The Prevalence of Malnutrition and Parasites in School-Age Children:

An Annotated Bibliography

by

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Forward

This annotated bibliography was compiled as a background document for "Improving Primary Education in Developing Countries" by Marlaine Lockheed, Adriaan Verspoor, et al., and an accompanying World Bank policy paper on primary education. The main emphasis of this review is on empirical research on prevalence of micronutrient deficiencies and parasites in school-age children. As the studies reviewed constitute a useful research tool on these topics, and the information is not widely available, it is being disseminated in this form.

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ABSTRACT

This annotated bibliography summarizes 23 studies that cite the prevalence of nutritional deficiencies (energy, protein, iron, iodine, and vitamin A) and parasites in school-age children in developing countries. The bibliography includes information on 66 countries and categorizes them by income beginning with the lowest income countries first.
INTRODUCTION

The prevalence of malnutrition and parasites in school-age children in developing countries is presented in the table entitled "The Percentage of School-Age Children Exhibiting Nutritional Deficiencies and Parasites". The data in the table are presented in annotated bibliography form. For each of the values in the table, the sample size, ages of children, location of the study, type of survey (national, local, regional, etc.), date of the survey, and reference standard are detailed in the bibliography.

Height-for-age measurements were used to denote stunting or chronic malnutrition since this has been related to school performance (4, 5) and suggested as a predictor of math and language scores (1). Stunting is substantial in many of the countries listed, ranging from 5% of children in a Chinese study to 71.0% for children in a Bangladeshi study.

Information on iron deficiency in school-age children is not readily available. The range for iron deficiency in school-age children for the data presented is .3% in Bahrain to 86.9% in China.

The prevalence of iodine deficiency in school children is probably the most well studied of the micronutrient deficiencies. The data is particularly good for Latin America. These studies show the enormity of the iodine deficiency problem in developing countries with as much as 75% of the children affected in some areas of Cameroon. Current thought is that if an area shows 10% of its population or children aged 6-12 years as goitrous, there is an endemic situation. From the table, it can be seen that there is reason for concern in many developing countries of the world.

The prevalence of vitamin A deficiency in school-age children is not well known because most survey work on the deficiency has been done in children under the age of 5 years. Some data is, however, presented for school-age children in the table. It might be possible to show that permanent damage from vitamin A deficiency may affect children in school in later years. For example, a study in Indonesia (16) found that 2% of children in one area were at risk of contracting corneal xerophthalmia by their fifth birthday which could permanently affect eyesight (although the authors make the point that the mortality of children from this group is high). Clearly, more work needs to be done on visual impairments due to vitamin A deficiency in school-age children.

Finally, the prevalence of intestinal parasites is listed. Most of these studies are conducted in small sections of each country. More work on national prevalence of parasites in school-age children is needed.

A caveat should be mentioned here on the use of the table. Comparing malnutrition and parasites prevalence in school-age children between the countries is very difficult because the studies range from national surveys involving large numbers of children to local studies involving only small numbers of children. Also, dates of these surveys range from the 1940s to the present which may date some of the information. However, since ongoing surveillance and control for nutritional deficiencies and parasites is not often good, the data presented might in fact be up-to-date. Finally, the
reference standards used vary among the surveys. For example, the anthropometric data for Chile uses the reference standard of <-1 standard deviation, giving a high percentage of malnutrition for the children in Chile. If <-2 S.D. of standard had been used, the figures would have been lower because they would have included only those who were moderately and severely malnourished (<-2 & -3 S.D.) . The percentage would thus be more comparable to other Latin American countries.
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<td>Iodine def.</td>
<td>Vit. A Ref</td>
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</table>

Discussion on nutrition, health and education including the effects of energy protein malnutrition, iron deficiency and anemia, iodine deficiency, hunger, intestinal parasites and lead toxicity on educational outcomes. Some prevalence data stated for school-age children. Prevalence data used for this table:

**Anthropometric:**
- **Country:** Kenya
- **Sample Size:** 138 children
- **Ages of Children:** average age=7 years, 7 months; most children were either in nursery school or the first two years of elementary school
- **Location of Study:** from the Embu Districts, 120 miles northeast of Nairobi
- **Type of Survey:** district
- **Date:** in press
- **Reference Standard:** <90% of the median (Mean Z score = -1.69)

2. FAO Nutrition Country Profiles (1986-1989). Food and Agriculture Organization of the United Nations; Via delle Terme di Caracalla, 00100; Rome, Italy. (Contact the Nutrition Planning, Assessment and Evaluation Service; Food Policy and Nutrition Division at FAO.)

Summary information on the food and nutrition situation in developing countries. Currently, approximately 35 country profiles are finalized with about 100 country profiles waiting to be finalized. Profiles usually take the form of presenting data on agricultural production and food availability, food consumption, nutritional status and health related factors, population, access to services, and national nutrition units. Some prevalence data presented for school-age children:

**Anthropometric:**
- **Country:** Bangladesh
- **Sample Size:** 619 children
- **Ages of Children:** 6-18 years
- **Location of Study:** not stated
- **Type:** urban and rural survey
- **Date:** 1980
- **Reference Standard:** <90% of the standard for height for age

**Country:** Bangladesh
- **Sample Size:** 619 children
<table>
<thead>
<tr>
<th>Country</th>
<th>Sample Size</th>
<th>Ages of Children</th>
<th>Location of Study</th>
<th>Type</th>
<th>Date</th>
<th>Reference Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burkina Faso</td>
<td>177 children</td>
<td>6-9 years</td>
<td>not stated</td>
<td>rural</td>
<td>1983</td>
<td>&lt;90% of the standard for height for age</td>
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<tr>
<td>Egypt</td>
<td>3,419 children</td>
<td>6-20 years</td>
<td>Cairo schools</td>
<td>urban</td>
<td>1980</td>
<td>&lt;90% of the standard for height for age</td>
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<tr>
<td>Grenada</td>
<td>2,408 children</td>
<td>6-11 years</td>
<td>not stated</td>
<td>national</td>
<td>1981-2</td>
<td>85-95% of the standard for height for age</td>
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<td>Kuwait</td>
<td>5,132 children</td>
<td>6-10 years</td>
<td>not stated</td>
<td>national</td>
<td>1984</td>
<td>&lt;2 S.D. of the standard for height for age</td>
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<tr>
<td>Lebanon</td>
<td>1,181 children</td>
<td>5-12 years</td>
<td>7 areas listed</td>
<td>urban and rural</td>
<td>1981</td>
<td>&lt;90% of the standard for height for age</td>
</tr>
<tr>
<td>Syria</td>
<td>256 children</td>
<td>6-12 years</td>
<td>not stated</td>
<td>provincial</td>
<td>1984</td>
<td></td>
</tr>
</tbody>
</table>
Reference Standard: <85% of the standard for height for age

**Country:** Thailand  
**Sample Size:** 2,880 children  
**Ages of Children:** 6-12 years  
**Location of Study:** northeast rural and urban areas  
**Type:** rural and urban  
**Date:** two seasons in 1981-82  
**Reference Standard:** <90% of Thai standard for height for age

**Iron Deficiency:**  
**Country:** Antigua and Barbuda  
**Sample Size:** not stated  
**Ages of Children:** school-age  
**Location of Study:** not stated  
**Type:** national  
**Date:** 1981  
**Reference Standard:** hemoglobin <12 g/dl

**Country:** Bahrain  
**Sample Size:** 692 children  
**Ages of Children:** 6-18 years  
**Location of Study:** not stated  
**Type:** urban and rural survey  
**Date:** 1980  
**Reference Standard:** hemoglobin <12 g/dl

**Country:** Bangladesh  
**Sample Size:** 818 children  
**Ages of Children:** 5-11 years  
**Location of Study:** not stated  
**Type:** national  
**Date:** 1981-82  
**Reference Standard:** hemoglobin <12 g/dl

**Country:** Burundi  
**Sample Size:** unspecific number of children  
**Ages of Children:** 5-19 years  
**Location of Study:** Imbo area  
**Type:** not stated  
**Date:** 1983  
**Reference Standard:** presence of anemia

**Country:** China  
**Sample Size:** 1,189 children  
**Ages of Children:** 6-13 years  
**Location of Study:** Huang-Shi city  
**Type:** urban  
**Date:** 1983  
**Reference Standard:** hemoglobin <12 g/dl
Country: Kenya  
Sample Size: undefined number of children  
Ages of Children: 6-15 years  
Location of Study: 3 areas (W. Koguta, Nasumbi, Nyaani)  
Type: not stated  
Date: 1962  
Reference Standard: hemoglobin <10 g/dl  
Note: range stated was 4-13%  

Country: Kuwait  
Sample Size: 1,208 children  
Ages of Children: 6-17 years  
Location of Study: 45 schools  
Type: national survey  
Date: 1983-84  
Reference Standard: hemoglobin <12 g/dl for 6-13 year olds and females 14-17 years olds and <13 g/dl for males 14-17 years olds  

Country: Lebanon  
Sample Size: 53 children  
Ages of Children: 10-14 years  
Location of Study: not stated  
Type: national  
Date: 1961-2  
Reference Standard: hemoglobin <12 g/dl  

Country: Syria  
Sample Size: 175 children  
Ages of Children: 10-12 years  
Location of Study: Damascus  
Type: urban  
Date: not stated  
Reference Standard: presence of anemia  

Country: Thailand  
Sample Size: 2,880 children  
Ages of Children: 6-12 years  
Location: not stated  
Type: rural, suburb, and urban  
Date: two seasons of 1981-82  
Reference Standard: clinical exam  

Country: Trinidad and Tobago  
Sample Size: 119 children  
Ages of Children: 10-13 years  
Location of Study: not stated  
Type: national  
Date: 1969  
Reference Standard: hemoglobin <10 g/dl  

Country: Zambia  
Sample Size: 7,101 children
**Ages of Children:** 5-14 years  
**Location of Study:** 8 provinces  
**Type:** rural  
**Date:** 1970-71  
**Reference Standard:** presence of anemia  
**Note:** range is 4.3% for females and 13.2% for males

**Iodine Deficiency:**  
**Country:** Bolivia  
**Sample Size:** 89,177 children  
**Ages of Children:** 6-18 years  
**Location of Study:** 9 areas listed  
**Type:** national  
**Date:** 1983  
**Reference Standard:** presence of any one of three grades of goiter

**Country:** Burundi  
**Sample Size:** 362 children  
**Ages of Children:** 10-14 years  
**Location of Study:** Bututsi  
**Type:** not stated  
**Date:** 1984  
**Reference Standard:** presence of goiter

**Country:** Kenya  
**Sample Size:** 28,520 children  
**Ages of Children:** school-age  
**Location of Study:** 14 districts  
**Type:** district  
**Date:** 1962-64 study  
**Reference Standard:** presence of goiter

**Country:** Lebanon  
**Sample Size:** 1,180 children  
**Ages of Children:** 5-12 years  
**Location of Study:** all regions  
**Type:** not stated  
**Date:** 1981  
**Reference Standard:** presence of goiter

**Parasites:**  
**Country:** Guyana  
**Sample Size:** 89 children from 103 households  
**Ages of Children:** 6-14 years  
**Location of Study:** not stated  
**Type:** household  
**Date:** 1982  
**Reference Standard:** presence of *Ascaris lumbricoides* and *Trichuris trichuria*
Vitamin A Deficiency:

Country: Bolivia
Sample Size: 161 children
Ages of Children: 6-15 years
Location of Study: La Paz
Type: rural
Date: 1967
Reference Standard: presence of Bitot's spots

Country: Burma
Sample Size: 1,039 children
Ages of Children: 6-15 years
Location of Study: Mingalado
Type: rural
Date: 1987
Reference Standard: presence of Bitot's spots

Country: Ethiopia
Sample Size: 426 children
Ages of Children: school-age
Location of Study: one area (ecozone)
Type: not stated
Date: 1980
Reference Standard: presence of nightblindness

Country: Lebanon
Sample Size: 45 children
Ages of Children: 10-14 years
Location of Study: not stated
Type: national
Date: 1961-2
Reference standard: serum vitamin A <10 ug/dl

Country: Tanzania
Sample Size: 156 children
Ages of Children: 6-10 years
Location of Study: Usambara
Type: not stated
Date: 1964-67
Reference standard: serum vitamin A <10 ug/dl

3. La Trinidad: A Community on the Move. JOICFP Review Vol. XI.

Gives reference to a control program for parasites. The figure of 98% parasite infection was before a treatment program. After the program the prevalence was 23%.

Country: Philippines
Sample Size: not stated
Ages of Children: school children
Location of Study: one city in Northern Philippines
Type: urban

Paper discusses the nutritional status of children and relates it to performance in school. Some prevalence data for anthropometric measures is presented for this small sample. Hemoglobins were taken and presented as averages. Only anthropometric measures were used for this table.

**Anthropometric:**
- **Country:** Nepal
- **Sample Size:** 350 children
- **Ages of Children:** 5-11 years
- **Location of Study:** southern region (Terai)
- **Type:** subsistence farm households
- **Date:** 1980
- **Reference Standard:** <90% of NCHS median


Paper relates anthropometric measurements for school children to school performance and attainment. Data is presented as mean heights and is therefore not presented in the table.


Comprehensive listing of anthropometric studies on mainly children <5 years but some information is available for school-age children. This publication is being updated by WHO Nutrition Unit and will include information from reference 19. Information used for this table are:

**Anthropometric:**
- **Country:** China
- **Sample Size:** 1,451 children
- **Ages of Children:** 6-9 years
- **Location of Study:** 5 provinces
- **Type:** regional
- **Date:** 1980
- **Reference Standard:** <-2S.D. of NCHS standard

Country: Kampuchea
- **Sample Size:** 1,000 children
- **Ages of Children:** 7-9 years
Location of Study: not stated  
Type: not stated  
Date: 1971  
Reference Standard: <-2 S.D. of NCHS standard

Country: Malaysia  
Sample Size: 280 Malay children  
Ages of Children: 6-9 years  
Location of Study: poor kampungs  
Type: rural  
Date: 1980  
Reference Standard: <-2 S.D. of NCHS standard

Country: Peru  
Sample Size: 1,052 children  
Ages of Children: 6-9 years  
Location of Survey: Cusco  
Type: district  
Date: 1985  
Reference Standard: <-2 S.D. of NCHS standard

Country: Zaire  
Sample Size: 80 children  
Ages of Children: 6 years  
Location of Survey: not stated  
Type: national  
Date: 1975  
Reference Standard: <-2 S.D. NCHS standard

Country: Zambia  
Sample Size: 1,121 children  
Ages of Children: 6-9 years  
Location of Survey: not stated  
Type: national-rural  
Date: 1970-72  
Reference Standard: <2 S.D. of standard

Country: Zimbabwe  
Sample Size: 2,689 children  
Ages of Children: 6-9 years  
Location of Survey: not stated  
Type: local  
Date: 1983  
Reference Standard: <-2 S.D. of NCHS standard


Publication gives information on indicators for economics, food production, and nutrition for 16 countries in Africa, 6 countries in Asia and 11 countries in Latin America and the Caribbean. Most
of the nutrition information is for children under the age of 5 but there is data on school-age children for a few countries. Only one, however, gives information on stunting for school-age children.

Anthropometric:
Country: Nicaragua
Sample Size: not stated
Ages of Children: 6-9 years
Location of Survey: 7 regions
Type: national
Date: 1986
Reference Standard: <-2SD of NCHS standard


Chapter discusses iron deficiency anemia in Chile and interventions in that country to alleviate the situation.

Iron Deficiency:
Country: Chile
Sample Size: 958
Ages of Children: 6-11 years (school-age)
Location of Survey: not stated
Type: national
Date: 1974-75
Reference Standard: presence of anemia (WHO definition)


Extensive information on the worldwide situation on iodine deficiency prevalence and control.

Iodine Deficiency:
Country: Argentina
Sample Size: 43,598 children
Ages of Children: school-age
Location of Survey: Mendoza
Type: not stated
Date: 1968 survey
Reference Standard: presence of goiter
Note: this was after iodine prophylaxis program. All salt in Argentina must now be iodinated by law.

Country: Brazil
Sample Size: 266,373 children
Ages of Children: school-age  
Location of Survey: 25 states  
Type: national  
Date: 1975  
Reference Standard: presence of goiter

Country: Burma  
Ages of Children: below the age of 15 years  
Location of Survey: not stated  
Type: not stated  
Date: 1966 study  
Reference Standard: urinary iodide excretion of less than 50 ug/gm creatinine

Country: Chile  
Sample Size: 31,512 children  
Ages of Children: not stated  
Location of Study: 4 provincial areas  
Type: provincial  
Date: four 1954-72 studies  
Reference Standard: presence of goiter  
Note: iodination of salt is mandatory since 1968. Prevalence is now regarded as low on the coast (less than 10% in Santiago) and increasing toward the Andes.

Country: Colombia  
Sample Size: 183,243 children  
Ages of Children: school-age  
Location of Study: 14 regions  
Type: national  
Date: 1945-48  
Reference Standard: presence of goiter

Country: Cuba  
Sample Size: not stated  
Ages of Children: school-age  
Location of Study: eastern province of Baracoa  
Type: not stated  
Date: 1977  
Reference Standard: presence of goiter

Country: El Salvador  
Sample Size: 35,000 children  
Ages of Children: school-age  
Location of Study: not stated  
Type: national  
Date: 1952  
Reference Standard: presence of goiter

Country: India  
Sample Size: not stated  
Ages of Children: school-age
Country: Indonesia
Sample Size: 11,774 children
Ages of Children: school-age
Location of Study: Merapi Mountain in Central Java
Date: 1973
Reference Standard: presence of goiter
Note: data represents lower range. (Upper range = 100%)

Country: Nepal
Sample Size: not stated
Ages of Children: school-age
Location of Study: 2 areas (Trisuli & Jhumla Valley)
Date: 1974
Reference Standard: visible signs of goiter.
Note: data represents lower range. (Upper range = 100%)

Country: Paraguay
Sample Size: 44,000 children
Ages of Children: 6-16 years (school-age)
Location of Study: lower economic group
Date: 1946
Reference Standard: presence of goiter
Note: a national campaign for iodization of table salt began in 1958

Country: Peru
Sample Size: 12 villages surveyed
Ages of Children: school-age
Location of Study: jungle area
Date: 1975
Reference Standard: presence of goiter
Note: also listed but not presented is data from other areas which had lower iodine deficiency prevalence. (coast, 0%; Sierra, 21%)

Country: Sri Lanka
Sample Size: not stated
Ages of Children: school-age
Location of Study: endemic goiter region
Date: 1966
Reference Standard: presence of goiter
Note: data represents lower range (Range was from 12 to 54%)
Country: Uruguay
Sample Size: not stated
Ages of Children: school-age
Location of Study: not stated
Type: not stated
Date: 1974
Reference Standard: presence of goiter

Country: Venezuela
Sample Size: 470,207 children
Ages of Children: 5-14 years
Location of Study: not stated
Type: national
Date: 1966
Reference Standard: presence of goiter
Note: ongoing research being conducted to update these figures


Like Stanbury and Hetzel, this is a comprehensive review of the current iodine deficiency situation in the world and includes extensive data on the prevalence of iodine deficiency in both children and general populations.

Iodine Deficiency:
Country: Bhutan
Sample Size: not stated
Ages of Children: school-age
Location of Study: not stated
Type: districts
Date: 1975
Reference Standard: presence of goiter
Note: range was 47 to 68%

Country: Cameroon
Sample Size: 4,000 children
Ages of Children: school-age
Location of Study: east region
Type: not stated
Date: 1953
Reference Standard: presence of goiter

Country: Costa Rica
Sample Size: not stated
Ages of Children: school-age
Location of Study: not stated
Type: not stated
Date: 1979 (after salt iodination program)
Reference Standard: presence of goiter
Country: Egypt  
Sample Size: not stated  
Ages of Children: not stated  
Location of Study: not stated  
Type: regional  
Date: 1968-71  
Reference Standard: presence of goiter

Country: Ethiopia  
Sample Size: 35,635 children  
Ages of Children: school-age  
Location of Study: not stated  
Type: national  
Date: 1983  
Reference Standard: presence of goiter

Country: Guatemala  
Sample Size: 3,000 children  
Ages of Children: students  
Location of Study: 20 communities  
Type: community  
Date: 1979  
Reference Standard: presence of goiter

Country: Libya  
Sample Size: 741 children  
Ages of Children: 11-20 years (school-age)  
Location of Study: Fezzan District  
Type: district  
Date: not stated  
Reference Standard: presence of goiter

Country: Nigeria  
Sample Size: not stated  
Ages of Children: school-age and patients  
Location of Study: north  
Type: not stated  
Date: 1970-74  
Reference Standard: presence of goiter

Country: Philippines  
Sample Size: 12,253 children  
Ages of Children: school-age  
Location of Study: 8 regions  
Type: regional  
Date: 1976-1979 survey  
Reference Standard: prevalence of goiter  
Note: data represents lower range (Upper range = 77.7%)

Country: Sudan  
Sample Size: not stated
Ages of Children: school-age
Location of Study: Khartoum
Type: urban
Date: 1975
Reference Standard: presence of goiter

Country: Tanzania
Sample Size: 55,373 children
Age of Children: school-age
Location of Study: 230 schools in 23 districts
Type: national
Date: 1980-81
Reference Standard: prevalence of goiter

Country: Thailand
Sample Size: not stated
Age of Children: primary school-age
Location of Study: northern provinces
Type: provincial
Date: 1957
Reference Standard: presence of goiter
Note: range was 23.5-49.3%


Review of iron nutrition with prevalence data for the deficiency in school-age children. Data used for this table was:

Iron Deficiency:
Country: Barbados
Sample Size: not stated
Ages of Children: 5-16 years
Location of Study: not stated
Type: not stated
Date: 1982
Reference Standard: hemoglobin <11.5 g/dl

Country: Bolivia
Sample Size: not stated
Ages of Children: school-age, undefined
Location of Study: not stated
Type: not stated
Date: not stated
Reference Standard: presence of anemia

Country: Guyana
Sample Size: not stated
Ages of Children: 6-14 years
Location of Study: not stated
Type: not stated
Date: 1982
Reference Standard: hemoglobin <12 g/dl

Country: India
Sample Size: not stated
Ages of Children: 5-15 years
Location of Study: not stated
Type: rural
Date: not stated
Reference Standard: FVC response
Note: urban numbers were lower at 33.8%

Country: Jamaica
Sample Size: not stated
Ages of Children: 7-15 years
Location of Study: not stated
Type: not stated
Date: 1982
Reference Standard: hemoglobin <10 g/dl

Country: Philippines
Sample Size: 175 children
Ages of Children: 6-9 years
Location of Study: not stated
Type: not stated
Date: 1974
Reference Standard: hemoglobin <12.5 g/dl

Country: St. Christopher-Nevis
Sample Size: not stated
Ages of Children: 5-16 years
Location of Study: not stated
Type: not stated
Date: 1982
Reference Standard: hemoglobin <12 g/dl

Country: St. Lucia
Sample Size: not stated
Ages of Children: 5-14 years
Location of Study: not stated
Type: not stated
Date: 1982
Reference Standard: hemoglobin <12 g/dl

Country: Turks and Caicos Islands
Sample Size: not stated
Ages of Children: 6-13 years
Location of Study: not stated
Type: not stated
Date: 1982
Reference Standard: hemoglobin <12 g/dl

Comprehensive guide to the effects of helminth infections on nutritional status. Some prevalence data listed. Data used in the table:

**Parasites:**
**Country:** India
**Sample Size:** 84 villages
**Ages of Children:** 5-14 years
**Location of Study:** W. Bengal
**Type:** not stated
**Date:** not stated
**Reference Standard:** two types of worms Bengal

Note: data represents frequency distribution among age groups


Comprehensive guide to ascariasis. Some prevalence data for school-age and other age groups. Data used in this table:

**Parasites:**
**Country:** Burma
**Sample Size:** 2,220 children
**Ages of Children:** primary school-age
**Location of Study:** Rangoon
**Type:** urban
**Date:** 1980
**Reference Standard:** infected with *Ascaris lumbricoides*

Note: other studies are listed for other areas

**Country:** Cote d'Ivoire
**Sample Size:** 430 children
**Age of Children:** school-age
**Location of Study:** forest zone
**Type:** not stated
**Date:** 1980
**Reference Standard:** presence of ascariasis

Note: range is 51-86%

**Country:** Kenya
**Sample Size:** 2,020 children
**Ages of Children:** 6-13 years
**Location of Study:** not stated
**Type:** not stated
**Date:** 1978
**Reference Standard:** infected with *Ascaris lumbricoides*

**Country:** Malaysia
**Sample Size:** not stated
Ages of Children: 10-19 years
Location of Study: not stated
Type: urban and rural
Date: not stated
Reference Standard: presence of soil transmitted parasites
Note: 50% of children (ages 7-15 years) from slums with ascariasis; 31.9% of 2,267 children (ages 7-12 years) with Ascaris lumbricoides.

Country: Peru
Sample Size: 63 children
Ages of Children: school-age
Location of Study: Amazon area
Type: not stated
Date: not stated
Reference Standard: infected with Ascaris lumbricoides

Country: Tanzania
Sample Size: 185 children
Ages of Children: school-age
Location of Study: village schools in Tanga area
Type: not stated
Date: 1976
Reference Standard: infected with Ascaris lumbricoides

Country: Zaire
Sample Size: 176 children
Ages of Children: school-age
Location of Study: Lulavu
Type: not stated
Date: 1978
Reference Standard: infected with Ascaris lumbricoides

14. Vial, Isabel, Eugenia Muchnik and Juliana Kain (1987). Evolution of Chile's Nutrition Intervention Programs: A Synthesis. Institute of Nutrition and Food Technology (University of Chile) and Department of Agricultural Economics (Catholic University of Chile).

Anthropometric:
Country: Chile
Sample Size: Over 1 million children
Ages of Children: 6-15 years
Location of Study: not stated
Type: national
Date: not stated
Reference Standard: <-1 S.D


Data on vitamin A deficiency in one area of Thailand.
Vitamin A Deficiency:
Country: Thailand
Sample Size: not stated
Age of Children: 7-8 years
Location of Study: Northeast provinces
Type: provincial
Date: not stated
Reference Standard: presence of nightblindness


Some prevalence data but nothing on school-age children. One reference is made to children in Indonesia 2% of which contract corneal xerophthalmia and 52% noncorneal xerophthalmia before their fifth birthday. This may be an indicator of the number of school-age children who are visually impaired before they reach school-age. A caveat is that those children who contract corneal xerophthalmia also have a high mortality rate.


Some prevalence data on intestinal parasites but little for school-age children. The one exception is used in this table.

Parasites:
Country: Brazil
Sample Size: not stated
Age of Children: 7-14 years
Location of Study: two areas
Type: not stated
Date: not stated
Reference Standard: presence of schistosomiasis


Some prevalence data available for school-age children.

Parasites:
Country: Burkina Faso
Sample Size: No sample size was given but total population in the area is 150,000
Age of Children: 10-14 years
Location of Study: one area of Lake Volta
Type: not stated
Date: 1968
Reference Standard: presence of schistosomiasis

Country: Zambia
Sample Size: not stated
Age of Children: 5-14 years
Location of Study: not stated
Type: not stated
Date: not stated
Reference Standard: presence of schistosomiasis


Update to information in reference 6. Extensive data bank on anthropometric nutritional surveys with some data available for school-age children. Future data bank information will be available on prevalence of iron deficiency, iodine deficiency and vitamin A deficiency. Data used in this table:

Anthropometric:
Country: Bolivia
Sample Size: 6,378 children
Age of Children: 6-10 years
Location of Study: Oruro, Sucre, Tarija
Type: regional
Date: 1988
Reference Standard: <-2S.D. of NCHS standard

Country: Cape Verde
Sample Size: 491 children
Age of Children: 6 years
Location of Study: not stated
Type: national
Date: 1985
Reference Standard: <-2S.D. of NCHS standard

Country: Costa Rica
Sample Size: 64,547 children
Age of Children: 6-8 years
Location of Study: not stated
Type: national
Date: 1985
Reference Standard: <-2S.D. of NCHS standard

Country: India
Sample Size: 2,599 children
Age of Children: 6-9 years (school-age)
Location of Study: Kerala
Type: local
Date: 1981-82 & 1985
Reference Standard: <-2S.D. of NCHS standard
Country: Indonesia
Sample Size: 874 children
Ages of Children: 6-7 years
Location of Study: urban, rural and slum areas
Type: local
Date: 1977
Reference Standard: <-2S.D. of NCFS standard

Country: Korea, Rep.
Sample Size: 83 children
Ages of Children: 6 years
Location of Study: Seosan County
Type: rural
Date: 1984
Reference Standard: <-2S.D. of NCHS standard

Country: Philippines
Sample Size: 358 children
Ages of Children: 6 years
Location of Study: not stated
Type: national
Date: 1982
Reference Standard: <-2S.D. of NCHS standard

Country: Seychelles
Sample Size: 1,140 children
Ages of Children: 6-9 years
Location of Study: not stated
Type: national
Date: 1987-88
Reference Standard: <-2S.D. of NCHS standard

Country: Somalia
Sample Size: 436 children
Ages of Children: 6-9 years
Location of Study: Mogadishu
Type: national-urban
Date: 1975
Reference Standard: <-2S.D. of NCHS standard
Note: prevalence of chronic malnutrition was much higher for children of the same age in drought camps (33%)

Country: South Africa
Sample Size: 51 (rural) & 165 (urban) black children
Ages of Children: 6 years
Location of Study: rural and urban
Type: national
Date: 1976-81
Reference Standard: <-2S.D.
Country: Venezuela
Sample Size: 4,309 children
Ages of Children: 6-7 years
Location of Study: not stated
Type: national
Date: 1981-87
Reference Standard: <-2S.D. of NCHS standard

Country: Yemen, Dem.
Sample Size: 182 children
Ages of Children: 6.5-6.99 years
Location of Study: rural, slum, urban
Type: National
Date: 1982
Reference Standard: <-2S.D. of NCHS standard


Most current data on nutritional status studies for Central America and Panama. Information on children under the age of 5 (anthropometric, vitamin A deficiency, children with diarrhea), but also prevalence data available for chronic malnutrition for school-age children. Information on the prevalence of iodine deficiency for the general population. Data used in this table is for chronic malnutrition.

Anthropometric:
Country: El Salvador
Sample Size: not stated
Ages of Children: First-grade primary school-age
Location of Study: eastern region
Type: national or regional
Date: 1986-88
Reference Standard: <-2S.D of NCHS standard

Country: Guatemala
Sample Size: not stated
Ages of Children: First-grade primary school-age
Location of Study: not stated
Type: national or regional
Date: 1985-86
Reference Standard: <-2S.D. of NCHS standard

Country: Honduras
Sample Size: not stated
Ages of Children: First-grade primary school-age
Location of Study: not stated
Type: national or regional
Date: 1985-86
Reference Standard: <=2S.D. of NCHS standard

Country: Panama
Sample Size: not stated
Ages of Children: First-grade primary school-age
Location of Study: not stated
Type: national or regional
Date: 1985-86
Reference Standard: <=2S.D. of NCHS standard


Comprehensive text on the prevalence and epidemiology of schistosomiasis in developing countries. Complete with country maps showing areas of study.

Parasites:
Country: Cameroon
Sample Size: 3,533 children
Ages of Children: primary school-age
Location of Study: Yagoua
Type: not stated
Date: 1984
Reference Standard: presence of schistosomiasis

Country: China
Sample Size: not stated
Ages of Children: school-age
Location of Study: Taipen Commune, Shangrao county
Type: not stated
Date: 1981
Reference Standard: presence of schistosomiasis

Country: Ethiopia
Sample Size: not stated
Ages of Children: 9-18 years (school-age)
Location of Study: Harar
Type: not stated
Date: 1961-62
Reference Standard: presence of schistosomiasis
Note: in Gorgora prevalence was 22.8% among school children

Country: Gambia
Sample Size: not stated
Ages of Children: 8-18 years
Location of Study: Bangang region
Type: not stated
Date: 1977

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Reference Standard: presence of schistosomiasis

Country: Libya
Sample Size: not stated
Ages of Children: school-age
Location of Study: not stated
Type: not stated
Date: 1972
Reference Standard: presence of schistosomiasis

Country: Mauritania
Sample Size: 6,540 children
Ages of Children: 6-21 years (school-age)
Location of Study: west, south-east
Type: not stated
Date: 1979-81
Reference Standard: presence of schistosomiasis
Note: range is 1.3 in the west to 62.2 in highly endemic area

Country: Niger
Sample Size: One-half the school-age population
Ages of Children: school-age
Location of Study: 9 localities in Kandadji
Type: not stated
Date: not stated
Reference Standard: presence of schistosomiasis
Note: range is 25-80%

Country: Nigeria
Sample Size: not stated
Ages of Children: 6-17 years (school children)
Location: Ondo
Type: not stated
Date: 1982
Reference Standard: presence of schistosomiasis

Country: Senegal
Sample Size: not stated
Ages of Children: adolescents
Location of Study: endemic area (Wassadou)
Type: not stated
Date: not stated
Reference Standard: presence of schistosomiasis

Country: Somalia
Sample Size: not stated
Ages of Children: 10-14 years
Location of Study: Benadir region
Type: not stated
Date: 1981
Reference Standard: presence of schistosomiasis
Country: South Africa  
Sample Size: 8,200 children  
Ages of Children: school-age  
Location of Study: not stated  
Type: not stated  
Date: 1977  
Reference Standard: presence of schistosomiasis

Country: Sudan  
Sample Size: not stated  
Ages of Children: 6-14 years  
Location of Study: Hibeka near N. Khartoum  
Type: urban  
Date: 1972  
Reference Standard: presence of schistosomiasis  
Note: 80% for boys; 45.5% for girls

Sample Size: not stated  
Ages of Children: school-age  
Location of Study: Ta‘izz and Ibb  
Type: provincial  
Date: in 1980  
Reference Standard: presence of schistosomiasis

Country: Zimbabwe  
Sample Size: not stated  
Ages of Children: 8-10 years (school-age)  
Location of Study: Mashonaland North  
Type: national  
Date: 1981-83  
Reference Standard: Presence of schistosomiasis  
Note: range was 20-60%


Parasites:  
Country: Costa Rica  
Sample Size: not stated  
Ages of Children: 5-14 years  
Location of Study: not stated  
Type: urban and rural areas  
Date: 1969  
Reference Standard: presence of many different parasites  
Urban children with A. lubricoides (30.3%); rural children with A. lumbricoides (31.65%). Urban children with Trichuris trichura (43.8-66.7%) and rural children with Trichuris trichura (56-69%)

Vitamin A Deficiency:

Country: India
Sample Size: 1,336 children
Ages of Children: 6-8 years
Location of Study: schools in Varanasi area of Uttar Pradesh
Type: rural
Date: 1987
Reference Standard: presence of Bitot's spots