured. Data have been analyzed with EPI-INFO. Detailed results of the survey can be seen in table next page.

"Chronic malnutrition" or stunting is a major problem as a majority of the pupils in Trapiang Reang (former Chum Kiri) (59.7 % or 139/233) are affected and 45.4% (94/207) in Dang Tung. In Trapiang Reang, 47 children out of 233 (20.2%) are <-3 s.d. for Height/Age and are affected with Moderate or severe degree of chronic malnutrition. In Dang Tung, 24 or 11.6% are <-3 s.d. H/A and are affected with moderate or severe stunting. (see graphic page 21 and annex 9)
“Acute malnutrition” or wasting is a serious problem in Trapiang Reang, where 9.4% (22 out of 233) of the grade 1 pupils are affected by wasting, for 4.4 % (9 out of 204) in Dang Tung. (see annex 10)

Prevalence of stunting is increasing with the age, an indicator that chronic malnutrition is a long-term burden during the child development. The graphic on the next page shows that almost 80% of the eleven years old group are stunted. During interview of school pupils, we have had confirmation that a majority of them eats only twice a day; consumption of meat is a rarity (about once per month) and vegetable are mostly absent from their common diet.
Distribution of malnutrition among grade 1 pupils in Trapiang Reang and Dang Tung schools in 1999

<table>
<thead>
<tr>
<th></th>
<th>Trapiang Reang</th>
<th></th>
<th>Trapiang Reang</th>
<th></th>
<th>Dang Tung</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACUTE W/H</td>
<td>CHRONIC H/A</td>
<td>GENERAL W/A</td>
<td>ACUTE W/H</td>
<td>CHRONIC H/A</td>
</tr>
<tr>
<td>&gt; - 2 sd</td>
<td>211</td>
<td>94</td>
<td>95</td>
<td>195</td>
<td>113</td>
</tr>
<tr>
<td>Healthy</td>
<td>90.6%</td>
<td>40.3%</td>
<td>40.8%</td>
<td>95.6%</td>
<td>54.6%</td>
</tr>
<tr>
<td>&lt; - 2 sd</td>
<td>22</td>
<td>139</td>
<td>138</td>
<td>9</td>
<td>94</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>9.4%</td>
<td>59.7%</td>
<td>59.2%</td>
<td>4.4%</td>
<td>45.4%</td>
</tr>
<tr>
<td>Total kids in survey</td>
<td>233</td>
<td>233</td>
<td>233</td>
<td>204</td>
<td>207</td>
</tr>
<tr>
<td>Mild malnutrition</td>
<td>19</td>
<td>92</td>
<td>122</td>
<td>9</td>
<td>70</td>
</tr>
<tr>
<td>Mild malnutrition</td>
<td>8.2%</td>
<td>39.5%</td>
<td>52.4%</td>
<td>4.4%</td>
<td>33.8%</td>
</tr>
<tr>
<td>Moderate malnutr.</td>
<td>3</td>
<td>36</td>
<td>14</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Moderate malnutr.</td>
<td>1.3%</td>
<td>15.5%</td>
<td>6%</td>
<td>0%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Severe malnutrit.</td>
<td>0</td>
<td>11</td>
<td>2</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Severe malnutrit.</td>
<td>0%</td>
<td>4.7%</td>
<td>0.9%</td>
<td>0%</td>
<td>3.9%</td>
</tr>
</tbody>
</table>
Distribution of chronic malnutrition in Traplang Reang school grade 1 pupils: July 1999 compared to a normal standard population
5.2.5. Summary of the stool survey in Dang Tung
5 - 7 July 1999

A stool examination has been carved out during the anthropological survey at the Dang tun pilot school. During stool collection, a village condition survey on water supply and behavior during defecation has been carried out. 172 children answered the questionnaire (see annex 10).

The stools have been checked using the following techniques:
- Kato-Katz: to assess the intensity of the infestation
- SAF: to assess the prevalence of all intestine parasites, including protozoa
- Baermann: to assess prevalence of strongyloide

170 children have been able to produce a stool specimen for examination. Among them 8 children have been added to the list by laboratory staffs. Their stool results have been removed from the study, because their name is not available, so no follow-up will be possible. Number of stool specimen considered in the survey: 162

Below is a summary of the results found: (see graphic in Annex 11)

<table>
<thead>
<tr>
<th>Parasite in 1999</th>
<th>Positive</th>
<th>%</th>
<th>Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hookworm</td>
<td>68</td>
<td>42%</td>
<td>94</td>
<td>162</td>
</tr>
<tr>
<td>Ankylostome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongyloide Stercoralis Angulifera</td>
<td>20</td>
<td>12.3%</td>
<td>142</td>
<td>162</td>
</tr>
<tr>
<td>Trichuris Trichura</td>
<td>11</td>
<td>6.8%</td>
<td>151</td>
<td>162</td>
</tr>
<tr>
<td>Entamoeba Histolitica</td>
<td>11</td>
<td>6.5%</td>
<td>151</td>
<td>162</td>
</tr>
<tr>
<td>Enterobius</td>
<td>6</td>
<td>3.7%</td>
<td>156</td>
<td>162</td>
</tr>
<tr>
<td>Ascaris Lumbricoides</td>
<td>3</td>
<td>1.9%</td>
<td>159</td>
<td>162</td>
</tr>
<tr>
<td>Hymenolepis Nana</td>
<td>4</td>
<td>2.5%</td>
<td>158</td>
<td>162</td>
</tr>
<tr>
<td>Gardia Intestinalis</td>
<td>2</td>
<td>1.2%</td>
<td>160</td>
<td>162</td>
</tr>
<tr>
<td>Total positive stool</td>
<td>101</td>
<td>62.3%</td>
<td>61</td>
<td>162</td>
</tr>
</tbody>
</table>

Infection by hookworm is very high, but this is common in rural Cambodia. Infestation by strongyloide is also high, but the low level of infection by ascaris is a surprise.

Survey found that 84% of households don’t have a latrine and that 90% of children don’t wear shoes during defecation. This may be the appropriate answer to the high prevalence of infestation by hookworm

9 Grand Total different of sum of all parasites found, as several children have mixed infection
Prevalence of stool parasites among school children grade 1 in Dang Tung school in June 1999

Parasite + 62%

101

no 38%

61

% infection

Type of parasite

Hookworm/ankylostome 68

Gardia

Hym.nana

Ascaris

Entero

Trichuris

Strongy/anguilule

Amibe
(ankylostome) and strongyloide (angufule). The transmission of those two worms is made from larva living in infested defecation area, which penetrates into the body through the skin of a barefoot.

The very low level of ascaris infestation is probably due to the fact that children eat few vegetables. Dirty vegetable is the main way of contamination for ascaris.

During data analysis, we have tried to match the level of hemoglobin with the hookworm stool infestation. The study could not find a significant association between hookworm infestation and anemia.

The stool survey was associated with a village questionnaire survey:
172 grade 1 pupils from Dang Tung school have been interviewed (see questionnaire in Annex 10.

From this survey, we found out:

? 16.3 % of the child household have a toilet (28 out of 172)

? 95.3 % of the household use water from a protected well (164 out of 172)
  0.6% use water from a lake (1 out of 172)
  4.1 % use water from tape water (7 out 172)

? 8.1 % of household has a water storage system (14 out of 172)
  91.9% don't have water storage or jar (158 out of 172)

? shoes: 79.5% of children claim they always wear shoes (136 out of 171)
  4.7% say they wear shoes regularly (8 out of 171)
  27 % say they never wear shoes

? wearing shoes on the day of the survey.
  74.3% of the kids were wearing shoes (127 out of 171)
  25.7% didn't have shoes (44 out of 171)

? child wearing shoes during defecation
  9.9% of them have shoes when defecate (17 out of 171)
  90.1% don't (154 out of 171)

? diarrhea on the time of examination
  37.2% says they have diarrhea (64 out of 172)
  62.8% don't have (108 out of 172)

? blood in the stool
  32.6% say they have blood in the stool (56 out of 172)
  67.4% don't (116 out of 172)

? mucus in the stool
  9.9% say they have mucus (17 out of 172)
  90.1 % don't (155 out of 172)
Comments:

This survey was done in Dang Tung. This is a little market town, where life is better off than in villages far away. This survey confirms the great need to develop toilet. 16.31% with toilet is already a good result, if compare with rural villages. It is surprising that 95.31% of the household use water from protected well. This may be because Dang Tung is a market town. But only one third of the pupils are coming from Phum Thmey, the district town. Water storage is a problem, as only 8.11% have jar. More work is need on water storage. It is very surprising that 79.91% of the children always wear shoes. Probably some were shy to say "no". Nevertheless, 74.31% were wearing shoes on the survey day. As only 9.91% wear shoes during defecation, more health education should be done on this special topic. Diarrhea is endemic with 37.21% having diarrhea. It is quite surprising that 32.6% claim to have blood in the stool, while only 7.71% were found with amoebiasis and gardiasis. Bias may be considered?

5.3 Outcome form this first school health survey done in July 1999

This survey just confirms the dramatic level of malnutrition affecting children. The prevalence of stunting is astonishing (over 801% in the 12 year old group). The hemoglobin survey is the first known survey among school children in Cambodia. It confirms the high prevalence of anemia found in other groups: under five-year-old and women 15 to 45 years old. Our study found that 57.31% to 91.3% of pupils are anemic according of place and age group. Following recommendation from WHO expert, mass treatment with Iron and Folic Acid is the appropriate answer.

On the contrary of the GTZ evaluation report, this school report confirms that school health programme needs to be strengthened. It is not time consuming as it is easy to be carried out and health staff with VHW can provide the service themselves after a minimum of training and experience. Considering the size of the health problem seen, school health programme should be developed in our third and fourth pilot HC.

In June 2000, a follow up survey will be organized among the same population of pupils. After 2 deworming treatments, 2 doses of Vitamin A, 25 doses of iron-folic acid weekly therapy and health education sessions, weight, height, hemoglobin level measurements and stool examination will be carried again.

We hope that dramatic improvement will be seen.
6. FOLLOW-UP SURVEY IN JULY 2000

Recent studies have demonstrated that for children and for non-pregnant women, a weekly iron therapy gives nearly the same result as a daily regimen.

6.1 Iron therapy:

Children in this survey received iron through the mass "Iron therapy school programme". Mass treatment with Ferrous Sulphate (200 mg)/ Folic Acid (0.25 mg) has started in November 1999 in the schools belonging to our 2 pilot HC in Dang Tung and Triapiang Reang (former Chum Kiri). Nearly 5,000 children, from grade 1 to grade 6, are treated whatever is their hemoglobin level. In January 2001, the nine schools of Champey (4,248 pupils) will join this programme. During the year 2001, we will have 9,759 kids on weekly iron therapy in our programme. Financial support is provided to each school director to ensure his collaboration to supervise the storage and distribution of the medicine.

The IFSP counterparts provide the drug to school director once per month. On a given day, all children entering the classroom take one tablet per week during the school year. Our local IFSP counterpart closely supervises this activity. At the beginning, some pupils, about 5%, complained of stomachache after taking the iron pill. We found out that the majority of the morning shift students are going to school with an empty stomach. Recommendation was given to the kids to eat some food prior the weekly iron distribution.

The same action has been taken for prevention of anemia among under-five children. Following the WHO protocol, IFSP has started during the 1999 Q4 a preventive iron therapy. A supply of 9 iron folic acid tablets is provided during under-five year old activity. This supply covers a 4 months period. 1/2 to per week is taken in a full stomach (2 x 9 1/2 tablet = 18 weeks). Implementation is difficult and follow-up show poor compliance. This may be due to side effect and lack of adequate tablet with pediatric dose.

The same policy applies to women on birth spacing programme. IFSP has started an iron prevention programme. Each woman attending birth spacing receives 13 iron-folic acid tablets, which are taken at the regimen of one tablet per week.

6.2 2000 Survey:

As planned the follow-up survey has been organized just 12 months after the first survey. The same group of children has been follow-up with the same measurement taken. Preparation for the survey required to up-date the list of children. Our main concern was to lost children because of the important drop out from school in Cambodia. a per diem of 50,000 Riels for 3 months is provided to the school director to monitor the stock of iron table and ensure distribution of the medicine in each classroom once a week.
The table below explains where the children from 1999 survey where found:

<table>
<thead>
<tr>
<th></th>
<th>Trapiang Reang</th>
<th>Dang Tung</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Children in 1999 in grade 1</td>
<td>234</td>
<td>100%</td>
</tr>
<tr>
<td>Total children included in 2000 survey</td>
<td>215</td>
<td>91.9%</td>
</tr>
<tr>
<td>Children in 2000 still in grade 1</td>
<td>80</td>
<td>34.2%</td>
</tr>
<tr>
<td>Children in 2000 in grade 2</td>
<td>128</td>
<td>54.7%</td>
</tr>
<tr>
<td>Children in 2000 found at home</td>
<td>7</td>
<td>0.3%</td>
</tr>
<tr>
<td>Lost children in 2000</td>
<td>19</td>
<td>8.1%</td>
</tr>
</tbody>
</table>

Among lost children, some left to other districts, some other could not be found.

Over 90% of the 1999 children could be follow-up. Repeated school year is a major problem in Cambodia. In Dang Tung more kids are repeating grade 1 than passing to grade 2!

---

**Follow-up of 1999 grade 1 pupils in Trapiang Reang and Dang Tung schools in 2000**

- **Trapiang Reang 2000**
  - Grade 1: 79 pupils
  - Grade 2: 12 pupils
  - Lost: 12 pupils
  - At home: 12 pupils

- **Dang Tung 2000**
  - Grade 1: 96 pupils
  - Grade 2: 2 pupils
  - Lost: 2 pupils
  - At home: 2 pupils

grade 1 = repeat = doublant
More boys are repeating grade 1 than girls:

<table>
<thead>
<tr>
<th>All kids in grade 1 in 1999</th>
<th>Grade in 2000</th>
<th>Boy</th>
<th>Girl</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dang Tung</td>
<td>Repeat grade 1</td>
<td>54</td>
<td>44</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>Pass to grade 2</td>
<td>44</td>
<td>52</td>
<td>96</td>
</tr>
<tr>
<td>Trapiang Reang (TRI)</td>
<td>Repeat grade 1</td>
<td>45</td>
<td>35</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Pass to grade 2</td>
<td>64</td>
<td>64</td>
<td>128</td>
</tr>
</tbody>
</table>

6.2.1 Age assessment:

Of course, all children are 12 months older in July 2000 than in July 1999. The main change is that more kids are now in the group 12-15 year old, which has a different cut-off level for Hemoglobin measurement. In 1999, 15.2% of the pupils were in the 12-15 age groups, while in 2000, 30.9% of the pupils are in this age group. This is a very high number if we can remember that those children are in grade 1 and 2 only! This is a consequence of the chronic repetition and late start at primary school. (figure below)

Pupils age distribution in 1999 and 2000 school surveys
6-11 year and 12-15 year old kids in Trapiang Reang & Dang Tung schools
6.2.2 Sex distribution

No change from 1999 survey. Boys still represent 51.6% in TR and 51% in DT (see annex 12)

6.2.3. Hemoglobin level after Intervention:

215 children in Trapiang Reang and 197 in Dang Tung have had their blood analyzed in 2000. Tablet of Vitamin A, Mebendazole and Iron were shown to each kids. They were asked how many of each tablets, they have taken during the past twelve months.

We found out that compliance was better in Trapiang Reang than in Dang Tung. The mean of iron tablet taken in Trapiang Reang is 17.88, while it is only 14.03 in Dang Tung (see graphic in annex 13). In Trapiang Reang, 3 classes only out 14 have an average compliance rate below 15 tablets through the year, while we found in Dang Tung 8 classes out of 16 (number in italic in the table).

In TR, 10 classes have Hb ≥ 12 grams out of 16 classes for only 7 classes out of 17 in DT (bold number).

![Table](image.png)

<table>
<thead>
<tr>
<th>Class #</th>
<th># pupil</th>
<th>mean of iron tablet taken</th>
<th>Mean of Hb</th>
<th># pupil</th>
<th>mean of iron tablet taken</th>
<th>Mean of Hb</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 = at home</td>
<td>7</td>
<td>2</td>
<td>12.4</td>
<td>2</td>
<td>0</td>
<td>11.7</td>
</tr>
<tr>
<td>1.1</td>
<td>5</td>
<td>11.5</td>
<td>11.5</td>
<td>21</td>
<td>15.81</td>
<td>11.414</td>
</tr>
<tr>
<td>1.2</td>
<td>19</td>
<td>13</td>
<td>12.26</td>
<td>15</td>
<td>16.13</td>
<td>11.643</td>
</tr>
<tr>
<td>1.3</td>
<td>1</td>
<td>1</td>
<td>10.7</td>
<td>34</td>
<td>14.97</td>
<td>11.884</td>
</tr>
<tr>
<td>1.4</td>
<td>11</td>
<td>20.2</td>
<td>12.67</td>
<td>4</td>
<td>15</td>
<td>12.75</td>
</tr>
<tr>
<td>1.5</td>
<td>15</td>
<td>20</td>
<td>13.02</td>
<td>1</td>
<td>20</td>
<td>12.7</td>
</tr>
<tr>
<td>1.6</td>
<td>8</td>
<td>17.5</td>
<td>12.53</td>
<td>13</td>
<td>15.23</td>
<td>11.954</td>
</tr>
<tr>
<td>1.7</td>
<td>20</td>
<td>20.1</td>
<td>11.55</td>
<td>6</td>
<td>14.5</td>
<td>11.2</td>
</tr>
<tr>
<td>1.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>11.5</td>
<td>12.025</td>
</tr>
<tr>
<td>2.1</td>
<td>32</td>
<td>17.7</td>
<td>12.91</td>
<td>26</td>
<td>10</td>
<td>12.654</td>
</tr>
<tr>
<td>2.2</td>
<td>32</td>
<td>18.3</td>
<td>12.56</td>
<td>18</td>
<td>17.78</td>
<td>12.217</td>
</tr>
<tr>
<td>2.3</td>
<td>17</td>
<td>20.5</td>
<td>12.27</td>
<td>15</td>
<td>12.73</td>
<td>12.207</td>
</tr>
<tr>
<td>2.4</td>
<td>16</td>
<td>20</td>
<td>11.97</td>
<td>13</td>
<td>15.77</td>
<td>11.777</td>
</tr>
<tr>
<td>2.5</td>
<td>30</td>
<td>19.9</td>
<td>12.27</td>
<td>20</td>
<td>10.7</td>
<td>12.625</td>
</tr>
<tr>
<td>2.6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>11.7</td>
</tr>
<tr>
<td>2.7</td>
<td>1</td>
<td>20</td>
<td>12.7</td>
<td>1</td>
<td>20</td>
<td>10.7</td>
</tr>
<tr>
<td>2.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>14</td>
<td>11.7</td>
</tr>
</tbody>
</table>

Total | 17.88 | 12.38 | 14.03 | 12.026 |

Result of the iron therapy remarkable, especially in the Trapaing Reang, where compliance is better.
Percent of children with anemia in 1999 and 2000

<table>
<thead>
<tr>
<th>age group</th>
<th>Trapiang Reang (Chum Kiri)</th>
<th>Dang Tung</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
<td>2000</td>
</tr>
<tr>
<td>5-11 years old</td>
<td>130/211</td>
<td>19/160</td>
</tr>
<tr>
<td>61.5%</td>
<td>11.9%</td>
<td>57.3%</td>
</tr>
<tr>
<td>12-14 years old</td>
<td>19/23</td>
<td>23/52</td>
</tr>
<tr>
<td>82.5%</td>
<td>44.2%</td>
<td>91.3%</td>
</tr>
</tbody>
</table>

Anemia per age group - follow-up survey
in grade 1-2 in Trapiang Reang and Dang Tung schools - July 2000

After intervention: 1 tablet Iron-Folic Acid per week for 20 weeks

Trapiang Reang: age 5-11

Trapiang Reang: age 12-14

Dang Tung: age 5-11

Dang Tung: age 12-14

Hb cut-off point: 5-11 y: < 11.5 g. Hb/100 ml; 12-14 y: < 12 g. Hb/100 ml

A recent IFSP survey among pregnant women attending ANC1 in Trapiang Reang HC confirms the extreme gravity of anemia among the Khmer population. 85 pregnant women have had their Hb level analyzed, before receiving the 30 tablets of iron therapy given to all pregnant women attending ANC1. Out of 85 women screened in 2000, only 2 had a normal level of 12.7 gr. Hb per 100 ml of blood. Among those with anemia, 28 women had 11.7 gr. Hb, 50 women had 10.7 gr. Hb, and 5 had 9.7 gr. Hb. (see annex 17)
Prevalence of anemia among grade 1 & 2 school children
Follow-up survey in Trapiang Reang and Dang Tung schools – July 2000
OD Chhuk, Kampot Province

GTZ – IFSP school survey

After intervention: one tablet Iron-Folic acid per week for 20 weeks

<table>
<thead>
<tr>
<th>School</th>
<th>Trapiang Reang</th>
<th></th>
<th>Dang Tung</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb cut-off</td>
<td>&lt; 11.5 g</td>
<td>&lt; 12.0 g</td>
<td></td>
<td>&lt; 11.5 g</td>
</tr>
<tr>
<td>age group</td>
<td>5 – 11 y.</td>
<td>12 – 14 y.</td>
<td>all</td>
<td>5 – 11 y.</td>
</tr>
<tr>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>Anemia</td>
<td>19</td>
<td>11.9</td>
<td>23</td>
<td>44.2</td>
</tr>
<tr>
<td>No anemia</td>
<td>141</td>
<td>88.1</td>
<td>29</td>
<td>55.8</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100</td>
<td>52</td>
<td>100</td>
</tr>
</tbody>
</table>
Regarding severe anemia, all cases, with Hb. level ≤ 9.7 gr./100 ml. have completely disappeared. In 1999, we had 21 cases in TR (9%) and 29 cases in DT (13.3%). (see figure below)

Regarding moderate anemia (Hb > 9.7 - ≤ 11.7), we observe a major decrease. We had
- in 1999, 184 cases in TR (78.6%) and 162 cases in DT (74.3), but
- in 2000, 84 cases in TR (39%) and 110 cases in DT (56%).

Number of healthy pupils (Hb > 11.7) increase remarkably, from 29 (12.4%) to 131 (61%) in TR from 27 (12.4%) to 87 in DT (44.2%)
When we compare the curve of Hemoglobin level distribution between 1999 and 2000, we can see in both Trapiang Reang (figure below) and Dang Tung (see annex 14), a major shift to the right after intervention.

We note an increase of the mean of Hemoglobin level of:
- over 1 gram in Trapiang Reang from 11.11 to 12.38
- 0.984 gram in Dang Tung from 11.042 to 12.026.

Even when compliance is not perfect, as in Dang Tung, we can say that this regimen of one tablet of iron per week works perfectly well.

We have not been able to determine the impact of Mebendazole treatment on the decrease of anemia.
6.2.4. Follow-up Anthropological survey:

The surveyed group did not receive particular intervention regarding nutrition. They have only been exposed to some health education, two times distribution of Vitamin A, Mebendazole 500 and Vitamin B Complex for about 10% of the pupils.

Weight and height were measured with the same instrument and method. The table below shows the results:

<table>
<thead>
<tr>
<th>Place &amp; year</th>
<th># pupils seen</th>
<th>Acute malnutrition: W/H</th>
<th>Chronic malnutrition: H/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td># kid &lt; -2 sd</td>
<td>% &lt; -2 sd</td>
</tr>
<tr>
<td>CK 1999</td>
<td>233</td>
<td>22/233</td>
<td>9.4%</td>
</tr>
<tr>
<td>CK 2000</td>
<td>215</td>
<td>21/207</td>
<td>10.1%</td>
</tr>
<tr>
<td>DT 1999</td>
<td>207</td>
<td>9/204</td>
<td>4.4%</td>
</tr>
<tr>
<td>DT 2000</td>
<td>197</td>
<td>7/177</td>
<td>4%</td>
</tr>
</tbody>
</table>

For more detail see table next page and ANNEX 15.

We can see a significant change in the distribution of malnutrition between 1999 and 2000.

Regarding *acute malnutrition*, we observe a mild increase from 9.4% to 10.1% in Traplang Reang (p = 0.820), while there is a mild decrease in Dang Tung from 4.4% to 4% (p = 0.83). This follow-up survey happened in the same period of the year and we could not find a proper explanation to this unexpected change compared to 1999.

Regarding *chronic malnutrition*, we can see a decrease both in Trapiang Reang from 59.7% to 55.3% (p = 0.29) and in Dang Tung from 45.4% to 43.1% (p = 0.77). If no improvement, chronic malnutrition increases with age. The present decrease, even if statistically not significant, may be an indication of improvement of living condition.
Distribution of malnutrition in Trapiang Reang (CK) and Dang Tung schools in July 1999 and July 2000

<table>
<thead>
<tr>
<th></th>
<th>Acute Malnutrition</th>
<th>Chronic Malnutrition</th>
<th>General Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight/Height</td>
<td>Height/Height</td>
<td>Weight/Height</td>
</tr>
<tr>
<td></td>
<td>all &lt; 2sd</td>
<td>all &lt; 2sd</td>
<td>all &lt; 2sd</td>
</tr>
<tr>
<td>Chum Kiri</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; -2sd</td>
<td>211 90.6%</td>
<td>211 90.6%</td>
<td>94 40.3%</td>
</tr>
<tr>
<td>&lt; -2sd</td>
<td>22  9.4%</td>
<td>19  8.2%</td>
<td>92 39.5%</td>
</tr>
<tr>
<td>&lt; -3sd</td>
<td>3    1.3%</td>
<td>36 15.5%</td>
<td>11  4.7%</td>
</tr>
<tr>
<td>&lt; -4sd</td>
<td>234</td>
<td>233</td>
<td>233</td>
</tr>
<tr>
<td>Dang Tung</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; -2sd</td>
<td>186 89.9%</td>
<td>186 89.9%</td>
<td>119 55.3%</td>
</tr>
<tr>
<td>&lt; -2sd</td>
<td>21 10.1%</td>
<td>16 7.7%</td>
<td>80 37.2%</td>
</tr>
<tr>
<td>&lt; -3sd</td>
<td>3    1.4%</td>
<td>31 14.4%</td>
<td>8   3.7%</td>
</tr>
<tr>
<td>&lt; -4sd</td>
<td>207</td>
<td>215</td>
<td>215</td>
</tr>
<tr>
<td>Dang Tung</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; -2sd</td>
<td>195 95.6%</td>
<td>195 95.6%</td>
<td>113 54.6%</td>
</tr>
<tr>
<td>&lt; -2sd</td>
<td>9    4.4%</td>
<td>9   4.4%</td>
<td>70 33.8%</td>
</tr>
<tr>
<td>&lt; -3sd</td>
<td>204</td>
<td>16  7.7%</td>
<td>8   3.9%</td>
</tr>
<tr>
<td>&lt; -4sd</td>
<td>207</td>
<td>207</td>
<td>207</td>
</tr>
<tr>
<td>Dang Tung</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; -2sd</td>
<td>170 96%</td>
<td>170 96%</td>
<td>112 56.9%</td>
</tr>
<tr>
<td>&lt; -2sd</td>
<td>7    4%</td>
<td>7   4%</td>
<td>63 32%</td>
</tr>
<tr>
<td>&lt; -3sd</td>
<td>5    2.5%</td>
<td>17  8.6%</td>
<td>5   2.5%</td>
</tr>
<tr>
<td>&lt; -4sd</td>
<td>198</td>
<td>197</td>
<td>197</td>
</tr>
</tbody>
</table>

37
School Health program
6.2.5 Follow-up Stool survey in Dang Tung in July 2000:

During the follow-up survey, 146 children have their stool analyzed. In 1999, stools from 162 children were analyzed in the survey: 71 girls and 75 boys aged 7 to 14 years old.

During the survey, pupils were interviewed regarding the number of tablet of Mebendazole and Vitamin A pupils they have taken since the first survey. Two sessions of health programme have been done in July 99 and December 99. Kids in TR have taken an average of 1.9 tablet of Mebendazole and 1.5 tablet in DT.

Number of tablet is lower than 2, as some children have missed the December 99 health screening follow-up. Once again, the follow-up has been lower in DT; where the stool survey has been done:

Because of technical problem, CNM staff doing the survey could not provide the result as an EPI-INFO document, but as a WORD document only. So, analysis has been limited and done by hand.

The stools have been checked using the following techniques:

- **Kato-Katz:** detected 59 specimens positive for Hookworm (59/146 or 40.6%)  
  1 specimen positive for ascaris (1/146 or 0.68%)  
  1 specimen positive for enterobius (1/146 or 0.68%)

- **SAF method** detected 48 specimens positive for Hookworm (48/146 or 33%)  
  1 specimen positive for ascaris  
  7 specimens positive for cyst E. histilotica (4.8%)  
  1 specimen positive for cyst of Gardia Lumbia

SAF was not done for the specimen with enterobius done with Kato-Katz

- **Baermann.** detected 10 specimens positive for strongyloid (10/146 or 6.8%)

After 2 deworming sessions, we observe a significant decrease of children infected with parasites: 49% (12/146) in 2000 for 62% (101/162) in 1999.

If we compare prevalence of Hookworm among the children screened, the results are about the same: 40.4% in 2000 for 42% in 1999. But, the infestation level has much decreased.

Graphic page 40b shows that in 1999 more kids have a high infestation rate than in 2000. On the contrary, we observe in 2000, more kids having low infestation rate than in 1999.

If we compare the prevalence of hookworm among infected stool, we see that 67.3 % (68/101) of infected stool in 1999 are infected by hookworm, for 82% (59/72) in 2000.

Other parasites such as: ascaris, enterobius, gardia cyst have a very low prevalence in 2000.

See the results in the next pages).
Epidemiology of the hookworm Infestation: Is explained in the figure In the following page. Considering the high number of new infested pupils (33) in 2000, we can tell that re-infection rate is high. Ratio new cases over old positive cases is: 33/68 = 0.48. As a consequence, it is wise to presume that the large majority of the 26 still positive cases” from 99 to 2000 have probably been cured and re-infected between the two surveys.

Regarding strongyloid, we observe that the infestation prevalence is about half than in 1999. It is interesting to evaluate if Mebendazole works, as the recommended drug to treat this worm is Thiambendazol, which is not available at HC. From the 20 positive cases in 1999, 17 have been follow-up in 2000. From them, we found: 7 Cases still positive, 10 cases are negative and 3 cases negative in 1999 become positive this year. Ration of new cases over old positive cases: 3/20 = 0.15. As only three new cases have happened, we can presume that the re-infestation rate is lower and that the majority of cases that are still positive may be failure to treatment. With 10/17 cases cured and not re-infested, we can assume that Mebendazole may have a 59% cure rate. So, III case of strongyloid treated with Mebendazole, a second dose of this drug could be recommended.

Regarding ascaris, prevalence is extremely low, indication that children still eat little vegetable or that hygiene has improved (washing hand or washing vegetable).

Regarding way of transmission, see comment on pages 24-25.
Prevalence of stool parasites among school children grade 1 in Dang Tung school, follow-up survey June 2000

Parasite + 49%

- Hookworm/ankylostome: 72%
- No: 51%

Type of parasite

- Giardia: 59%
- Ascaris: 8%
- Entero: 10%
- Strongy/anguilule: 72%
Distribution of intensity of Hookworm infestation in stool survey in Dang Tung

![Graph showing the distribution of hookworm infestation intensity. The x-axis represents the infestation rate (number of parasites per stool unit), and the y-axis shows the number of stool specimens. The graph compares the data from 1999 and 2000.]
**Hookworm Distribution**

1999 Survey

- 162
  - Cured 36
  - Lost follow up 5
  - Probable cure 68
    - Failure treatment (few?)
    - Re-infected
    - 26 still positive
    - 26 + 33 = 59
    - 33 New

2000 Survey

- 146
  - Hookworm positive 59

**Strongyloid Distribution**

1999 Survey

- 162
  - Cured 10
  - Lost follow up 3
  - 20
    - Strongyloid positive 10
      - 7 still positive

2000 Survey

- 146
As in 1999, the children had to answer to a questionnaire. Answers are below:

- 29.4% have a latrine in the house (43/146) for 16.3% (28 out of 172) in 1999
- Diarrhea: 15% complain of chronic diarrhea (22/146) for 37.21% (64 out of 172) in 1999
- Blood in the stool: 24% mention blood in the stool (36/146) for 32% (56/172) in 1999
- Frequent abdominal pain: 53% have this complain (78/146). Not asked in 1999.

As we can see, there is improvement: the number of household with latrine increase, while there is decrease with the symptoms.

7. SCHOOL FEEDING PROGRAMME
Considering the significant acute malnutrition among primary school children, IFSP health component (R5) discussed the possibility to develop a pilot feeding programme in one of our schools. The plan is to provide a daily meal to all children (grade 1 to 6) attending the selected school. It will consist of our under-five programme rice soup enriched with vegetable, meat and fat. The intervention will last from December 18, 2000 to July 2001.

To limit cost and facilitate the work, the prospected school should have a small number of pupils (200-400) and be in a poor area. It was well known that acute malnutrition in Chum Kiri school was high (9.4% in 1999), so R5 proposed to develop a feeding programme in Phum Or, which has been recognized as the poorest school in the area. Unfortunately, IFSP community development component (R6) objected that community mobilization would be quite difficult in that village, and at the last minute, the school in Kchey Khang Tebong in Dang Tung has been selected.

In December 2000, 135 children of grade 1 have had their weight and height measured. A control group has been selected in nearby Sre Chiar school, where 135 grade 1 pupils have been measured as well.

Only weight and height have been measured, which are indicators to assess acute malnutrition. To calculate the real age would be too much time consuming and anyway, it is unlucky that a significant change in chronic malnutrition already affecting children could be observed in a 7 months period.

<table>
<thead>
<tr>
<th>School</th>
<th># pupil measured</th>
<th># pupil &lt; 2 s.d. W/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kchey Khang Tebong</td>
<td>135</td>
<td>5/128 12%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3/121 2.5%</td>
</tr>
<tr>
<td>Sre Chiar</td>
<td>135</td>
<td></td>
</tr>
</tbody>
</table>

\(^{12}\) Only 128 kids analyzed by EPI-INFO. Kids taller than 140 cm are rejected by EPI6.
Distribution of acute malnutrition in Kchey Khang Tebong school (Dang Tung District) in December 2000
Primary School Feeding Program

Khchey Khang Tbong Primary School Bobor Preparation team

Daily Bobor feeding in Khchey Khang Tbong Primary School
We hope that this report will motivate an initiative from Ministry of Health and Ministry of Education to set up a School Health Programme in Cambodia for the whole benefit of the Khmer children.

10. ACKNOWLEDGEMENT:
The writer is grateful to the good cooperation from the Provincial Health Direction.

He addresses his gratitude to Dr. Doung Socheat, Director of CNM for his interest in this survey and his kind cooperation in providing thousand of Mebendazole tablets and staff for the stool survey.

He is especially grateful to Dr. Ouk Poly, chief of Nutrition department at N-MCH for his kind support in this survey preparation and for his major contribution in supplying iron tablets for our iron therapy programme and Vitamin A for our school health programme. Our many thanks to Mrs. Muth Snoun and her team from CNM, who implemented the stool survey in 1999 and 2000.

He address his many thanks to Mr. Ung Kim Hiang, who has been working as assistant, for his energetic work and especially his tireless effort in the preparation and implementation of this survey.

A special mention to the directors from our 18 schools, who help to supervise the pilot iron therapy programme.

Finally, he address all his consideration to the IFSP HC counterpart, Mrs. Em Saren in Dang Tung and Not Son in Trapiang Reang and to all our Village Health Workers, who have provided much help to in the home visiting age survey and in the school programme activity.
ADDENDUM

Price of Iron therapy
According of CMS price list, one tablet of Iron-Folic acid costs 20 Riels.
So, a treatment with 20 tablets will cost 400 Riels per child.
With one US $, we can rebuild healthy blood level for 10 kids!

Recommendation to Ministry of education:

The traditional test "Hand catching the opposite ear" is a common practice in Cambodian schools. It is believed that a child that can perform this test has the appropriate age to register school. It is unknown about the specificity of this test. But the high prevalence of chronic malnutrition makes that children stay small and many cannot perform this test even at age of 7 or $ years, old. This common practice should be banned, as it just helps to delay even more the already late registration of Khmer children.

7 years old child who cannot perform the test.
11. TABLE OF ABBREVIATION

A : Age
AIDS - STD : Aids - Sexual Transmitted Disease..
ANC : Ante Natal Care
BMI : Body Mass Index
CASD : Community Action for Social Development
CK : Chum Kid (former District Hospital, now TR HC)
CNM : Centre National de Malaria
Cp-HC : IFSP counterpart for HC development
CID : Champey HC
DT : Dang Tung HC
EPI : Expended Programme Immunization.
FBC : Feed Back Committee.
Hb : Haemoglobin
HC : Health Center.
HE : Health Education
HIS : Health Information System
HP : Health Personnel
Ht : Height
IEC : Information , Education and Communication.
IFSP : Integrated Food Security Programme.
MoH : Ministry of Health .
MPA : Minimum Package of Activities.
NGO : Non Governmental Organization
N-MCH : National Mother and Child Health
OA : Outreach Activities .
OD : Operational District
01 : International Organization
p : p Values: the exact probability of getting a value
PHA : Provincial Health Advisor.
PHD : Provincial Health Department.
R5 : Result 5, the fifth component or IFSP health component
sd : Standard Deviation (percentage of the mean)
TR : Trapeang Reang HC (former Chum Kiri Hospital)
VHW : Village health Worker.
WFP : World Food Programme
Wt : Weight
# LIST OF THE SCHOOLS in Dang Tung HC

<table>
<thead>
<tr>
<th>SCHOOL NAME</th>
<th>Village Number</th>
<th>NUMBER OF STUDENT</th>
<th>Well</th>
<th>TOILET</th>
<th>BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANG TUNG SCHOOL</td>
<td>4,3,2,0,18,17</td>
<td>683</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANG SVAY SCHOOL</td>
<td>6,4,2,1,5,8,10</td>
<td>777</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KCHEY KANG TBONG SCHOOL</td>
<td>7,5,9,10</td>
<td>336</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREY SAMNANG SCHOOL</td>
<td>4,3,14,15</td>
<td>457</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAMNAK SCHOOL</td>
<td>9,12,13</td>
<td>550</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRE CHEA SCHOOL</td>
<td>3,17,18,19,20</td>
<td>712</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>3515</td>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

1 Wells will be dug in Q1 2000.
2 Latrine will be built in Q1 – Q2 2000
3 Number of students in 1998-99 up-dated.
4 Support to this school was stopped in early 2000 when this area has been attached to Kampong Trach OD.
MORINGA TREE

Deum Mrom

A short introduction

Moringa tree growth naturally in Cambodia and are newly known to contain high level of nutritious element to fight malnutrition.

Their pods, fresh leaves and dried leaf powder contain high level of:

? Protein, important for body growth
? Calcium, important in bone growth
? Iron, important for blood
? Vitamin A : important for good eyes and skin
? Vitamin B
? And many other elements

Leaf and pod contain many of those nutrition elements, which are greatly needed by malnourished children of Cambodia, but also for pregnant and lactating women.

Moringa leaves can be dried and made into powder by rubbing them over a sieve. Leaves should not be dried under the sun, as Vitamin will be destroyed), but indoor in the shade.

If one rounded tablespoon of powder is added to infant's food, three times a day, the 25 g of leave powder will give him roundly about 50 % of its daily need in protein. Malnourished children fed this way, are taking weight very quickly and are recovering to a normal weight and a good health in a few weeks only.

Boiling the leaves in hot water is commonly done, but is not recommended as most of the nutritional content will be lost when discarding the water. But drinking tea made from Moringa leave is useful to control blood sugar for diabetic patient.

It has been noticed also that children fed with Moringa void tapeworm. An other interesting property of Moringa is that its seed powder can be used for water purification.

Cultivation:
Moringa trees tolerate a wide range of soil and rainfall condition. It is resistant to period of drought and it is fast growing.

During its first year, Moringa tree will growth up to four meters in height and produces flowers and fruits.
The tree should be cut down each year to one meter high. This doesn’t affect the tree, but keep leaves and pods within easy reach. But the tree should be protected with a fence from animal (cattle, etc.), which appreciate its test.

Growing from seed:

Seed planted in plastic bag, produce tree that can be transplanted after 4 months.
Seed should be covered by one and half centimeter of soil only.

Moringa tree need little water to growth, don’t need fertilizer and are resistant to pest and diseases. Young tree suffers from flooding.

Moringa tree is the best answer to solve the dramatic problem of malnutrition in our programme. Its biggest advantage is that once it is planted it is free of charge.

Health education will focus to promote Moringa tree for feeding. Health personnel and VHW will be trained on this topic.

IFSP will encourage all households in our pilot HC to growth Moringa tree. Nursery to grow small trees has to be developed and VHW interested will be able to sell the growing trees

Priority will be given

- first to family with severely malnourished children,
- then to all poorest family
- to all VHW
- to health staff and HC facility
- to teacher and school
- and finally to all household when enough trees will be available from nursery
Resume of the School survey in Trapiang Reang and Dang Tung
July 1999

To increase chance for follow up during the next two years, only grade 1 pupils have been included.

A questionnaire on leaving condition at home and at the village included with the stool survey.
in grade 1 & 2: Trapiang Reang and Dang Tung schools

Trapiang Reang 1999: 234 pupils

Dang Tung 1999: 217 pupils

Trapiang Reang 2000: 215 pupils

Dang Tung 2000: 198 pupils