41652

Final Evaluation:

HKI Program of Nutritional Blindness Prevention/Control for Drought Victims (Program of Vitamin A Deficiency Control) in Sudan (Specific Support Grant No. DAN-0045-G-55-6011-00

by

David F. Pyle, PhD.
Senior Associate
John Snow, Inc.

Victoria M. Sheffield
Director of Training
Helen Keller International

December 1988

TABLE OF CONTENTS:

Maps
Acknowledgement
Glossary
Executive Summary

I. Introduction 1
II. Background 3

A. Grant Agreement 4
B. Program Start-Up 4
C. Finances 5

III. Ministry of Health Vitamin A Activities 6

A. Northern Darfur Province 6
1. Survey 6
2. Training Materials 8
3. Training of Health Workers 8
4. Findings 10
B. Red Sea Province 10
1. History 10
2. HKI 6-month Action Plan 11
3. Findings 11
C. Other Activities 15
D. Recommendations 16

IV. Refugee Vitamin A Activities 18

A. Situation 18
B. HKI-Supported Activities 19
C. Findings 20
D. Recommendations 22

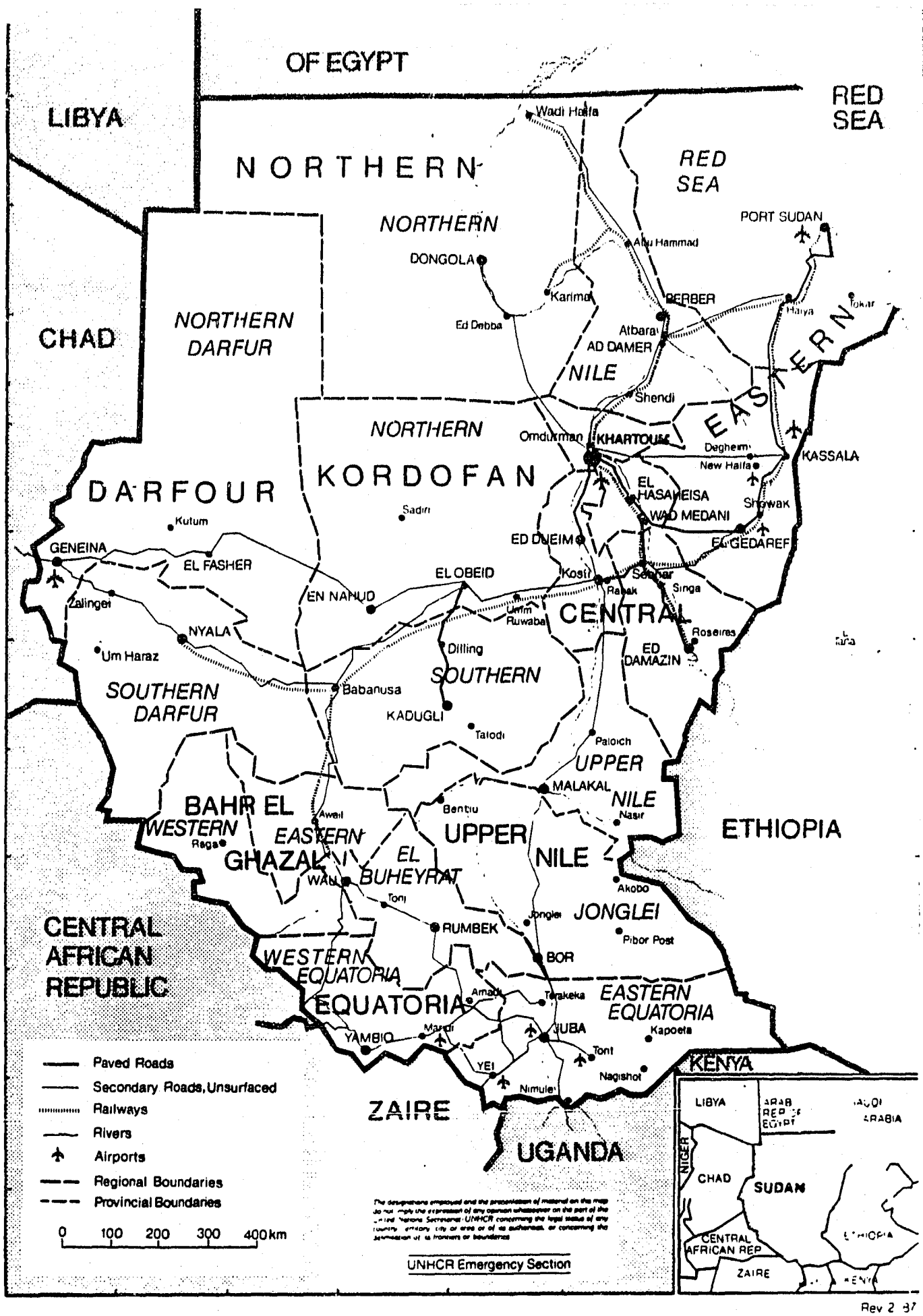
V. Conclusions/Recommendations 24

Bibliography

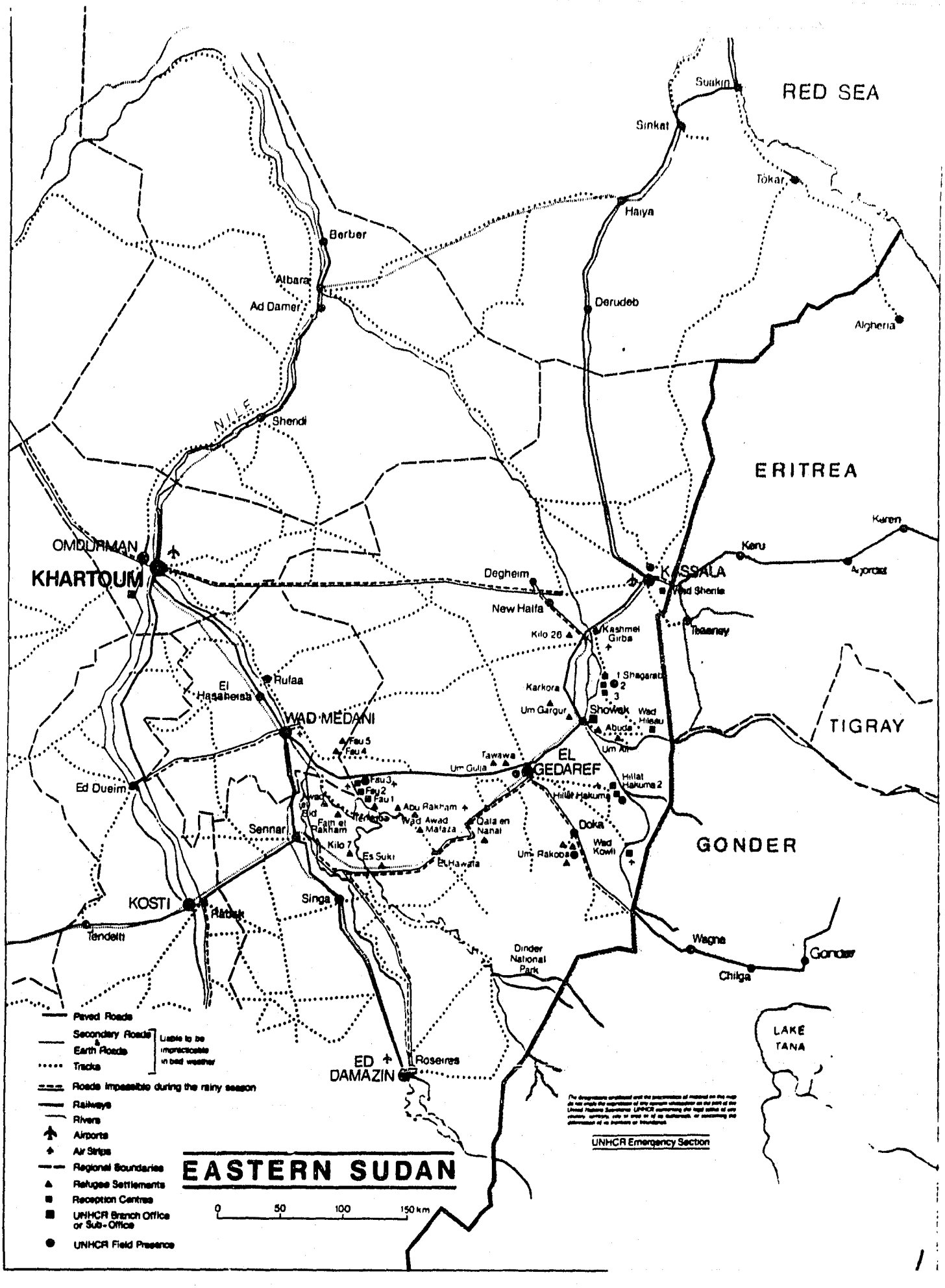
Attachments

I. TERMS OF REFERENCE
II. LIST OF PERSONS CONTACTED
III. PROJECT DESCRIPTION (FROM GRANT AGREEMENT)
IV. PROJECT GOALS, OBJECTIVES AND TARGETS (FROM FIRST ANNUAL REPORT)
V. APPROVAL OF NO-COST EXTENSION
VI. CHILD'S INTERVIEW AND OCULAR EXAM FORMS
VII. PREVENTION OF BLINDING MALNUTRITION: A TRAINING MANUAL FOR HEALTH WORKERS (TRANSLATION)
VIII. SELECTION OF FLIPCHART PICTURES

IX. GUIDELINES FOR PREVENTION OF BLINDNESS DUE TO VITAMIN A DEFICIENCY (XEROPHTHALMIA)
X. AHMED "SHELEIL" AND HIS SISTER "OUM EIOUN" (TRANSLATION WITH ILLUSTRATIONS)
XI. PRE/POST-TEST FOR HEALTH WORKERS RECEIVING VITAMIN A DEFICIENCY CONTROL TRAINING
XII. OUTLINE OF TRAINING COURSE
XIII. VITAMIN A EXTRACT FROM "NUTRITION PROGRAM GUIDELINES" (FOR EMERGENCIES)
XIV. POPULATION AND PVOs RESPONSIBLE FOR REFUGEE CAMPS IN EASTERN SUDAN
XV. "GUIDELINES FOR THE PREVENTION OF VITAMIN A DEFICIENCY AND XEROPHTHALMIA - REFUGEE CENTERS AND SETTLEMENTS"
XVI. "EMERGENCY GUIDELINES FOR THE TREATMENT AND PREVENTION OF XEROPHTHALMIA (VITAMIN A DEFICIENCY)"
XVII. LQAS MONOGRAPH


OF EGYPT
LIBYA
RED SEA
NORTHERN
Wadi Halfa
RED SEA
NORTHERN
PORT SUDAN
Abu Hammad
DONGOLA
Karima
BERBER
Haiya
Tokar
CHAD
NORTHERN DARFUR
Ed Debba
Atbara
AD DAMER
NILE
EASTERN
Shendi
NORTHERN
Omdurman
KHARTOUM
Degheim
KASSALA
New Halfa
DARFOUR
KORDOFAN
EL HASAHEISA
Showak
Sadiri
WAD MEDANI
Kutum
ED DUEIM
EL GEDAREF
GENEINA
EL FASHER
EL OBEID
Kosti
Sennar
Singa
Zalingei
EN NAHUD
Rabak
CENTRAL
Um Ruwaba
NYALA
Roseires
Um Haraz
Dilling
ED DAMAZIN
SOUTHERN
SOUTHERN DARFUR
Babanusa
KADUGLI
Talodi
Paloich
UPPER
MALAKAL
NILE
BAHR EL
Aweil
Bentiu
Nasir
WESTERN
Raga
EASTERN
UPPER
ETHIOPIA
GHAZAL
EL BUHEYRAT
NILE
WAU
Akobo
Toni
JONGLEI
Jonglei
RUMBEK
Pibor Post
CENTRAL AFRICAN REPUBLIC
WESTERN EQUATORIA
BOR
Amadi
Terakeka
EASTERN EQUATORIA
EQUATORIA
YAMBIO
Maridi
JUBA
Kapoeta
Tonj
YEI
KENYA
Nagishot
Nimule
ZAIRE
UGANDA
Paved Roads
Secondary Roads, Unsurfaced
Railways
Rivers
Airports
Regional Boundaries
Provincial Boundaries
0 100 200 300 400 km
The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the United Nations Secretariat/UNHCR concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.
UNHCR Emergency Section
LIBYA
ARAB REP. OF EGYPT
SAUDI ARABIA
NIGER
CHAD
SUDAN
CENTRAL AFRICAN REP.
ETHIOPIA
ZAIRE
KENYA

Rev 2 87


RED SEA
Suakin
Sinkat
Tokar
Haiya
Berber
Atbara
Ad Damer
Derudeb
Algheria
NILE
Shendi
ERITREA
Keren
Keru
Agordat
OMDURMAN
KHARTOUM
Degheim
KASSALA
Wad Sherifa
New Halfa
Kilo 26
Kashmeir Girba
Tsaeney
El Hasaheisa
Rufaa
Karkora
1 Shagarab
2
3
Um Gargur
Showak
Wad Hileau
Abude
Um Ali
TIGRAY
WAD MEDANI
Fau 5
Fau 4
Tawawa
Um Gulia
EL GEDAREF
Hillat Hakuma 2
Hillat Hakuma
Ed Dueim
Fau 3
Fau 2
Fau 1
Abu Rakham
Wad Awad Mafaza
Qala en Nanai
Doka
Wad Kowli
Um Rakooba
Sennar
Fam el Rakham
Kilo 7
Es Suki
El Hawata
GONDER
KOSTI
Rabak
Singa
Tendelti
Wagna
Gondar
Chilga
Dinder National Park
LAKE TANA
ED DAMAZIN
Roseires
Paved Roads
Secondary Roads
Earth Roads
Tracks
Liable to be impracticable in bad weather
Roads impassable during the rainy season
Railways
Rivers
Airports
Air Strips
Regional Boundaries
Refugee Settlements
Reception Centres
UNHCR Branch Office or Sub-Office
UNHCR Field Presence
EASTERN SUDAN
0 50 100 150 km
UNHCR Emergency Section

Acknowledgment

We would like to thank all those who facilitated this evaluation. The list is long as this was really a team effort. The cooperation from all parties involved made it not only possible to complete the task in the limited time allocated, but made it an educational and pleasant assignment.

Special thanks are given to Dr. Kamal, Director of the Nutrition Department, MOH, who gave generously of his time and thoughts during the course of the review. The same must also be said of his able assistants and staff, including Ms. Alawia, Ms. Ihsan and Ms. Durria. In the field Mr. Hasan, the Nutrition Officer for the Red Sea Province and Dr. Rashid, Director General for Health for Darfur, were most helpful in the discussion and tour of the vitamin A program in their respective areas. We are indebted to Dr. Zuhier el Nur, Director of International Health Office, MOH for assisting in the procurement of our visas.

In the refugee program, Dr. Omar, the Medical Coordinator for COR, demonstrated great support and interest in the vitamin A activities. His staff member, Ms. Zarah, who leads the MCH activities was a great help to the evaluation team, especially in the visits to the various refugee camps. The UNHCR Nutritionist, Ms. Rita Bhatia, exemplified the best of international support personnel and provided us with the necessary background and contextual setting which put the vitamin A efforts into perspective. In addition, we appreciate the efforts of all the PVO officials who spent time with us describing their refugee relief efforts.

We must also thank Dr. Solomon Iyasu, Country Director for HKI, who made all the logistic arrangements, generally "made things happen" and accomplished the evaluation team. In the HKI/NY office, Ms. Susan Eastman and Ms. Anne Paxton facilitated matters. Finally, we thank Dr. Anita Markie, USAID/Khartoum Health Officer, who met with the team on several occasions and discussed project activities in the context of broader child survival activities.

GLOSSARY

ADRA -	Adventist Development Relief Agency
AID -	Agency for International Development
ARC -	American Refugee Committee
CARE -	Cooperative for American Relief Everywhere
CHW -	Community Health Worker
COR -	Commissioner's Office for Refugees
EEC -	European Economic Community
farig -	Nomadic Group
HIID -	Harvard Institute for International Development
HKI -	Helen Keller International
IRC -	International Rescue Committee
IU -	International Units
IVACG -	International Vitamin A Consultative Group
JNSP -	Joint Nutrition Support Project
LQAS -	Lot Quality Assurance Sampling
MOH -	Ministry of Health
MVI -	Medical Volunteers International
NGO -	Non-Governmental Organization
PVO -	Private Voluntary Organization
SCC -	Sudan Council of Churches
SCF -	Save the Children
SERISS -	Sudan Emergency Relief Information Surveillance System
UNHCR -	United Nations High Commission for Refugees
UNICEF -	UN Children's Program
VAC -	Vitamin A Capsule
VAD -	Vitamin A Deficiency
VITAP -	Vitamin A Technical Assistance Program
WHO -	World Health Organization

EXECUTIVE SUMMARY

The two-year grant from S&T/Nutrition for Vitamin A Deficiency Control in Sudan (DAN-0045-G-55-6011-00) has made significant progress in advancing the awareness and commitment to vitamin A programming in the country. The grant was originally made to HKI to provide support to the refugees and displaced populations in Sudan. As the situation developed and the HKI program progressed, the effort became more concerned with long-term consciousness raising and capacity building within the Ministry of Health and the Commissioner's Office for Refugees (COR). The most important contribution of HKI was made in the form of developing a vitamin A deficiency prevalence survey methodology, training materials (a manual, flipchart, and illustrated guidelines) as well as emergency and programming guidelines. The materials have been printed and distributed in the two districts where HKI is operating (Northern Darfur and Red Sea) and 346 health workers have been trained in the diagnosis, treatment and prevention of vitamin A deficiency. Post-training test scores improved considerably over the pre-course scores. Site visits made it clear that the health workers appreciated the training, retained most of what they had learned, and had integrated vitamin A knowledge into their work.

As the grant comes to an end, HKI leaves behind a core of health officials in the Department of Nutrition in the MOH who are knowledgeable in vitamin A issues and experienced in operational aspects. In addition, the COR and PVOs working with the refugees in Eastern Sudan have made an impressive beginning in vitamin A programming and have competence to carry out the work in the camps in the future.

While HKI is to be commended for what has been accomplished in vitamin A awareness and capacity building in Sudan over the last two years, a number of recommendations are made that will help the program maintain the momentum that has been developed. The need for a resident HKI adviser cannot be justified, but a number of support activities for HKI remain. The recommendations are divided into short- and long-term activities. The for[illegible] are extensions of current HKI-sponsored activities which can be in[illegible]ded in an additional no-cost extension of the current grant (possibly through mid-1989 if sufficient funds are available). The recommendations include the following:

- assistance in the organization and funding of a national vitamin A workshop to discuss policy and programming issues;
- modification of the training manual to clarify several points;
- printing of 1,000 more copies of the manual, flipchart and guidelines for distribution by the MOH and printing of the manual in Tigrigna for refugee workers in Eastern Sudan;
- publication and testing of the vitamin A story book;
- designing and printing of a vitamin A poster;

- additional and more intensive training emphasizing practical aspects in VAD diagnosis, treatment and prevention with the PVOs working in the refugee camps;

- provision of technical assistance for future vitamin A prevalence surveys.

The longer-term recommendations might be funded from various sources, including VITAP (piggybacking on HKI's technical assistance to U.S. PVOs active in Child Survival in Sudan), USAID (as part of the proposed bilateral Child Survival project), UNICEF (through the JNSP), UNHCR (through support to HKI to provide continuing assistance in vitamin A programming to the refugees). The recommendations include the following:

- formation of a vitamin A unit in the Department of Nutrition (along with training for its head in epidemiology and management) to pursue vitamin A programming;

- provision of approximately three trips a year to provide technical assistance in such areas as survey design and implementation;

- funding to support field activities (per diems and transportation);

- testing of the Lot Quality Assurance Sampling (LQAS) methodology in the refugee camps to determine if it is helpful in establishing levels of VAC distribution;

- inclusion of vitamin A activities in the forthcoming Child Survival Project;

- study of the trachoma problem in the refugee camps to determine if the problem can be addressed and, if so, develop a plan of action.

I. INTRODUCTION

As specified in the Terms of Reference for the Final Evaluation of HKI's Program of Nutritional Blindness Prevention Control for Drought Victims in Sudan (Attachment I), the evaluation team was requested to address two major issues. One focuses on what has been accomplished during the two-year grant (in accordance with objectives, adequacy of support, constraints, sustainability). The second looks ahead at what, if any, support HKI might provide in the future to prevent and identify/treat vitamin A deficiency in Sudan.

At the very beginning attention must be drawn to the variation between what was originally intended for this program and what has actually transpired. As conceived, HKI was to continue the work carried out with funding from the U.S. Foreign Disaster Assistance Office, that is vitamin A deficiency treatment and prevention among the refugee populations in east and west Sudan as well as among displaced Sudanese populations. The project was viewed as relief, and impact was viewed in a short-term perspective. As the program developed and evolved, HKI to its credit has carried out a program which not only achieved the short-term objectives but has developed an institutional capacity within the Ministry of Health which has as good chance of having long-term impact in the country. A capability to deal with vitamin A issues now exists in the Ministry. This evolution is responsible for the confusion over the title of the program; the original grant title of "Program of Nutritional Blindness Prevention/Control for Drought Victims" does not reflect what the project has actually done. Thus a new title "Program of Vitamin A Deficiency Control" is currently being used, reflecting the broader nature of the HKI effort.

The review of Program activities took place between mid-November and mid-December 1988. The core team, consisting of Victoria Sheffield of HKI (Director of Training) and David Pyle (JSI Consultant) each spent a week in country alone with a week in the middle (29 November to 5 December) when they overlapped. Ms. Sheffield visited Northern Darfur Province where she reviewed the training activities while Dr. Pyle did the same in the Red Sea Province. The core team met with Nutrition Department (MOH) and COR/UNHCR officials and visited refugee camps together.

The methodology used in this evaluation consisted of several elements. Program documents were reviewed. This included the grant agreement, annual program reports, survey methodology and findings, trip reports as well as government and COR/UNHCR materials. In addition, considerable time was devoted to interviewing the government officials who had participated in the vitamin A deficiency control program. Officials at HKI and the central, provincial, district, dispensary and primary health care unit levels of the MOH were interviewed (see Attachment II). Community members in Northern Darfur and Red Sea were chosen at random and their knowledge of program activities investigated. Questionnaires have been developed by HKI/NY to determine the effectiveness of their training programs and they were utilized in Sudan as well as part of the evaluation. Separate questionnaires are used for government counterparts, nurses, community health workers and community members.

Site visits to districts and refugee camps where HKI activities have taken place were a vitally important part of the evaluation. Ms. Sheffield visited two areas in Northern Darfur District while Dr. Pyle observed program activities in Sinkat District of Red Sea Province. Discussions at the service delivery point primarily with Community Health Workers made it possible to ascertain the effectiveness of the HKI-supported activities as well as provided an opportunity to identify and explore what type of HKI support might be considered in the future.

The evaluation report will consist of separate chapters on the Nutrition Department and refugee activities. While these two elements of the program have certain similarities, they are administered separately, have different objectives and approaches and, therefore, must be considered as individual components. The final chapter of the report contains conclusions drawn by the evaluation team, recommendation for program improvements and possible directions that might be followed in the future.

II. BACKGROUND

HKI's work in Sudan began in 1985 when the agency provided support to the Commissioner's Office for Refugees (COR) and UNHCR to assist the refugee populations. This was funded by a grant from AID, Office of Foreign Disaster Assistance. HKI's assistance to the refugee effort included a rapid assessment survey to determine prevalence of xerophthalmia. This exercise determined that levels were far in excess of WHO minimum prevalence criteria resulting in HKI providing vitamin A capsules for distribution in refugee reception centers and settlement camps. In addition, HKI developed guidelines for treatment of vitamin A deficiency, provided training materials and conducted training sessions for the international Private Voluntary Organizations (PVOs) and Sudanese health staff responsible for the refugee population.

The early HKI missions to Sudan (January, June and September/October 1985) thought in terms of targeting three population groups for vitamin A prophylaxis and treatment - the refugees in Eastern (from Eritrea and Tigray in Ethiopia) and Western (from Chad) Sudan, Sudanese displaced by drought, and the population of drought-affected Northern Darfur Province.

Among the approximately 24,000 Chadian refugees, the health personnel in the refugee camps were trained in the prevention, identification and treatment of vitamin A xerophthalmia. Xerophthalmia prevalence rates were low, but this was believed to be related to the high mortality rates among the starving people. Because the health and nutrition status was so poor, Vitamin A was still distributed according to the guidelines for prevention of xerophthalmia.

In 1986, all displaced Sudanese camps in Darfur, Kordofan and Red Sea Provinces were closed. This eliminated HKI programming for these groups as well. Surveys of the under age 15 population and pregnant/lactating women in the Eastern Sudan refugee camps during January and July 1985, demonstrated a serious vitamin A deficiency problem. At this time, Sudan had over three quarters of a million Ethiopian refugees, approximately 430,000 in the camps. With HKI support in May and again in September, a total of almost a quarter million capsules (200,000 I.U.) were distributed to children under age 15 and lactating women. This population along with the drought-affected population of Darfur became the focus of HKI attention.

Prior to initiating their Vitamin A Deficiency Control Program in late 1986, a portion of HKI's energies in Sudan were devoted to testing of a liquid vitamin A dispenser. It was thought this would be very useful in servicing large populations; however, the oily base of the vitamin A made this messy and less appealing. They also studied the trachoma problem and explored ways to intervene to respond to this pressing concern. At the same time, HKI held discussions with officials in the MOH, Nutrition Department, UNHCR and the PVOs responsible for service delivery in the Eastern Sudan refugee camps as well as USAID/Khartoum. The consensus was that a genuine need for HKI services existed in Sudan. A proposal for the Nutritional Blindness Prevention Control Program for Drought Victims in

Sudan was drafted by HKI and submitted to AID in March 1986. A two-year grant from AID starting in September 1986 was the mechanism by which this assistance was to be provided.

A. Grant Agreement (September 1986)

The grant agreement (see Project Description, Attachment III) did not include any reference to trachoma since AID did not view it as a Child Survival intervention. Because the funding for the HKI Vitamin A Deficiency Control Program in Sudan was supported out of Child Survival funds, trachoma activities could not be justified despite a severe problem with the disease in the country.

The agreement made reference to two activities which have not been pursued. One was in the area of research, i.e., to determine serum vitamin A levels in children having various deficiency signs. Moreover, various dosage levels were to be given to children with diarrhea to compare serum vitamin A levels. The research was not carried out because of the delay in getting the program underway and the difficulty of collecting and analyzing blood samples in a country like Sudan where transport and communications are so difficult. The Nutrition Department concurred in the scaling down of program activities.

There was also a mention in the grant agreement that HKI would investigate the feasibility and cost-effectiveness of fortifying sugar with vitamin A in Sudan. It quickly became apparent that the processing of sugar (multiple sites) and various irregularities (eg., smuggling) precluded an effective fortification effort.

B. Program Start-Up

While the HKI Country Director arrived in Sudan in mid-September 1986, no agreement was signed with the Ministry of Health until late February of 1987. The primary reasons for the six-month delay were political. This was a period of transition from a military to a democratically-elected government with changes in regulations, directors and organization. Once the government's "Technical Committee" responsible for reviewing PVO program proposals was reconvened, a six-month license to operate was granted and an agreement could be signed with the MOH.

Another reason underlying slow progress in initiating and carrying out program activities is logistic difficulties. This is especially true for the Northern Darfur area. With no paved roads, it takes 6 to 10 days to drive to El Fasher (capital) during the dry season; it is impossible to reach overland during the rainy season. In addition, there is a perennial shortage of fuel and authorization is required to purchase it when it is available. Air travel is unreliable at best and railroads do not exist, therefore are not viable alternatives. Moreover, telephones do not exist or do not function. All this makes it extremely difficult to function in a large country that is three times the land mass of Texas. Because of an established transportation network of planes and vehicles being used by other PVOs and offered to HKI upon request at the time of the proposal submission, HKI had planned to make use of this network in carrying out

activities. However, when the drought was over, many PVOs pulled out of Sudan and others scaled down activities basically stopping this regular transport network greatly affecting HKI's transportation requirements.

The delay in initiating program activities made it necessary to modify program objectives (see Attachment IV, as stated in HKI's First Annual Report). Activities now focused on conducting a vitamin A deficiency assessment survey in North Darfur and to reduce the prevalence of vitamin A deficiency in the target population through the distribution of megadose vitamin A capsules. In addition, health workers in Northern Darfur and the refugee camps of Eastern Sudan would be trained in the detection, treatment and prevention of vitamin A deficiency. Finally, a monitoring system would be developed and put into operation.

Because of the delay experienced in launching project activities, USAID/Washington was requested by HKI to grant a six-month no-cost extension. This was granted (Attachment V), allowing the Vitamin A Deficiency Control Program to continue until the end of February 1989.

C. Finances

The Grant Agreement of September 1986 called for a total budget of $702,006 to carry out the Vitamin A Deficiency Control Program. Of this amount, HKI was to provide $244,174 (or 34.8%). The major line items were salaries and fringe (22.4%), supplies (36.8%) allowances (15.6% and travel (16.6%). [1]

To date the project has spent approximately $30,000 of the $130,000 budget for the last six months of the project (September 1988 to February 1989). The exact figure is not available as all expense reports and costs for wrap-up activities have not been received. Although two and a half months remain in the life of the project, the country director plans to leave at the end of December 1988, thus reducing costs. Other projected project costs are minimal (eg., remaining training sessions in Red Sea Province). It is likely that approximately $50,000 will remain at the scheduled completion date of the project.

---

[1] Money was saved when the Country Director decided against hiring an expatriate project administrator and instead hired a Sudanese administrator. The project has not suffered as a result of this decision.

III. MINISTRY OF HEALTH VITAMIN A ACTIVITIES

During the development stage of the Nutritional Blindness Prevention Program in Sudan, HKI and the Ministry of Health proposed that a vitamin A intervention program would be developed in drought-affected areas of the country. These were identified as Darfur and Kordofan Regions and Red Sea Province. Plans called for the periodic distribution of megadose vitamin A capsules (VAC) to at-risk children using the government's existing health care infrastructure. However, by the time the project became operational (following 6 months for approval by AID and another 6 months to acquire government permission to operate in Sudan) and due to changes in the PVO transportation network described earlier, it became necessary to scale down and revise the HKI efforts. The revised plan of action called for assistance to Sudanese in Darfur Region and technical assistance upon request from regional MOH officials in Red Sea and Kordofan Provinces.

The counterpart for HKI in Sudan is the Director of the Nutrition Department. Three Nutrition Officers have been seconded to work with HKI. All three of the MOH nutrition officers completed the vitamin A training course given by HKI in Khartoum.

Project activities with the MOH have taken place in Northern Darfur Province (population 1,535,526)[2] and in Red Sea Province (population 920,407); they will be described in separate sections of this chapter. The third section of the chapter is devoted to findings regarding the effectiveness of the HKI work in these two areas. Finally, other forms of HKI support to the MOH and other groups is discussed. In Kordofan, the Regional Director of Health Services did not request HKI assistance. The Directors Generals for Health in Sudan act very independently, in a decentralized manner, and in the case of Kordofan, they decided they would do the vitamin A survey on their own. According to those who have seen the results of the survey, their sample was large yet was unrepresentative of the province's population. They did not utilize the survey guidelines developed by HKI in Northern Darfur which not only reduces the validity of their findings but also precludes comparisons.

A. Northern Darfur Province

1. Survey - The first activity planned for Northern Darfur Province was a survey to determine the prevalence of vitamin A deficiency (VAD). The only existing data came for a SERISS survey which included data for six regions in 1986 and 1987. It only identified night blindness in children under five; no ocular examinations were carried out. Night blindness is difficult to quantify, is more subjective and, as a result, is prone to bias. In order to assess the level of xerophthalmia in the province, therefore, it became necessary for HKI to carry out a survey. This would also provide baseline data against which program performance could be

---

[2] 1987 project population in the case of the Red Sea population 38.1% of this figure represents Port Sudan Town Council.

measured. To limit time and financial commitments, a rapid assessment survey was scheduled to be carried out in November/December 1987. This corresponds to the pre-harvest season, the time of highest risk of vitamin A deficiency. A sample of more than 1,900 children under the age of 6 were to be surveyed, divided proportionately between urban and rural populations.

A detailed Operational Procedures Manual was prepared by HKI/Khartoum for the Northern Darfur xerophthalmia assessment. The survey protocol and field manual were developed in June 1987 with the assistance of the HKI/NY epidemiologist. It gave the district-wise breakdown, detailing the number of urban quarters, village councils and farigs (nomadic groups), sample size calculations and random sample design (including alternative sites), survey team members, survey equipment, child interviews and ocular exam forms. Attachment VI provides copies of the two survey forms.

The survey was conducted in 9 sample sites (8 rural and 1 urban) in five of the six districts of the province during February - March 1988. The survey was delayed four months due to the failure of the Darfur MOH to deliver two vehicles. Finally, HKI was forced to send its vehicle from Khartoum while the survey was being conducted.[3] Moreover, poor communications and fuel shortages made it impossible to carry out the survey according to schedule. One district, Kebkabiya, could not be included due to security problems. The survey found 10 cases of nightblindness (rate 0.52%) and one case of Bitot's spots (0.05%). Seven corneal scars were identified, two having been associated with VAD and measles during the drought. When compared with the minimum prevalence criteria established by WHO, the current prevalence of active xerophthalmia was found not to be a significant public health problem in Northern Darfur Province. Although not widespread nor serious during normal times, certain pockets of mild xerophthalmia do exist. Interviews with the mothers revealed a number of different local terms for nightblindness and a high incidence rate during droughts.

HKI and the Nutrition Department of the MOH developed a strategy which relied on the training of local health workers (Community Health Workers - CHWs, Medical Assistants, nurses and health visitors) in the targeted districts. The training would emphasize the recognition, treatment and prevention of vitamin A deficiency by the frontline health workers so that they could respond to emergencies when they arose and distribute prophylactic and treatment dosages of vitamin A as required. Treatment was to be made available at all peripheral health facilities (primary health units) to ensure that VAD could be addressed when and if it occurred. Finally, a monitoring system was required to identify impending famines or man-made disasters which might precipitate an increase in the prevalence of VAD and trigger appropriate control and prevention interventions.

---

[3] Although three vehicles were included in the original HKI proposal and budget, HKI/NY never approved the purchase of more than one vehicle despite requests from HKI/Khartoum.

2. Training Materials - To achieve the objective of developing an institutional capacity to identify, treat and prevent vitamin A deficiency, HKI and the Nutrition Department collaborated in the development of training materials. Three different items were produced and given to each trainer to retain.

- Training Manual: The manual is to serve as the basic textbook and reference for the local health workers. It defines vitamin A deficiency and xerophthalmia, describes the risk groups and contributing factors, identifies eye signs and symptoms, explains the treatment and prevention of xerophthalmia, provides information on nutrition education in prevention of VAD and reviews recording and reporting procedures for vitamin A activities. Attachment VII is a translated copy of the Manual. 1,000 copies of the manual were printed in Arabic in Egypt to save money and improve quality (especially a long-lasting cover).

- Flip chart: This visual aid consists of 19 pictures portraying nutritional blindness and visual impairment. It relates these to consumption of vitamin A-rich foods. It is used by the CHW in the instruction of community members on the prevention and treatment of vitamin A deficiency. Attachment VIII is a selection of the pictures from the flipchart. 1,000 copies of the flipchart were produced.

- Guidelines: This is a concise ready reference on vitamin A deficiency to be used by CHWs and posted in the health care units. It defines xerophthalmia, explains its importance, gives signs and symptoms (illustrated by colored pictures), describes treatment and prevention and lists foods rich in vitamin A. The information is given in Arabic on one side and English on the other (see Attachment IX).

HKI has also developed a story book on vitamin A in Arabic complete with illustrations, entitled Ahmed "Shileil" and his sister Aisha "Oum Eioun" (see Attachment X). It has supposedly been well received in Sudan by those who have seen it, but as yet it has not been tested or printed in volume. The same story developed in Sudan has been utilized by HKI in their programs in Malawi and Niger.

3. Training of Health Workers - The HKI Country Director, with the assistance from the Nutrition Department Officers who had completed the vitamin A trainers' course, trained three Ophthalmic Medical Assistants at the CHW School in El Fasher in Northern Darfur as trainers in vitamin A detection, treatment and prevention. These workers were seconded to the project by the Director General of Health in Darfur Region who has primary responsibility for overseeing project activities, assigning and supervising

MOH personnel and management project funds for activities in the region. They in turn toured five districts of the province training 207 community health workers, medical assistants, nurses and health workers. No village midwives were trained. El Geneina District, in the southwestern corner of the province, could not be reached due to inaccessibility caused by heavy rains. Table I gives a breakdown of the health workers trained by district:

Table I

Number of Health Workers Trained in Northern Darfur Province
(by district)

District	CHWs	MAs	Nurses	HV	Total
El Fasher	35	28	1	15	79
Kebkebia	28	9	3	0	40
Kuttom	18	13	3	1	35
Um Kedada	23	13	1	0	37
Mellit	5	10	1	0	16
TOTALS	109	73	9	16	207

CHW= Community Health Worker
MA= Medical Assistant
HV= Health Visitor

As standard practice, pre- and post-tests (consisting of 20 questions) were administered to the trainers. In the Northern Darfur Province average pre-test scores improved by almost a third in the post-test. Attachment XI is a copy of the pre/post tests administered to the trainers. Table II gives the results by district.

Table II

Pre/Post Test Scores of Health Workers Trained in
Northern Darfur Province
(by district)

District	Pre-test Score	Post-test Score	% Improvement
El Fasher	12.4	17.9	44.4%
Kebkebia	14.5	17.9	23.4
Kornoy	12.4	15.9	28.2
Kuttom	15.4	18.1	17.5
Seraf Omra	17.6	19.9	13.1

4. Findings - The targets established during the first year for Northern Darfur Province included both vitamin A coverage and training activities. In the former, HKI expected to reach 60% coverage in the first cycle of mass dosing. In addition, 90% of all health facilities in the province were to have adequate and timely supply of vitamin A capsules. However, because the survey found little evidence of xerophthalmia, and the decision was made not to initiate a vitamin A supplementation program, these two elements were no longer valid.

The target for training, however, is valid. HKI was to train over 90% of the community health workers, medical assistants and nurses. According to HKI records and site visit verification, all the targeted health personnel at the service delivery level have been trained and have a highly satisfactory level of knowledge on the diagnosis, treatment and prevention of vitamin A deficiency. Logistic problems (roads closed due to rains) precluded training of the health staff in El Geneina District.

Generally, the health staff members in Northern Darfur found the training and associated materials to be very good. An outline of the 3-day training course can be found in Attachment XII. A minor concern was raised about the manual which had two diagrams reversed and some paragraphs out of place. This was due to the fact that they were printed in Egypt and it was not possible to proof the final layout before printing. The flip chart was used and appreciated as part of the training process, by the trainers as well as the trainees. However, it was not being used by the CHWs in community education. In fact, CHWs rarely do community education and because VAD is not a major problem in the area, it is not a priority. As a result, villagers interviewed had not heard of vitamin A. They did know however, about "jahar", the local term for night blindness, but did not know that it was caused by lack of vitamin A nor that it can be cured by eating Vitamin A rich foods. Some mothers thought that milk cured "jahar" because children got "jahar" during the drought when the animals died and milk was not available.

The delay in carrying out the survey in Northern Darfur raised a potential problem. It was originally scheduled for the pre-harvest (hunger) season (November-December) but was carried out in February (post-harvest). Intuitively, one would assume this would give results that did not reflect the actual situation.

More importantly, the delay in the survey meant the training was carried out prior to knowing the survey findings. Training could have been tailored to survey findings if they had been available. In fact, there is a good possibility the training resources would have been placed elsewhere where the problem of vitamin A deficiency was greater. Nonetheless, considering that pockets of VAD were identified in Northern Darfur and that droughts are cyclical, raising the awareness of vitamin A in the province and instructing health workers how to identify, treat and prevent VAD was worthwhile.

B. Red Sea Province

1. History - While vitamin A deficiency has been known to exist in the Red Sea Province for some time, the drought of 1983/84 made it a priority health problem that needed to be addressed as part of the general nutritional relief and rehabilitation program in the province. The MOH and Oxfam initiated a vitamin A capsule distribution program through the government health service infrastructure (dispensaries, health centers and to some extent primary care units). Problems arose because health workers were not trained in the identification, treatment or prevention of xerophthalmia and the program was poorly coordinated and monitored. The capsule distribution program ended in 1987 when the MOH and collaborating PVOs disagreed over how the program was to be run.

2. HKI 6-Month Action Plan - To rectify the problem, HKI wanted to determine the extent and location of the VAD problem, train the workers to treat and control it, and develop a reporting system. In April 1988, two nutrition officers from the Nutrition Department in Khartoum visited the Director of Health Services for the Red Sea Province and explored possibilities of initiating a VAD intervention program. They agreed in principle that a survey was required to determine the magnitude and geographic distribution of xerophthalmia in the province. At the same time, the local MOH staff had to be trained in the recognition, treatment and prevention of VAD. Based on the survey results, a strategy would be developed. A six-month support project was drafted to carry out these steps.

The Action Plan for the six-months of support activities, written collaboratively with the Provincial health staff, was divided into two phases. Phase I (July - September 1988) was to consist of the Training of Trainers, two from each of the eight districts. Secondly, a vitamin A deficiency prevalence survey was to be developed, data collection teams trained and mechanics tested. During Phase II (last quarter of 1988) they were to carry out and complete the assessment survey, analyze its data and write-up the findings. In addition, district level training of health workers was to be completed by the district training teams. Finally, the intervention strategy was to be developed.

3. Findings - The survey design, sample size determination and random sample selection for the Red Sea Province was developed at the same time as the Northern Darfur survey. However, due to a lack of cooperation of the Director of Health for the Province who withdrew his verbal agreement to the scheduled activities, the survey has been delayed. No teams have been trained for data collection to date. When the Director for Health asked when it would be possible to carry out the assessment, the answer was after Ramadan, sometime in May of 1989. January/February was not considered possible due to planning exercises which will dominate people's attention. The director complained that 45 days is more than he can afford to let his officials be away from their jobs. The HKI representative assured him that it was possible to halve the amount of time required.

More progress was made in the training of the district trainers. The two nutrition officers from the Nutrition Department of the MOH in Khartoum visited Port Sudan during the first half of August and gave 16 trainers four days of training. The trainers consisted of dispensary inspectors (9), medical assistants (4), CHW tutors (3). The pre-test scores improved 24.8% in the post-test where the average score was 18.6 (out of a possible 20).

The trained trainers then carried out one round of training of health workers in their respective districts. Because no health workers were trained in Port Sudan urban areas, only seven training sessions were held. The list of workers to be trained by district and position is provided in Table III.

Table III
Number of Health Workers to
to be Trained in Red Sea Province
(by District)

	MAG	MAE	Nurses	Health Visitors	CHW's	Total
S. Tokar	6	1	6	-	42	54
N. Tokar	2	-	2	1	26	31
Sinkat	3	1	1	2	37	44
Haya	4	-	3	-	28	35
Derudeb	2	-	2	-	24	28
Halaib	5	-	6	1	28	40
P. Sudan R.	5	-	7	-	28	40
P. Sudan T.	13	11	18	19	5	66
TOTAL	40	13	45	23	218	284

*SOURCE: MOH - Port Sudan (1988).

MAE = Medical Assistants - Eye
MAG = Medical Assistants - General

The persons interviewed who had been trained by the Nutrition Officers from Khartoum had a high regard for the manner in which the sessions were conducted. The only minor complaints heard were that the women were young and assumed they knew considerably more than the older men being trained. More importantly, a comment was made that the training was strong in the theoretical aspects and less strong in the practical/operational side. It was difficult to find cases with the various stages of active xerophthalmia for the trainees to examine and identify the status for themselves; cases

of VAD usually only exist in the villages, and the perennial problem of lack of transport makes it difficult to locate/transport them to the training site or to take the trainees to the village.

A total of 139 health workers were trained in the 7 sessions. The pretest scores indicate that the information had been transferred as the mean score rose from 14.2 to 18, an increase of 26.8%. Table IV summarizes the dates of training, the number of trainees by category, pre/post test scores and percentage increase, and number remaining to be trained.

Table IV

Pre/Post-Test Scores of Health Workers
Trained in Red Sea Province
(by District)

District	Date of Training	Number Trained		Mean Test Scores			# to be trained
		MA	CHW	Pre	Post	% Incr.	
Halaib	20-23 Sep	2	18	10.9	15.5	42.2	20
Derudeb	10-12 Sep	-	14	13.8	18.1	31.2	9
N. Tokar	24-26 Sep	4	16	14.5	18.4	26.9	11
Haya	27-29 Oct	-	20	14.3	18.8	31.5	15
Sinkat	17-19 Nov	-	20	15.4	18.8	22.1	24
S. Tokar	24-26 Nov.	3	17	NA	NA	NA	34
Port Sudan Rural	26-28 Nov	-	20	16.5	18.1	9.7	20

The remaining 133 health workers will be trained early in 1989.

In a site visit to Sinkat District, the local health workers that were trained by the district level trainers were knowledgeable on the various aspects of identification, treatment and prophylaxis of vitamin A deficiency. They all had the materials (the manual, flipchart and guidelines). Several of the primary health units had the guidelines mounted on the wall. One enterprising CHW had two copies of the flipchart hanging in his unit, one turned to the picture illustrating nightblindness, the other to the illustration of the vitamin A-rich foods. He did not say how he had procured a second copy, but he said that these two pictures were the most important ones to convey the message about nutritional blindness. The same CHW reinforced the message of proper diet during his home visits. His effectiveness was demonstrated by the fact that husbands complained that their wives were spending too much on vegetables at the market. Once the CHW got through lecturing them on the importance of these foods, they too became converts!

The health workers visited were also following recording/reporting instructions as given in the training course. For example, a Medical Assistant was keeping outpatient records. Although case definition left something to be desired, the Medical Assistant at Arkowit Dispensary began recording vitamin A deficiency cases in his outpatient register classified by sex and age, after he had completed the vitamin A training course in early August. From mid-August through the end of November, he had identified 99 cases.

In terms of ways to improve the materials and training, several issues were raised. For one, there was not enough practical training. Again the difficulty of locating cases with VAD close to the training site was mentioned. Secondly, there was not a clear idea of why megadose vitamin A was not given to the pregnant women or only once to the lactating women. One CHW was continuing to provide VACs to lactating women so that their breast-fed babies would receive a vitamin A supplement. The danger of the mother being in the early stage of pregnancy was not evident to the CHW. In addition, the desire for a poster portraying vitamin A deficiency that could be displayed in primary health units, schools, shops, etc. was mentioned. Some innovative health workers are using the guidelines and flipcharts in just such a way at present, apparently with some success.

One problem in Sinkat arose when the ophthalmic Medical Assistant was not chosen as a district Trainer. Unfortunately, he was not available at his post when the Provincial Health Director chose the district trainers. He is very experienced and knowledgeable on vitamin-A related eye problems. Because he was not included as a trainer, his cooperation (e.g., finding cases of VAD to use in the practical training) was not forthcoming. Moreover, training him would have helped institutionalize vitamin A deficiency diagnosis, treatment and prevention in the district. Only one other district has a medical assistant for eyes. He also was not chosen as a district trainer. The district-level officials who select the district-level trainers could have improved the effectiveness of the program by including the existing ophthalmic MAs as district trainers.

Generally, the approach of training district trainers in the Red Sea Province was found more efficient than having a central team train health workers in each district as was done in Northern Darfur. The former approach also increases the possibility of institutionalization since each district has two qualified trainers who can reinforce the training in the future with periodic in-service training sessions and field supervision.

The approach of training two trainers from each district is a significant improvement, more expeditious and cost-effective, over the strategy used in Northern Darfur. If the Red Sea approach had been employed in North Darfur, the sixth district could have been covered since they would not have had a provincial team going from district to district and logistic concerns would have been eliminated. HKI learned from this experience and modified their approach, reducing the time required and limiting the amount of movement needed to get trainers from district to district. The tradeoff is less supervision and control by the Nutrition Office, but the site visit to Sinkat demonstrated that the district-level trainers had done a good job in transferring the information on the diagnosis, treatment and prevention of vitamin A deficiency. Hence the

alternative approach proved to be an improvement. An additional advantage is that several health staff members are now available at the district level to monitor and reinforce vitamin A activities in the future; moreover, if any emergency were to arise, they could be mobilized. A final consideration is logistic ease; by scheduling the training sessions for the end of the month when workers from the outlying posts have to come to the district hospital to collect their pay, transport costs and time away from post can be minimized.

C. Other Activities

In addition to the specific provincial support activities in Northern Darfur and Red Sea, HKI has played a general facilitating role which has increased the awareness and support for vitamin A programming in Sudan. In the mid-1980's when HKI first began working in Sudan, the country was not considered to have a significant vitamin A deficiency problem. It is now widely recognized that not only does Sudan have a problem, but approaches are available and tested in Sudan to address it.

One way that the vitamin A consciousness has been raised in Sudan is by HKI sponsoring the participation of leading Sudanese health officials in international vitamin A meetings. For example, HKI sponsored the Director of the Nutrition Department so that he could attend the 10th International Vitamin A Consultative Group (IVACG) meeting in Addis Ababa in 1987. In addition, at the recommendation of HKI, UNICEF sponsored the deputy director of the Nutrition Department to attend the same meeting.

HKI also provided technical and training assistance during the floods of August 1988. HKI assisted the Nutrition Department in the preparation of the "Emergency Nutritional Resource Operating Plan of Action" providing guidelines on vitamin A distribution. One page of a 14-page booklet labelled "Nutrition Emergency Guidelines" was included on vitamin A (Attachment XIII). This included the blanket distribution of one megadose of vitamin A to children under five and treatment (3 doses) for children with signs of xerophthalmia, measles, severe malnutrition or chronic diarrhea. In addition, HKI provided 440,000 megadose capsules, including the first 40,000 capsules from in-country stock, for emergency distribution.

Finally, HKI serves as an advisor on vitamin A matters for any group interested in initiating vitamin A activities in Sudan. Although not in HKI/Khartoum's scope of work to assist U.S. PVOs implementing Child Survival projects, they have been willing to help when requested.[4] CARE, for instance, has requested HKI's assistance in designing a survey of vitamin A deficiency prevalence (at the same time as its EPI coverage survey) in its Child Survival program in two districts of Kordofan and assistance in training its workers. These are the two aspects upon which

---

[4] HKI has a centrally-funded project (Vitamin A Operational Assistance Project) to assist U.S. PVOs having Child Survival projects in 6 countries of Africa but Sudan is not one of them. Sudan, however, is included as a country to receive assistance under the recently granted VITAP.

HKI has focused attention in its work with the Nutrition Department and for which HKI has well established and tested approaches/materials. HKI also hopes to work with ADRA in the Northern Region, but definite plans or strategy have not yet been developed. In addition, HKI has worked closely with the Medical Volunteers International (MVI) who have a health project in one district of Red Sea Province. HKI views these efforts as ways of introducing vitamin A activities into areas where they have not existed before.

D. Recommendations

HKI has succeeded in developing an institutional capacity in the Nutrition Department to address vitamin A concerns in Sudan. The director and several of his staff take a real interest in and demonstrate a commitment to continuing vitamin A activity. With HKI assistance, training materials, methodologies and procedures have been developed and carried out by departmental staff. The need for assessment surveys is now realized by the Nutrition Department, and several individuals are now familiar with data collection and analysis technologies. To the country Director's credit, this has been achieved without salary supplements, the most common way for donor agencies to gain cooperation. HKI has, very justifiably, paid full expenses not covered by the limited departmental budget and which otherwise would have to come out of the worker's own pocket. With this institutionalized capability, there is no longer a need for HKI to maintain a resident advisor in Khartoum. However, it is apparent that support will be required in the future, primarily in the following areas.

- Seminar: There has been considerable work done in vitamin A in Sudan since 1985 by different agencies. There is a need to hold a national seminar where all those with experience in vitamin A (service, diagnosis, treatment, prevention) and the health directors from all the regions/provinces can come together and discuss vitamin A programming. The objective would be to share knowledge and develop greater uniformity of approach utilized by the various organizations.

- Materials: Additional copies of the Manual Flipchart and Guidelines will be required as vitamin A activities are expanded. First, the existing materials, especially the Manual, should have a few minor changes made (e.g., explanation of why pregnant women must not be given megadoses of vitamin A and why lactating women receive only one dose within a month of delivery; a mention of the morbidity/mortality reducing possibility to strengthen interest/commitment to vitamin A programming). Finally, a poster on vitamin A deficiency is needed (possibly depicting common symptoms such as nightblindness and showing readily available, affordable foods that can prevent vitamin A deficiency); support will be required for the design and printing.

- Technical Assistance: The need for periodic (approximately three visits a year) technical assistance will be required to assist the Nutrition Department and various regions to carry out vitamin A program activities. Of greatest importance is assistance in the design and conducting of xerophthalmia prevalence surveys. Guidelines for the surveys should be developed, and published by HKI to serve as a guide, covering such issues as design, sampling, random selection, data collection, questionnaires, logistics, data processing). In addition , funds to carry out such surveys (e.g., per diem, transport fund, data processing) will be required.

- Training: Training following the Red Sea approach (training two officials per district as trainers) will be required in additional provinces. Financial support will be required to fund the expenses; the Nutrition Officer training team (2 persons) and the transport, per diem, and the incidental cost of the training sessions themselves.

- Program Support: Funds to cover full operation (per diem for both training and survey work) will have to be continued since the budget of the Nutrition Department is not able to cover such expenses. In addition, small amounts for such things as printing, stationery and data processing will also be required.

IV. REFUGEE VITAMIN A ACTIVITIES

A. Situation

In 1984-85 there was a huge influx of Ethiopian refugees into Eastern Sudan. There was a high prevalence of xerophthalmia associated with malnutrition, measles and diarrhea. HKI carried out assessments of the refugee population during 1985 and found the prevalence of xerophthalmia far in excess of WHO criteria for a significant public health problem. Table V gives prevalence rates in selected camps in Eastern Sudan in four separate surveys in 1985 to 1987.

Table V
Vitamin A Deficiency Signs
(1985-87)

	Who Criteria	1/85*	7/85**	2/87***	3/87****
No. of Children (1-15) Examined		1191	451	621	2081
Bitot's spots (%)	0.5	2.4	7.3	5.3	4.0
Corneal xerosis (%)	0.01	1.7	1.3	0.03	NA
Corneal Scar (%)	0.05	2.4	1.8	2.6	3.2

* Carried out in Wad Kowli and Wad Sherefe
** Carried out in Fau II, Wad Kowli, Wad Sherefe; also found 14.3 % of lactating women sampled (63) had Bitot's spots, 0% had corneal xerosis, 7.9% had corneal scar.
*** Carried out at Fau II and Shagarab II; in Fau II, found 10.5% of pregnant (N = 19) and 6.1% of lactating women (N = 49) had Bitot's spots. There were no corneal xerosis but 5.3% of pregnant women and 8.1% of the lactating women had corneal scar.
**** Carried out in Shagarab II and Safawa

The high prevalence rates prompted HKI to develop a program with the Commissioner's Office for Refugees (COR) and UNHCR. Originally this included the Chadian refugees in Western Sudan as well, but when the prevalence of xerophthalmia there was found to be low, this component was dropped.

One very important contribution made by HKI was the development of vitamin A guidelines. During the height of refugee influx, the prescribed procedure was to give all children under 15 years of age a dose of 200,000 I.U. upon registration and every three months thereafter. Children under

one received 100,000 I.U. HKI was able to standardize dosages. Prior to this, agencies were dispensing varying dosages (e.g., 5,000, 20,000, 25,000, 40,000, 50,000 I.U.s).

B. HKI - Supported Activities

Responding to the problem found in the camps, HKI developed a three-pronged project:

- supply of megadose vitamin A capsules every three months to children under 15 and lactating women;
- train PVOs delivering services to diagnose, treat and prevent vitamin A deficiency;
- develop a monitoring/reporting system for vitamin A activities.

The number of refugees in the camps has dropped from a high of over 450,000 several years ago to approximately 230,000 in 32 camps today. A portion of the original population has returned to their homes while others have moved out of the camps to other locations in Sudan. The current refugee population is divided in two ways - reception centers (5 with almost 74,000 people) and settlements (26 with almost 163,000 people). Attachment XIV gives the population at each camp and the PVO responsible for the respective camps.

In January 1988, 49 people working with the refugee populations in Eastern Sudan received four days of training in the identification, treatment and prevention of vitamin A deficiency. Forty-two of the participants were from the nine PVOs [5] responsible for delivering services in the refugee camps. Two more were from UNHCR and five from COR.

The training in the refugee camps consisted of only one day which did not allow for practical field work (especially the identification of vitamin A deficiency signs). The information used for training and given to those trained to take with them is found in the "Guidelines for the Prevention of Vitamin A Deficiency and Xerophthalmia - Refugee Centers and Settlements," produced by HKI.

This 9-Page English handout (Attachment XV) gives the information required by the health workers to carry out vitamin A activities in their respective camps. It also served as a basic reference tool for the workers as they trained their staffs in vitamin A identification, treatment and prophylaxis. A shorter 3-page version "Emergency Guidelines for the Treatment and Prevention of Xerophthalmia (Vitamin A Deficiency)" was also

---

[5] The PVOs are: American Refugee Committee (6), Christian Outreach (3), International Rescue Committee (8), Lalmba (7), League of Red Cresent & Red Cross (2), Rada Barnen (2), Save the Children U.S. (3), Sudan Council of Churches (6), Swiss Red Cross (5).

prepared by HKI (Attachment XVI). The main difference in an emergency situation is that prophylactic doses are distributed every 3 months to all children under the age of 15. The child receives the first dose upon registration along with a measles immunization. This differs from a regular program which is every six months to children under 6 years old.

C. Findings

The targets established by HKI for its refugee program are divided into two elements, vitamin A capsule distribution and training. In the former, HKI aimed to achieve over 90% coverage of the target population in these refugee camps with megadoses (200,000 I.U.) vitamin A capsules. While the situation differed from camp to camp, it was clear that some PVOs were not distributing vitamin A capsules on a regular basis, and overall this target was not being reached. Vitamin A coverage figures for February and June 1988 show two (out of 25 camps reporting) with over 90% coverage. Both these were in camps run by Christian Outreach. A visit to the three camps under their control made it clear why their coverage was so good. They have a very well managed domiciliary outreach program in which each Home Visitor (responsible for 90 families) visits regularly and is charged with distribution of vitamin A capsules to those under six, in the appointed month. The system is a good example of the classic primary health care outreach approach, well supervised, supported and managed.

Two other groups reported coverage figures in the 80s, six in the 70s, six more in the 60s, one in the 50s, four in the 40s, one in the 30s, two in the teens and one below 10% coverage. One explanation given for the lower than expected coverage was the survey methodology. The surveyor asked for the Road to Health Card where the vitamin A capsule distribution was to be indicated. If no card could be produced in a particular home or if the vitamin A distribution was recorded in some other manner (e.g., in a register), it was counted as not having received vitamin A. Thus, it is reasonable to assume that the coverage figures are conservative and represent considerable under reporting.

More disturbing are the PVOs which are not distributing vitamin A capsules. Several explanations are given. One is that the person(s) trained in vitamin A deficiency diagnosis, treatment and prevention has been transferred. Considerable staff turnover takes place in the refugee camps. There has not been any additional training since January, meaning that the PVO is left without a vitamin A-trained person. Without this orientation, commitment and expertise, the vitamin A component of the health program is sometimes dropped.

A second reason is that in some camps, two PVOs provide health services. Responsibilities are split, divided into such activities as under five OPD, MCH, supplementary feeding, well-baby clinics. The vitamin A activity sometimes gets lost in such cases. No one takes explicit responsibility for it, thus, no one distributes the vitamin A capsules. These problems were found in one of the five camps visited by the evaluation team.

The second target of HKI in its refugee program is to have 100% of the camps maintain regular and adequate vitamin A capsule supplies. This did not seem to be a problem. While HKI has provided over 300,000 megadoses of vitamin A capsules in the last two years in support of the refugee program, at present all but two of the PVOs were receiving megadose vitamin A capsules from their respective organizations. The others could get them from COR/UNHCR buffer stocks. In other words, with very little assistance from HKI, this target was being achieved.

It is difficult to assess whether the training target (90% of refugee health workers will attend at least one training session on vitamin A) has been achieved. While a minimum of two representatives from each of the participatory PVOs were involved in the January vitamin A training session carried out by HKI, there is no way to know how many of the PVO health staff members they have trained. In addition, two PVOs (InterAid-having two camps and YMCA-having one) did not participate in the vitamin A training workshop in January for no specified reason. From our site visits and interviews, it is clear that 100% coverage has not been achieved; in one PVO the medical examiners were not able to identify the signs of vitamin A deficiency or give the proper treatment dosages. This was a case where vitamin A was not being distributed and those trained in January had been transferred. The ability of COR to carry out training in and monitoring of vitamin A activities is severely constrained by the lack of qualified personnel. The Health Director and the person responsible for MCH services are good and very supportive of vitamin A activities, but are unable to devote the time required. The MCH coordinator has all child survival activities (CDD, EPI maternal, nutrition, health education, etc.) under her and cannot be expected to devote great amounts of time to any one intervention. What is required is a health training unit made up of two or three persons who would train PVO staffs in vitamin A amongst other things. The same is required for monitoring. A person who would maintain a surveillance on the delivery of child survival services like vitamin A and follow-up lagging performance when it is reported or when no reports are submitted. The difficulty of getting health staffers to come and work in Eastern Sudan was raised. While acknowledging the difficulty, the need cannot be denied. There is also a problem with transport; however, COR has a large number of vehicles - it is a matter of how they choose to allocate them.

Another problem arising with the monitoring system is the precise definition of xerophthalmia signs and how they should be counted. The number of cases reported from the various camps varies tremendously. One reason is that some PVOs report Bitot's spots and corneal scars (found most often in the older age groups) on a repeated basis. Since corneal scars and some Bitot's spots do not respond to treatment, the number of corneal scars reported becomes cumulative and, as a result, misleading as an indicator of currently occurring vitamin A deficiency cases. If signs are not reported separately, they should at least have corneal scars separated out from the rates for other active signs if those rates are lumped together.

Finally, it became clear from the meeting of PVO health workers that there was little standardization in their vitamin A activities. For example, the target group ranged from under five year olds, to under sixes,

to under tens, to under fifteens. Agencies change the guidelines at their own discretion based on the strategies of health providers and individual service delivery approaches. This sometimes varies according to mode of distribution with those using mass campaigns and home visitors to distribute to under sixes and those employing MCH or under five clinics to reach children under age five years only. The guidelines are clear and should be followed so that there is uniformity among all the PVO-supported refugee health programs.

D. Recommendations

The refugee program is functioning fairly effectively. Awareness of vitamin A deficiency exists at COR/UNHCR and among most of the PVOs. Moreover, the training capacity and ability to respond to emergency situations has been institutionalized at COR as well as in most of the PVOs working in the refugee camps. Several actions, however, could improve the effectiveness of the program.

- Materials: The COR/UNHCR want to translate the HKI-developed vitamin A manual in the local language of the refugees (in most cases this is Tigrigna) and have copies produced for the refugee health workers. They are willing to translate the manual if someone could support the printing costs.

- Training: There is an obvious need to conduct another training course for new PVO health managers, for those PVOs not receiving training, and as refresher training for those who have received the short introductory vitamin A course. In addition, there is a need to provide a more specialized course (3-4 days) in which a limited number of PVO health workers (possibly one per PVO) would receive intensive training in identification of xerophthalmia signs. Emphasis should be placed on practical field training. The HKI curriculum used in Northern Darfur and Red Sea could be adapted for refugee use.

- Personnel: Although not within the scope of HKI funding, it is imperative that several staff members be added to the COR maternal child health staff to facilitate training and monitoring capacities, including vitamin A activities. This would assure follow-up of lagging PVOs and standardization of vitamin A activities.

- Prevalence Survey: TA is required to help COR carry out a vitamin A deficiency prevalence survey to ascertain the current status of the refugee population.

- Monitoring System: A clear definition must be established as to what cases are reported in the monthly forms. To eliminate the repeated reporting of corneal scars and unresponsive Bitot's spots, for example, only "new cases" should be reported. This will eliminate those cases which do not respond to vitamin A treatment.

- Simplified Monitoring Methodology: Technical assistance should be provided in a simplified methodology to determine vitamin A capsule coverage in the refugee camps. One approach is Lot Quality Assurance Sampling (LQAS) which can determine whether a predetermined level of coverage has been achieved by surveying a very small number of cases.

- Trachoma: The PVOs expressed concern over the high rates of trachoma among the refugee population. A prevalence survey in March 1987 (by David Heiden, Proctor Foundation) found that 21% of those examined from the general population in one camp and 60% in another suffered from active trachoma. Among healthy children in an orphanage, and Koranic and elementary schools in three camps, the rates of active trachoma were very high; out of a total sample of 1171 children, 279 (23.8%) had mild cases while another 295 (25.2%) had moderate/ severe cases. This means that slightly less than half the sample examined suffered from trachoma. With trachoma being excluded from HKI's soon to be completed project and with vitamin A deficiency being more under control at present in the camps, the consideration of the treatment and prevention of trachoma can be justified. An intervention should include the provision of antibiotic (tetracycline) eye ointment, development/production of hygiene education materials and training. But, because so much of the long-run success of a trachoma program depends on proper environmental sanitation, hygiene and sufficient water supplies, no actions should be taken before COR/UNHCR launches serious efforts in these regards.

V. CONCLUSIONS/RECOMMENDATIONS

HKI's Program of Vitamin A Deficiency Control in Sudan has made impressive progress toward realizing its objective of creating an awareness of the vitamin A deficiency problem in the country while developing a capacity to deal with it. It has developed, produced and distributed effective training materials, developed a capacity to train local health workers and personnel in the refugee camps of Eastern Sudan, developed a methodology for vitamin A deficiency prevalence surveys and completed one such survey, and developed guidelines for emergency vitamin A programming. The HKI Country Director has achieved this with a combination of professional competence, perseverance and diplomacy, in close cooperation and collaboration with the Nutrition Department of the MOH and his counterparts in COR/UNHCR. HKI is to be commended for its performance particularly in view of the extremely difficult times being experienced in Sudan - the refugees from two neighboring countries, hundreds of thousands of displaced Sudanese due to drought and civil unrest, a change in political leadership and the ever-present difficulties associated with operating in Sudan (tremendous distances, lack of communications and transport facilities).

HKI has established a credible foundation for effective vitamin A programming in Sudan. When its current grant comes to an end, HKI will leave behind an awareness of and commitment to vitamin A programming as well as such material support as a vehicle (plus spare parts), office furniture and equipment (typewriter, photocopier and slide projector for training). However, a few relatively minor modifications are recommended and future support will be required if the progress made and momentum developed is to be sustained. The recommendations are divided into two categories: the first set consists of short-term issues which concern modifications of the present program and relate mainly to the comments found in the chapters on the MOH and refugee programs, respectively; the second category involves longer-range issues which the next phase of vitamin A programming in Sudan might consider.

A. Short-Term Recommendations:

It is suggested that the short-term recommendations can be supported by the funds remaining in the two-year grant. It is recommended that an additional no-cost extension of three months be approved by AID to permit the funds to be utilized and the following recommendations carried out.

1. Seminar/Workshop: Considerable progress and work in vitamin A programming has been made in Sudan since mid-1985. There is a need for those involved in vitamin A efforts to share knowledge and to make sure that regional/provincial-level decision makers are aware of various aspects of vitamin A programming (survey methodology and findings, training materials and techniques, diagnosis/treatment/prophylactic guidelines).

2. Manual: Minor modifications should be made on the training manual before reprinting. These include (1) revisions (i.e., changing the order of a few graphics and paragraphs); (2) explaining why megadoses of vitamin A must not be given to pregnant women and only once to lactating women (within a month after delivery); (3) adding monitoring instruction (e.g., do not continue to count corneal scars and Bitot's spots if they do not respond to treatment).

3. Additional Copies: As planned, 1000 more copies of the manual will be produced and left for the Department of Nutrition to distribute to other provinces (e.g., Kordofan) and institutions (e.g., nursing schools, NGOs). In addition, COR/UNHCR expressed interest in translating the manual (plus flipchart and guidelines) into Tigrigna for use in the Eastern Sudan refugee camps. Support should be provided to print several hundred copies of the translated version.

4. Storybook: A limited edition (i.e., 1000 copies) of the Arabic story on vitamin A should be printed and tested in local schools, both urban and rural.

5. Poster: A need was identified for a poster on vitamin A deficiency for distribution to health centers, schools and shops. The poster would create awareness of the problem and reinforce the messages provided by the local health workers. They would be pictorial with no or minimal copy, as in the case of the illustrations in the flipchart.

6. Training: Additional training is required in the refugee camps to cover newly arrived PVO personnel and those not having received the vitamin A course. In addition, more intensive field training in identifying and treating clinical signs of VAD should be conducted for the medical examiners.

7. Surveys: Technical assistance will be required from HKI to carry out the proposed/delayed vitamin A deficiency prevalence survey in Red Sea Province. In addition, financial support to cover expenses in the field (fuel, per diems) will be required. In the refugee program, another prevalence survey is required to ascertain the current level of xerophthalmia.

B. Long-Term Recommendations

Some programming needs will require more time than can be accommodated within the proposed life of HKI's current vitamin A grant. Several possibilities exist for sources of support for these longer-term activities. One is the proposed Child Survival Project USAID/Khartoum is planning for FY 90. Another is to piggyback technical assistance provided to PVOs in Sudan under the recently funded HKI grant, Vitamin A Technical Assistance Program (VITAP). A third possibility is a small grant from USAID/Khartoum to fund on-going support by HKI to the Department of Nutrition and UNHCR to assist COR to assure that the progress made to date is maintained and, when possible, extended. Finally, UNICEF, directly or through the Joint Nutrition Support Project (JNSP) which is currently operating in the Red Sea Province and has just been extended for three years, may also be a source of support for vitamin A programming. Specific HKI activities that can usefully be part of a long-term strategy include:

1. Formation of Vitamin A Unit: The Department of Nutrition has developed expertise in vitamin A programming. This should be institutionalized as a separate small core unit within the Department. Several trainers and a survey specialist will be required to continue the efforts initiated by HKI. The head of the unit is likely to need training in epidemiology (intensive short course) and perhaps management. The unit would identify problems, develop proposals, seek funding, plan and facilitate surveys, organize training sessions and workshops, and oversee integration of vitamin A into child survival interventions.

2. Technical Assistance: Approximately three visits per year by HKI experts should be planned for over the next three-year period. In general these visits would provide technical support, monitor activities and guide such field exercises as prevalence surveys.

3. Field Support: A relatively small amount of funds will be required to support full activities so that vitamin A programming can be spread to other areas of Sudan. The most pressing needs would be to cover the field costs (transport and per diems) of surveys and training efforts.

4. Village Midwives: The Department of Nutrition requested that the village midwives receive an abbreviated version of the vitamin A training in districts where other health workers are trained. This is considered a worthwhile addition since this cadre of workers is in closest contact with the mothers and can have maximum impact on nutrition education and referral.

5. Monitoring tool: The Lot Quality Assurance Sampling (LQAS) methodology to determine if predetermined levels of vitamin A capsule distribution have been attained should be tested in Sudan, especially in the Eastern Sudan refugee camps. A copy of a monograph on the approach is provided as Attachment XVII of this report.

6. COR personnel: There is a pressing need to add to the MCH/Nutrition capability at COR. The MCH/Nutrition Coordinator is unable to cope with all the responsibilities with which she is presently tasked. She requires two trainers who would train PVO and camp health staffs on Child Survival interventions including vitamin A. Secondly, the MCH/Nutrition unit should have a person responsible for monitoring and follow-up of poor performance in Child Survival programs, such as vitamin A. Although HKI would not be able to fund such additional staff, this recommendation is made to stress the importance of COR allocating some of its resources to up-grading MCH/Nutrition capability through increased staff.

7. Child Survival Project: It is important that the vitamin A activities developed under HKI assistance be integrated into any Child Survival effort carried out in Sudan. It should be part of EPI (ensuring that infants receive at least one megadose of vitamin A); CDD/ORT (all children with severe diarrhea lasting more than three days given one megadose of vitamin A); the treatment of measles and severe malnutrition; training curricula for health workers; health/nutrition education (importance of vitamin A and vital importance of the early introduction of Vitamin A rich solid foods); and any mass media health/nutrition education campaign.

8. Trachoma: The high prevalence of and the concern in the refugee camps about trachoma should be addressed. The first step would be a prevalence survey and strategy development exercise. The second step is to determine if COR/UNHCR are willing/able to make a commitment to improve the environmental sanitation, hygiene and water situation to a point where a trachoma control program makes sense. If these steps are taken, HKI should develop a training/treatment program for trachoma, emphasizing the importance of health education and good hygiene. The supply of antibiotic eye ointment could be provided by the

PVOs or UNHCR. Any patient requiring trichiasis/entropion surgery would have to depend on a referral center as this is beyond the scope of any HKI support. Such an effort would have to be coordinated with the Trachoma Center at the Eye Hospital in Khartoum.

In addition, it is recommended that HKI work with Dr. Kamal and his staff at the Department of Nutrition on advice with Dr. Anita Mackie of USAID/Khartoum to propose vitamin A activities for the newly established Vitamin A Unit that might be supported by the Child Survival Grant slated for FY90. Specific strategies should address recommendations 1 through 8. Moreover, as HKI now has an in-depth knowledge about VAD and its patterns in Sudan, specific strategies can be defined and proposed for this grant. Examples include the following:

1. Identification of areas of the country which are vulnerable to serious prevalence rates of xerophthalmia during times of environmental stress or civil unrest. Monitoring of these areas should be on-going with institution of activities to address serious problems should they arise.

2. Identification of areas where the land and water supplies make home gardening a viable option for the general population. Specific strategies such as technical assistance in horticulture and social marketing should then be proposed.

3. The Department of Nutrition is well equipped to provide training about vitamin A foods, recipes, and weaning practices. A program which addresses such training strategies for various areas of the country and specific tribes (within their cultural practices and resources) should be designed and instituted.

4. Dr. Kamal, who is closely affiliated with the nutrition education programs at the three universities in Khartoum, can assist the Vitamin A Unit to work closely in developing collaborative activities utilizing university students in field work and other activities. Such collaboration is in the interest of sustainability and further creating an awareness of the importance of the vitamin A initiatives that are taking place is Sudan.

ATTACHMENT 1

SUDAN
TERMS OF REFERENCE
FINAL EVALUATION
PROGRAM OF VITAMIN A DEFICIENCY CONTROL

Consultant: David Pyle, Ph.D.
John Snow, Incorporated

Location: Khartoum, Sudan

Responsibilities of Consultant:

1. Assess with Country Director and Department of Nutrition counterparts the project's success in meeting revised project objectives as stated in Year One Annual Report.

2. Outline project components which may be sustainable within the resources of the Department of Nutrition, the regional Ministry of Health infrastructure in Darfur and Red Sea Provinces and the UNHCR/PVO relief infrastructure.

3. Document the amount and adequacy of project inputs in terms of money, materials, and manpower.

4. Document and assess project technical support from HKI/New York and plans for future technical input into project activities with the MOH and with the UNCHR/PVO Community.

5. Document obstacles faced by HKI/Sudan in meeting project objectives (i.e., infrastructural, counterpart support, logisticals, financial, policy-related and/or other).

6. Recommend strategy for future involvement of HKI in Sudan.

Final Evaluation Document:

A final project evaluation report will be prepared in draft form and submitted to both the USAID Mission and the HKI Country Director prior to the end of the consultancy. A final draft will be prepared and revised together with HKI New York staff. The evaluation report will cover all aspects outlined above.

ATTACHMENT II

LIST OF PERSONS CONTACTED

Ministry of Health

Dr. Kamal Ahamed Mohammed	Director, Nutrition Department
Alawia el Amin	Deputy Director, Nutrition Department
Ihsan Ahmed Hassan	Senior Nutrition Officer, Nutrition Department
Durria Mohammed Osman	Senior Nutrition Officer, Nutrition Department
Dr. El Rashid el Mubarak	Director General for Health, Darfur Region
Dr. Omer Abdella el Faki	Director General for Health, Red Sea Province
Hassan Teyfour	Director Officer, Red Sea Province
Mohammed Yousif Ibrahim	Senior Medical Assistant, Sinkat
Mahajoub Mohammed Nur	Ophthalmic Medical Assistant, Sinkat
Tahir Onur Tahir	CHW Tutor, Port Sudan
Sheikh Mohammed el Sheskh	CHW, Sinkat Town
Abu Mohammed Ahmet	CHW, Samat, Sinkat District
Gamadir el Sheikh	MA, Arkowit Dispensary, Sinkat District
Ahmet Bakash	CHW, Heal Geet Tomsha, Sinkat District

USAID/Khartoum

Dr. Anita Mackie	Chief, Health/Nutrition/Population Office

HKI

Dr. Solomon Iyasu	Country Director
Ismail Dahia	Administrator
Abdella Ibrahim Salim	Vitamin A Program Coordinator & CHW Tutor, El Fasher (Northern Darfur)

Commissions' Officer for Refugees (COR)

Hassan Mohammed Osman	General Project Manager, COR/Eastern Region, Showak
Dr. Omer Mekki	Medical Coordinator, Showak
Zarha Mirghani	MCH/Nutrition Coordinator, Showak
Afaf Omer	Statistician
Ali Khalifa	Project Manager, Um Gargur & Karkora
Dr. Yasir Abdoun	Physician, Um Gargur
Dr. Bahaeldin Hamza	Physician, Karkora

Private Voluntary Organization (PVOs)

Hadish	PHC Coordinator, SCC/Gedaref
Dahabi	Leader Medical Programs, Um Gargur
Jose Ortiz	Project Manager, SCF (US)
Sarah Corlett	Medical Coordinator, Christian Outreach, Shagarab I, II, III

Emma Roberts	Christian Outreach, Shagarab I, II, III
Tsegay Halle	Medical Examiner, Christian Outreach
Wolde Georgis	Feeding Center Coordinator, Christian Outreach
Zerai Estafores	Statistician, Christian Outreach

Harvard Institute for International Development (HIID)

Dr. Penelope Nestel	Vitamin A Project Coordinator, Kartoum

UNHCR

Dr. Bertrand Desmoullin	Medical Coordinator
Rita Bhatia	Nutrition Advisor

ATTACHMENT III

TWO YEAR PROGRAM OF NUTRITIONAL BLINDNESS PREVENTION CONTROL FOR DROUGHT VICTIMS IN SUDAN

Program Description

The two year program described in Helen Keller International's (HKI) Project proposal of March 1986 will serve the need for vitamin A supplementation measures to prevent and treat nutritional blindness among the children of Ethiopia and Chadian refugees and Sudanese nationals living in the province of Darfur. Technical assistance will also be provided to agencies active in the Kordofan and Red Sea Provinces. The need for such a program is well documented in reports of HKI's medical teams which visited Sudan in January and May 1985 to assess the extent of vitamin A deficiency among Ethiopian and Chadians living in refugee camps in Sudan and Sudanese nationals living in drought-striken northern regions. With a grant from the Office of Foreign Disaster Assistance, HKI began work with the refugee populations in early 1985 providing megadose vitamin A capsules, training, and training materials.

Children up to age 15 in the project areas will be the primary beneficiaries of this project until such a time as HKI medical personnel assess the situation of emergency (necessitating the inclusion of children over age five) to be over. Nutritional blindness among pregnant and lactating women will be monitored as well since evidence of severe vitamin A deficiency in these groups was seen by the HKI teams.

The main aim of the program will be the delivery of vitamin A capsules (for the prevention and treatment of nutritional blindness) to children of the population groups mentioned above. In the refugee camps, HKI will continue to work with health personnel affiliated with UNHCR, PVOs active in relief work, the Sudanese Commission of Refugees and the Sudanese Relief and Rehabilitation Commission. In Darfur Province, HKI will integrate its activities with those of USAID's Rural Health Support Project which works in collaboration with provincial health authorities, UNICEF, and other PVOs.

In order to achieve its objective of reducing vitamin A deficiency in these areas, HKI plans the following activities:

1) In cooperation with the Ministry of Health's Nutrition Department, HKI will conduct training

sessions for PVO health staffs working with refugees and displaced persons, and also for various levels of Ministry of Health workers both at the central level and the regional level.

2) HKI will design, develop, produce and field test training materials related to xerophthalmia, its treatment and its prevention.

3) On-going survey and evaluation activities will be accomplished to monitor the rates of xerophthalmia in the areas served by the project.

4) In the area of research, the MOH Nutrition Department requests that HKI provide technical assistance to do studies on the relationship of serum vitamin A levels in children and adults complaining of night blindness, children and adults with Bitot's spots, children with diarrhea, and pregnant and lactating women who have signs and symptoms of xerophthalmia. The nutrition staff under the direction of the head of the Nutrition Department and the HKI medical advisor will study various dosage delivery regimens to children with diarrhea to compare serum vitamin A levels.

5) As HKI has had experience in other countries with the research to fortify certain commonly eaten foodstuffs, HKI staff and the Nutrition Department will investigate the feasibility and cost-effectiveness of fortifying sugar in Sudan.

This project will be supported by a field team consisting of a third country national physician with public health training and experience, and a project administrator.

1. PROJECT GOAL

The goal of this two year program for the prevention and control of vitamin A deficiecy is to reduce nutritional blindness among drought affected sudanese and refugee populations in Sudan.

2. PROJECT OBJECTIVES.

1. To conduct a baseline assessment survey in N. Darfur
2. To reduce the prevalence of vitamin A deficiency in the target populations.
3. To deliver VAC to government and non government agencies in program areas for distribution. Design an efficient distribution system to all health facilities in project areas.
4. To train peripheral health workers in the detection, treatment and prevention of xerophthalmia.
5. To put in place a simple recording and reporting system for the monitoring of VAC use in project areas.
6. To increase awareness of the problem in the public and the government health system.

TARGETS.(by end of Year II)

1.VAC coverage:

-over 90% coverage with VAC in refugee camps.

-60% coverage with VAC in N.Darfur in the first cycle of mass dosing.

-over 90% of all health facilities in N.Darfur will have adequate and timely supplies of VAC.

-100 % of refugee camps/settlements in eastern sudan will have adequate and timely supplies of VAC.

2.Training:

-over 90% of the community health workers, medical assistants and midwives will be trained.

-over 90% of refugee health workers will attend atleast one training session.

TARGET POPLATION GROUPS.

Refugees: Ethiopian and Chadian.

Sudanese: North Darfur province.

Target Age groups:

Children under age six.

Children above six years of age and pregnant/lactating women will be monitored.

ATTACHMENT V

MODIFICATION OF GRANT

DUNS NO. 00-091-6312

1. Modification Number	2. Effective Date of Modification	3. Grant No.	4. Effective Dat of Grant
01	Sept. 1, 1988	DAN-0045-G-SS-6011-00	September 01, 198

5. Grantee: (Name and Address)

Helen Keller International
15 West Sixteenth Street
New York, New York 10011

6. Administered By:

Agency for International Development
Office of Procurement
OP/W/FA:ERW
Washington, D.C. 20523

7. PIO/T No.: 931-0045-6361261, A1
Appropriation No.:72-1161021.3
Allotment Symbol:643-36-099-00-20-61
Budget Plan Code:DDAA-86-13600-AG11
Amt. Oblig. Prior to this Mod.$457,832
Amt. Oblig. by this Mod. -0-
Total Obligated Amount $457,832

8. Previous PIO/T's:
931-00415-6361261

9. Description of Modification:

A. The purpose of this Modification is to extend the estimated completion c of activites through February 28, 1989, at no additional cost. Accordingly, the Grant is modified as follows:

1. Cover Page:

Paragraph 2 - Delete "August 31, 1988," and substitute "February 1989

(Continued Page - 2 -)

10. AID TECHNICAL OFFICE: S&T/N

11. This modification is entered into pursuant to the authority of the Foreic Assistance Act of 1961, as amended. Except as herein provided, all term: and conditions of the Grant referenced in Block #3 remain unchanged and in full force and effect.

12. Grantee is required to sign this document and return 7 copies.

13. GRANTEE:

BY: [signature]

NICHOLAS J. PIMA, JR.
(Name typed or printed)

TITLE: DIRECTOR OF FINANCE

DATE: OCTOBER 11, 1988

THE UNITED STATES OF AMERICA
AGENCY FOR INTERNATIONAL DEVELOPM

BY: [signature]

Jay M. Bergman
(Name typed or printed)

TITLE: Grant Officer

DATE: 9/30/88

4147n,p22

2. Article B. - Period of Grant
Delete "August 31, 1988" and insert February 28, 1989."

3. Article D - Financial Plan
Delete "Total FR: 9-1-86 TO: 8-31-88" and insert "Total FR: 9-1-86 TO: 2-29-89."

4. Except as indicated herein, all other terms and conditions of the Grant remain unchanged.

ATTACHMENT VI

Child's Interview Form

Name of Region: _____

Name of District: _____

Name of Village Council, Urban Quarter or Farig

_____

(check one) _____ VC=0 _____ UQ=1 _____ F=2 [ ] 1

What is your / the child's mother name (triple name)?

_____

What is the name of this child (triple name)?

_____

Child's Code: _____ [ ][ ][ ]

How old this child _____ Years _____ Months [ ][ ]

Is this child a boy or a girl?
(check one) _____ M=0 _____ F=1 [ ]

How are you related to this child?
(check one) [ ] : Mother =0 _____ Other=1 [ ]

In the past two weeks, has this child had severe Diarrhea, that is more than 3 loose watery stools for at least 24 hours?
(Check one) _____ N=0 _____ Y=1 [ ]

In the past two weeks, has this child had fever?
(check one _____ N=0 _____ Y=1 [ ]

In the past two weeks, has this child had measles rash?
(check one) _____ N=0 _____ Y=1 [ ]

In the past two weeks, has this child had cough?
(check one) _____ N=0 _____ Y=1 [ ]

Does this child have Nightblindness?
(check one) _____ N=0 _____ Y=1 [ ]

Has this child received a Vitamin A Capsule in the past 6 months?
(check one) _____ N=0 _____ Y=1 _____ DK=8 [ ]

OCULAR EXAM FORM

Absent=0 Present=1 Uncertain=8

		Right	Left	
16.	Bitot's Spots	_____	_____	
17.	Corneal Xerosis	_____	_____	
18.	Ulcer/Keratomalacia	_____	_____	
19.	Corneal Scars	_____	_____	IF YES GO TO 20
				IF NO GO TO 22

20. From the child's history, what was the age at occurrence of the corneal scar(s)? _____Years _____Months

21. Based on the clinical history and the lesions seen:

a. Right Eye: Is scar related to VAD or measles?
_____N=0 _____ Y=1

b. Left Eye: Is scar related to VAD or measles?
_____N=0 _____ Y=1

23. Hand Movements:

_____ Yes=0
_____ No: blind from trauma/injury=1
_____ No: blind from infection (sick eye)=2
_____ No: blind from measles=3
_____ No; inferonasal blind=4
_____ No: other=7

ATTACHMENT VII

PREVENTION OF

BLINDING MALNUTRITION

A Training Manual

for Health Workers

Ministry of Health
Nutrition Division
Khartoum, Sudan

Helen Keller
International
Khartoum, Sudan

Will be printed in Arabic.

55

PREVENTION OF

BLINDING MALNUTRITION

Table of Contents:

I. Introduction

II. Vitamin A Deficiency and Xerophthalmia

- A. Definitions
- B. At Risk Groups and Contributing Factors
- C. Eye Signs and Symptoms
- D. Field Trip - Practical Session
- E. Treatment of Xerophthalmia
- F. Prevention of Xerophthalmia

III. Nutrition and Public Education

IV. Recording and Reporting

Prevention of

Blinding Malnutrition

A Training Manual

for Health Workers

I. Introduction

The purpose of this training program is to help you to understand well the problem of blinding malnutrition. It is a condition which results from malnutrition, and it can lead to blindness in children. Vitamin A and foods containing vitamin A can prevent blindness caused by malnutrition.

This program will teach you which people are in danger of blinding malnutrition. You will learn how to recognize the eye signs and symptoms of blinding malnutrition. Also, you will learn how to treat and to prevent blinding malnutrition.

Your role as health workers gives you great responsibility for the health of the people in your communities, especially the children. You are the first health workers that the people come to see when they have an illness. Also, you provide care to keep children healthy. By recognizing, treating, and preventing blinding malnutrition, you will provide a great service to save the sight of the children in your area.

II. Vitamin A Deficiency and Xerophthalmia

A. Definitions.

1. Vitamin A.

Vitamin A is needed so that the body can grow and remain healthy. The eyes use vitamin A to see at night when there is very little light. The tears need vitamin A so that they can keep the front of the eye wet and bright and healthy.

Foods which are rich in vitamin A are dark, leafy green vegetables such as mollokhia and girgir. Yellow vegetables such as carrots and yellow pumpkin. Fruits such as mango and papaya. Animals sources rich in vitamin A are milk, eggs, liver, meat, and small fish. Fish oil and red palm oil are also rich in vitamin A.

Every day, the body uses some of the vitamin A eaten in foods. The rest of the vitamin A that is not used is stored in the liver. Vitamin A that is stored in the liver can be used when the need for vitamin A is great or when a child is not eating enough foods with vitamin A. If a child cannot eat some vitamin A foods every day, the child will start to take vitamin A from the liver store. The vitamin A stored in the liver will last for about 4 to 6 months only. That is why children must eat some vitamin A foods every day so that the vitamin A in the liver can remain to be used only when the need is great.

2. Vitamin A Deficiency.

Children must get some vitamin A every day from the foods that they eat. If they do not eat some foods with vitamin A every day, they begin to use the vitmain A that is stored in the liver. Soon, they develop vitamin A deficiency from lack of vitamin A. Children with vitamin A deficiency are malnourished. Also, they are at risk of blindness from malnutrition.

3. Xerophthalmia.

"Xerophthalmia" is the medical word which describes the group of eye signs and symptoms caused by vitamin A deficiency and malnutrition. In this program, we will not use this word "xerophthalmia", but you can know it. Instead, we will call this "blinding malnutrition.

B. At Risk Groups and Contributing Factors.

Certain groups of people are at more risk of blinding malnutrition than other groups. We will now discuss the groups of people that are at the highest risk of blindness from malnutrition.

1. Malnourished children.

Children who are always malnourished are lacking in many vitamins. They do not eat the proper foods and they do not get foods which contain vitamin A. After some months, this lack of vitamin A can affect the health of their eyes. Malnourished children who do not get foods with vitamin A are at a high risk of blindness from malnutrition.

2. Weaning children aged 6 months to 2 years.

Infants who are breast-feeding get a lot of vitamin A from breastmilk. However, they are growing very fast and when they become 6 months old, other foods must be added to the diet. Breastmilk alone is not enough for the growing infant. If mother adds only millet, maize, or dura, the infant is at risk of blindness. This is because grains do not have vitamin A. Certain fruits and vegetables contain vitamin A. These must be added to the infant's diet. Weaning children aged 6 months to 2 years are at risk of blindness if they eat only grain foods. Fruits and vegetables with vitamin A must also be added.

3. Children with measles and diarrhea.

A child with vitamin A deficiency has a low store of vitamin A in his/her liver. Also, the tears are not good tears because they lack some of the oils that are provided by vitamin A. When the tears are not good, the eye can become dry and at risk of blindness.

Measles causes fever. When there is fever, the body uses more vitamin A. The need is great and the body must go to the liver for more Vitamin A. If the liver store is low, the body quickly lacks vitamin A completely. Now, the eyes can become very dry and weak. Also, the measles virus can attack the dry, weak eyes and cause blindness. Many children become blind when they get measles together with vitamin A deficiency.

Fever can accompany diarrhea and cause the body to use more vitamin A. Also, children do not keep most of the nutrients from the foods they eat because they lost them with the diarrhea. If the vitamin A store in the liver is low, the child with diarrhea can quickly use all of the vitamin A from the liver. Also, the child cannot keep vitamin A from the foods because he has diarrhea. If the vitamin A quickly goes from the body, the eyes can become dry and weak. Children who with diarrhea, especially many times, are at risk of blindness because of vitamin A deficiency.

4. Poor children up to age 6 years.

Children up to age 6 years need more vitamin A because they are growing faster than older children. Poor families in the towns and the rural areas cannot afford to buy fruits and vegetables containing vitamin A. Also, cannot afford to buy milk, eggs, or meat to give to the children. If they have cows and chickens, they often sell the milk and eggs to make money. Poor children up to age 6 years are at risk of blindness due to malnutrition because their families cannot afford to buy vitamin A rich foods.

5. Children up to age 6 years at pre-harvest time.

Vegetables containing vitamin A are available and affordable to all of the people in January, February, and March. Fruits containing vitamin A are available and affordable in May, June, and July. Children can eat these fruits and vegetables and replace vitamin A in their liver stores.

In November and December before the harvest of the fruits and vegetables, children have little vitamin A remaining in their liver stores. If they are mainourished, or if they get measles or diarrhea, they are at great risk of blindness due to vitamin A deficiency.

6. Drought victims.

a. Sedentary.

People affected by drought can develop vitamin A deficiency simply because vitamin A foods cannot grow and are not available. Some few vitamin A foods that are available become very expensive and people cannot afford to buy them.

b. Nomads.

Nomads depend on meat and milk from their animals for vitamin A. In drought, most of the animals die. Also, the men move the animals to greener areas where there is also water. Often, the women and children are left behind in areas where there are food supplies. However, they only eat grains and they do not eat fruits and vegetables with vitamin A because it is not in their way of life.

7. Pregnant and lactating women.

Pregnant women need to eat a balanced diet rich in foods containing protein, iron, and vitamins, especially vitamin A. This is because they are eating for themselves and for their growing babies.

Lactating women need to eat a balanced diet in the same way and especially rich in vitamin A. This is because they are eating to feed themselves and to feed their growing babies. Breastmilk is the only source of vitamin A for the newborn babies.

Pregnant and lactating women need more vitamin A because they are eating for themselves and for their babies. If they are malnourished, their babies will be born malnourished and their babies will be at risk of blindness from malnutrition.

8. Female illiteracy.

Mothers who have been to school can read posters and books about good nutrition and good health. They often gather together and share ideas that they have learned from books and from meetings with the local health workers. Children of illiterate mothers are at a higher risk of malnutrition because mothers have not learned about balanced diets and the importance of foods containing protein and vitamins, especially vitamin A.

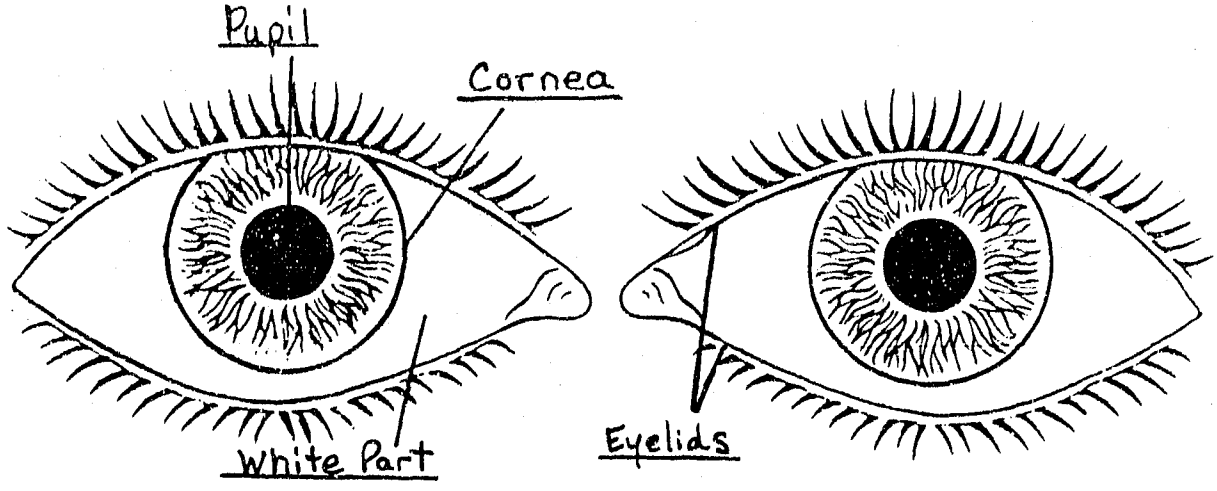
C. Ocular Signs and Symptoms.

We must know the parts of the eye so that we can tell the signs of blinding malnutrition. First we will learn the four rules for a normal, healthy eye:

1. Four Rules for a Normal, Healthy Eye:

1. The cornea should be clear.
2. The pupil should be black.
3. The white part should be white.
4. The eyelids should open and close properly.

Below is a diagram of the parts of the front of the eye. You will also see the "conjunctiva". The conjunctiva is a clear covering of the white part of the eye. When the conjunctiva is clear and normal, the white part remains white.

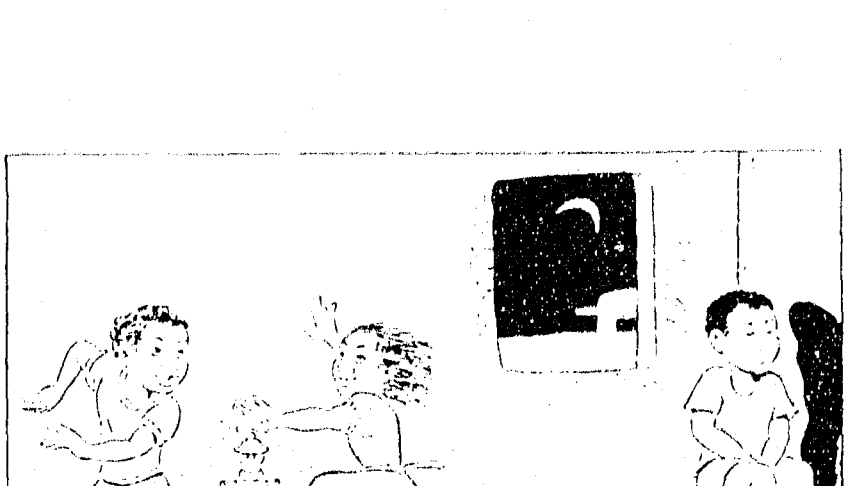


2. Signs and Symptoms.

a. Night blindness.

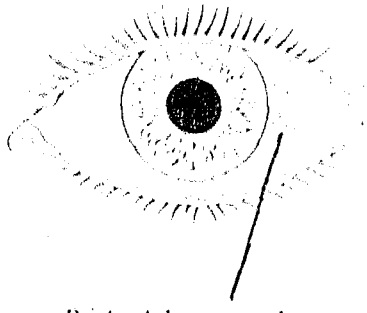
Night blindness is the first change in the eyes that is caused by vitamin A deficiency. It is a symptom because the patient complains that he cannot see well when the light is gone.

Mothers will tell you that their children refuse to play or to eat or to read after the sun is gone. If the house is dark, they cannot see unless they are very close to the light. They often fall over small stools or boxes because they cannot see them.



<u>The child sits alone in the corner because he cannot see well enough to play in the evening.</u>

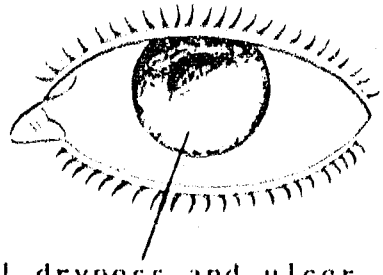
b. Bitot's spots.



Bitot's spots

Bitot's spots are small shiny white patches that appear on the white part of the eye. They can look like bubbles from soap or "cheesy" ("jibna") spots on the white part of the eyes. Bitot's spots are a sign of vitamin A deficiency which is affecting the eyes.

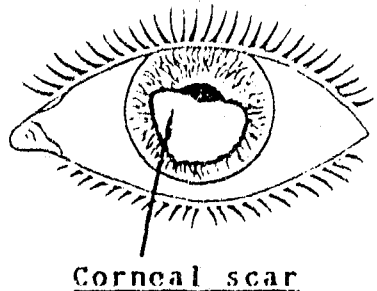
c. Corneal dryness/ulcer/wasting.



Corneal dryness and ulcer

The healthy cornea is clear, shiny, and bright. This is because healthy tears containing oils keep the cornea wet and bright. If there is vitamin A deficiency, the tears are not good and the cornea becomes very dry. If the child becomes very malnourished, or if he gets measles or diarrhea, an ulcer can come on the cornea and make the cornea white. This leads to blindness because the cornea should be clear.

d. Corneal scar.



Corneal scar

After an ulcer in the cornea heals, a scar will remain. If the ulcer was small and the eye was treated early, then a small scar will remain. If the ulcer was large, then a large scar and blindness will remain.

D. Review the Ocular Signs and Symptoms of Blinding Malnutrition.

Remember how to look at the parts of the eye and the Four Rules for a Normal Healthy Eye:

1. The cornea should be clear.
2. The pupil should be black.
3. The white part should be white.
4. The eyelids should open and close properly.

Remember the signs and symptoms of blinding malnutrition:

1. Night blindness

   The first symptoms of changes happening in the eyes.

2. Bitot's spots:

   Shiny white patches on the white part of the eye. They can look cheesy or like small soap bubbles.

3. Corneal dryness/ulcer/wasting:

   The cornea is dry and dull. An ulcer may show and the cornea appears soft.

4. Corneal scar:

   A corneal ulcer has healed leaving a blinding scar on the cornea.

Remember the groups of people who are at risk of blinding malnutrition:

1. Children up to age 6 years, especially weaning children and very poor children.
2. Malnourished children.
3. Children with measles and severe diarrhea.
4. Children during pre-harvest time.
5. Drought victims.
6. Pregnant and lactating women.

E. Treatment of Xerophthalmia

The eye signs and symptoms of blinding malnutrition and vitamin A deficiency are treated with recommended high doses of vitamin A. The standard high dose is 200,000 International Units (I.U.) This vitamin A is available as a capsule. Each capsule contains 200,000 IU of vitamin A. It is also available in liquid form. Each milliliter (ml) contains 200,000 IU.

Children who have signs and symptoms of blinding malnutrition (xerophthalmia) or measles should be treated with three doses of vitamin A.

****

Recommended Dosage:

Today - 200,000 IU vitamin A capsule or liquid

Tomorrow - 200,000 IU vitamin A capsule or liquid

Two weeks later - 200,000 IU vitamin A capsule or liquid

Children under age 1 year should be given half the dose (100,000 IU each dose).

Children with measles, give the treatment dosage of three doses of vitamin A.

Lactating women: give one dose of 200,000 IU vitamin A immediately after delivery or during the first month after delivery only.

Pregnant women should never be given high doses of vitamin A. They should get only ten thousand IU vitamin A every day during pregnancy. Then, they get 200,000 IU vitamin A once immediately after delivery.

****

Dosing technique:

1. Liquid vitamin A.

   Draw the liquid vitamin A into a syringe. One milliliter (1 ml) should be given directly into the child's mouth.

2. Capsules.

   a. Older children:

      Older children can chew and swallow the capsule. Be sure to watch that the child has swallowed the capsule and that he does not spit it out.

   b. Infants:

      Cut the capsule or nip off the nipple. Squeeze the contents of the capsule directly into the child's mouth. If the child is aged less that one year, you give half the dose (100,000 IU). Squeeze out two drops of vitamin A and throw away. Then squeeze the remaining vitamin A directly into the child's mouth.

Medical Assistants can treat all children who have signs and symptoms of blinding malnutrition. This includes night blindness, Bitot's spots, and corneal dryness and ulcers. They can also treat children who have measles with vitamin A. Also, they can treat pregnant and lactating women if they have signs and symptoms of blinding malnutrition.

Midwives can give one 200,000 IU dose of vitamin A to mothers immediately after delivery.

Community Health Workers (CHWs) and Nomadic Community Health Workers (NCHWs) can give treatment to children who have early signs of blinding malnutrition and/or measles.

Following is a list of what the Community Health Workers should do to treat children who need vitamin A.

1. Children with night blindness and/or Bitot's spots:

   CHWs and NCHWs should treat children who complain of night blindness or who have Bitot's spots. The treatment is three doses of 200,000 IU vitamin A as recommended.

2. Children with measles:

   CHWs and NCHWs should treat children who have measles with the treatment of three doses of 200,000 IU vitamin A as recommended.

3. Children with corneal signs (dryness/ulcer/wasting:

   Children who have corneal signs of blinding malnutrition need to be treated with three doses of 200,000 IU of vitamin A. However, because their condition is serious, they must be referred to the medical assistant for this treatment.

   CHWs and NCHWs should refer children with corneal signs of blinding malnutrition to the medical assistant for treatment.

4. Pregnant and lactating women with eye signs of blinding malnutrition.

   Pregnant women cannot receive high doses of vitamin A because it can be dangerous for their health. If a pregnant woman or a lactating woman who may again be pregnant is having eye problems caused by vitamin A deficiency, she should be referred to the medical assistant for examination. A pregnant woman who needs vitamin A should receive 5,000 IU (five thousand) to 10,000 IU (ten thousand) international units of vitamin A per day only.

   Remember, a woman can safely be given one 200,000 IU dose of vitamin A within the first month after delivery. This will increase the amount of vitamin A in her breastmilk.

5. Malnourished children:

Children who are below 80% Harvard Standard weight for height are considered malnourished. They can have vitamin A deficiency and are at risk of blindness from malnutrition.

CHWs and NCHWs should be sure to look in the eyes of these children for signs of blinding malnutrition. If these signs are present, the child should be treated with vitamin A. If the signs are not present, the mother should be given nutrition education. Her child must eat more food. It is important that she knows that the child must get foods rich in vitamin A such as leafy green vegetables, yellow vegetables, fruits, milk and eggs.

CHWs and NCHWs should provide nutrition education about vitamin A foods to mothers who have malnourished children. This will help prevent blindness caused by malnutrition.

6. Children with diarrhea:

Children who have severe diarrhea, especially many times, are at risk of dehydration. If a child is lacking vitamin A and then he becomes dehydrated from diarrhea, he can become blind.

CHWs and NCHWs must tell mothers to treat children who have diarrhea with ORS. Also, they must tell mothers to feed their children even if the diarrhea is still present. The foods should include foods rich in vitamin A such as milk and eggs.

CHWs and NCHWs should tell mothers to treat children with diarrhea with ORS and vitamin A foods. This will prevent blindness from vitamin A deficiency.

F. Prevention of Vitamin A Deficiency and Xerophthalmia:

We have all heard of GOBI-FFF. These are the health care activities that work together to keep children healthy. We are adding "A" to this for vitamin A:

G - Growth monitoring
O - ORS
B - Breast-feeding
I - Immunization
A - Vitamin A

F - Family spacing
F - Food supplements
F - Female education

Look in the back of this manual at Appendix I. This describes how the GOBIA-FFF activities work together to prevent blindness.

1. Dosing for mass distribution:

For children who live in communities where there are not many foods with vitamin A and these children are at risk of xerophthalmia, give the following:

****
*
* Give to all children under age six years:
*
* One 200,000 IU dose of vitamin A once only
* every 6 months.
*
* Children under age 1 year, give half the dose
* (100,000 IU).
*
****

2. Dosing lactating women immediately after birth.

Remember, it is safe to give a mother one 200,000 IU dose of vitamin A immediately after delivery or during the first month after delivery.

3. Vitamin A rich foods:

a. Breast-feeding and weaning:

Breastmilk is a good source of vitamin A for newborn babies. After age 6 months, breastmilk is a good addition to vitamin A foods. At age 6 months, vitamin A rich foods must be given to infants because they are growing and need more vitamin A.

b. Vegetables:

Leafy green vegetables such as mollokhia and girgir contain a lot of vitamin A. Also, yellow pumpkin and carrots have a lot of vitamin A. Tomatoes have a small amount of vitamin A.

c. Animal sources:

Milk, cheese (jibna), yogurt (robb), and butter (forsa) are rich in vitamin A.
Eggs.
Liver (cow, goat, sheep, and fish).
Small fish and fish oil.

4. Food preparations containing vitamin A rich foods.

Asida - Asida contains millet and milk in a pudding. The milk contains vitamin A and is good for children's health and eyes.

Robb - Robb has a lot of vitamin A. Children can eat it alone or on stew, dried okra, meat, or on sesame.

Forsa - Forsa contains vitamin A. Children can eat it alone or on stew.

Eggs - Eggs are rich in vitamin A. It is good for children to eat them fried or boiled. They can eat eggs alone or with bread.

5. Vitamin A food values list.

All foods contain nutrients. Many foods are rich in vitamin A. Other foods contain very little or no vitamin A at all.

Go to the back of this manual to Appendix II. This page lists the foods in Sudan which are rich in vitamin A.

III. Nutrition and Public Education

A. Teaching about vitamin A foods to mothers, schoolchildren, and other community groups.

When you examine children and families in your clinics, you can give a small talk about vitamin A foods and how they prevent blindness. It is good for you to ask if you can give a small talk to groups of people who must be aware of good nutrition for children. Here are some of the groups that you can talk to:

1. Mothers.
2. School teachers.
3. School children.
4. Religious leaders.
5. Village chairman and members.

Tell families that children can become blind if they do not eat foods with vitamin A. Tell them which foods have vitamn A and when they are available in the markets. Also, tell them the food preparations that contain foods with vitamin A. Then they will understand why those foods are important for their children's eyes.

B. Practice using education tools.

You have been given a flip chart that tells a story about a little boy who became blind from vitamin A deficiency. His mother did not give him vitamin A foods when he was 4 to 6 months old and he became weak and malnourished. She gave him only porridge made with millet and water.

The story describes how the boy became blind. It tells how this can be prevented. Practice now with a friend and tell the story to each other using the flip chart. You can use this flip chart to tell the story when you talk to community groups and families about vitamin A foods and preventing blindness.

IV. Recording and Reporting

A. Practice recording vitamin A dosing on patient records.

Every time a child is treated with vitamin A, it must be recorded on the patient's record. This can be on the clinic card or on the Road to Health Card. The following information must be recorded:

1. Name, age, sex, address of case.
2. Symptoms and/or signs seen.
3. Date and dosage of vitamin A given (200,000 IU or 100,000 IU).
4. Follow-up: date, condition of eyes, changes seen.

Here is an example of the information that must be recorded on the patient's record.

Name: Mohammed Yusuf Address: Block A
Age: 3 House 14
Sex: male Yusuf Ali Musa

Symptom or sign seen: Bitot's spots

Date: 4 Sept.'87 Vitamin A dosage given: 200,000 IU

Follow-up:
Date: 5 Sept.'87 Eye changes/condition: Bitot's spots going away. Second dose of 200,000 IU given today.

The prevention dose given every 6 months should be recorded in two places:

1. Record the date and dosage (200,000 IU or 100,000 IU) on the Road to Health Card or the clinic card as shown above.

2. Record in a register all children given the prevention dose of vitamin A. Each entry should include the child's name, age, sex, block number, house number (wareda), and name of house-hold head.

   On the next page, there is a sample of how the register should be kept and how to record the information.

This is a sample of how the register should be kept. Remember, whenever a child is given one dose of vitamin A in a mass distribution program every 6 months, the following information should be recorded in the register: name, age, sex, address.

Date vitamin A given: 21 December 1987 Town: El Fasher

Name	Age	Sex	Block	House	Head of Family
Ahamed Ali Yusuf	4	M	A	23	Yusuf Ali Musa
Isahn Abdel Magid	3	F	A	2	Mohammed El Magid
Baddria Ali Tayeb	4	F	A	16	Tayeb El Sadiq Ali
Ahamed El Kamal	2	M	C	4	Kamal Ali El Hasan
Ahamed El Rashid	5	M	C	7	Rashid El Ahamed
Alawia El Mohamed	3	F	B	20	Isahn Musa Tayeb

B. Practice filing in information on vitamin A dosing on the monthly reporting forms.

1. Patients treated with vitamin A:

Every month, you should give a report to the district health office showing the number of patients that you saw with blinding malnutrition and how many capsules you gave out for treatment. The monthly report should contain the following information:

Number of cases of xerophthalmia seen. •
Sex.

Here is an example of how to make this report:

```
!                                                    !
!Report of patients treated with vitamin A:          !
!                                                    !
!Patients with blinding malnutrition:    9           !
!                                                    !
!Male:   5      Female:   4      Total:  9           !
!                                                    !
!Number of vitamin A capsules given out:  27         !
!                                                    !
!Submitted by: Said El Rashid    Date: 31 Sept 1987  !
!Title: Community Health Worker  Location: El Fasher !
!                                                    !
```

2. After each round of mass distribution of vitamin A, a report should be submitted to the district health office. The report should contain the following information:

a. Number of capsules distributed to children under age 6 years.
b. Available stock of vitamin A (current).
c. Additional needs of vitamin A for the next 6 months

Here is an example of how to make this report:

```
!                                                    !
!Report of mass distribution of vitamin A:           !
!                                                    !
!Number of capsules distributed to children          !
!under age 6 years:  488                             !
!                                                    !
!Available stock of vitamin A:  100                  !
!                                                    !
!Amount of vitamin A needed for next 6 months: 400   !
!                                                    !
!Submitted by: Said El Rashid    Date: 31 Dec. 1987  !
!Title: Community Health Worker  Location: El Fasher !
!                                                    !
```

We hope that you now understand the blindness that can come from vitamin A deficiency and malnutrition. You have learned how to treat children with blinding malnutrition and you have also learned how to prevent it.

We hope that you will be successful in your important job of keeping children healthy and preventing blindness.

CHILD CARE ACTIVITIES

GOBIA-FFF

Everyone has hea.. of the child care activities called GOBI-FFF. We are adding "A" to these for vitamin A. The following information describes how GOBIA-FFF prevents blindness:

G. The "G" for GROWTH MONITORING is a warning system for malnutrition. By preventing malnutrition, we also prevent vitamin A deficiency. In this way, we reduce the risk of blinding malnutrition. By preventing malnutrition, growth monitoring helps to prevent blindness.

O. The "O" for ORS prevents severe dehydration. When a child is severely dehydrated, he is at the highest risk of developing the signs and symptoms of blinding malnutrition. By preventing dehydration, ORS helps to prevent blindness.

B. The "B" for BREAST-FEEDING is easy to understand. Breast-feeding provides vitamin A to the infant in the early months of life. As the baby grows and solid vitamin A foods are added, breastmilk is an excellent supplement for vitamin A. Breast-feeding prevents vitamin A deficiency and malnutrition in babies and helps to prevent blindness.

I. The "I" for IMMUNIZATION has a direct connection to preventing blindness. We have learned that a child is at a very high risk of blindness if he has vitamin A deficiency together with measles. Immunization against measles prevents measles in a vitamin A deficient child and prevents him from getting these two conditions together which lead to blindness. By preventing measles, immunization helps to prevent blindness.

A. The "A" of course is for VITAMIN A. By adding vitamin A dosing to the activities of growth monitoring, ORS, breast-feeding, and immunization, all of the activities work together to prevent blindness.

F.F.F. The 3 "F's" are for FAMILY SPACING, FOOD SUPPLIMENTATION, and FEMALE EDUCATION. These also relate to vitamin A deficiency and the prevention of blindness.

FAMILY SPACING encourages parents to wait two years between children. This allows parents to afford a better diet for their children and be able to better care for the younger ones.

FOOD SUPPLEMENTATION means the addition of vitamins and fortified foods to the diet. Vitamin A is a food supplement.

FEMALE EDUCATION concerns the fact that children of mothers who can read have a better diet because their mothers can read and learn about good nutrition from books, pamphlets, and posters.

G.O.B.I.A.-F.F.F. ALL WORK TOGETHER TO PREVENT BLINDNESS.

Appendix II

VITAMIN A FOOD VALUES

FOODS IN SUDAN

This is a list of fruits and vegetables found in Sudan that contain vitamin A. The name of the vegetable or fruit is listed followed by it's vitamin A value in International Units per 100 grams of edible food.

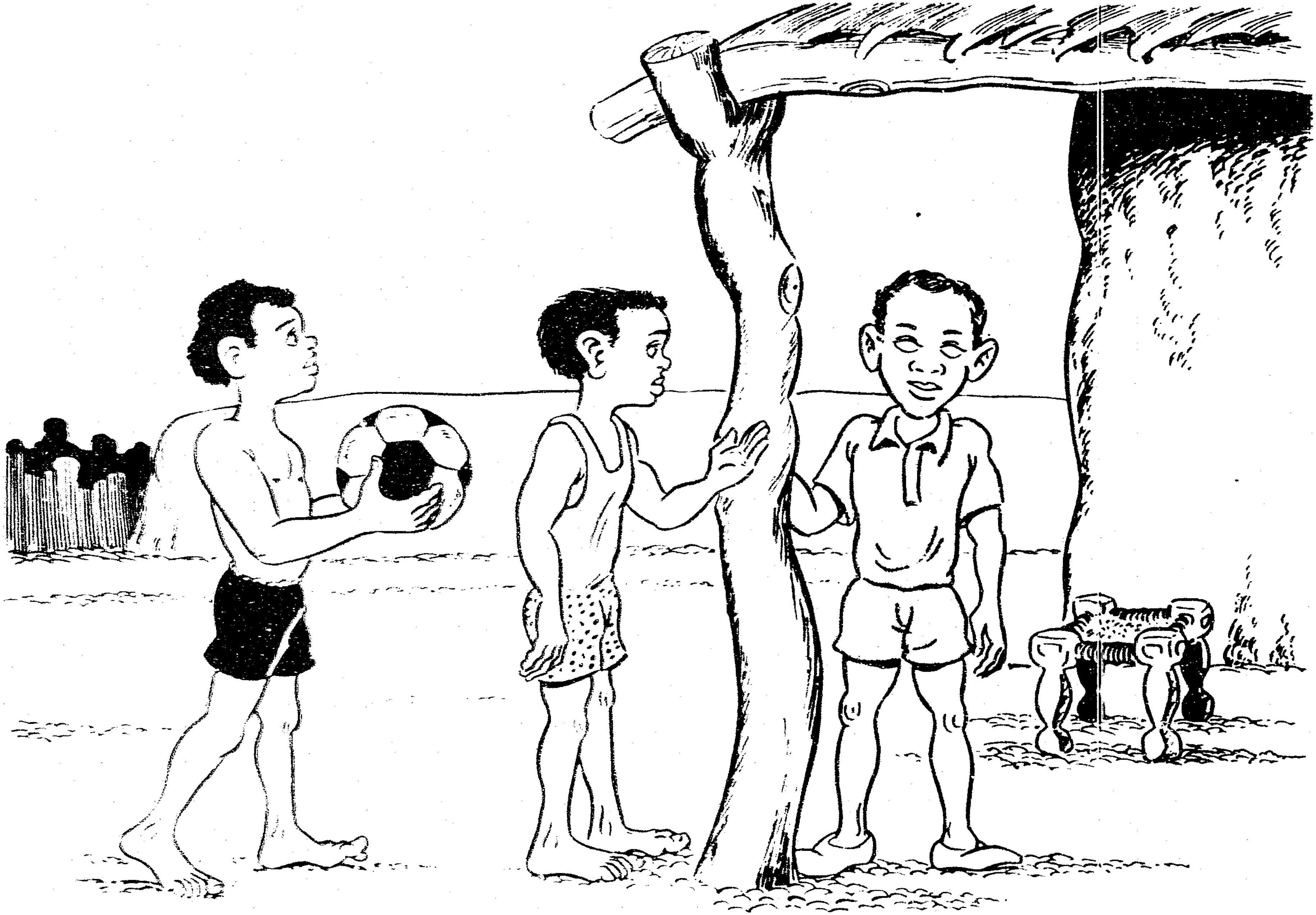
Name	International Units per 100 grams
Fruits:	
Banana	2,300 IU
Canteloupe (shamam)	2,100 IU
Mango	600 - 21,600 IU
Papaya fruit	10,900 IU
Papaya leaves (young leaves)	19,300 IU

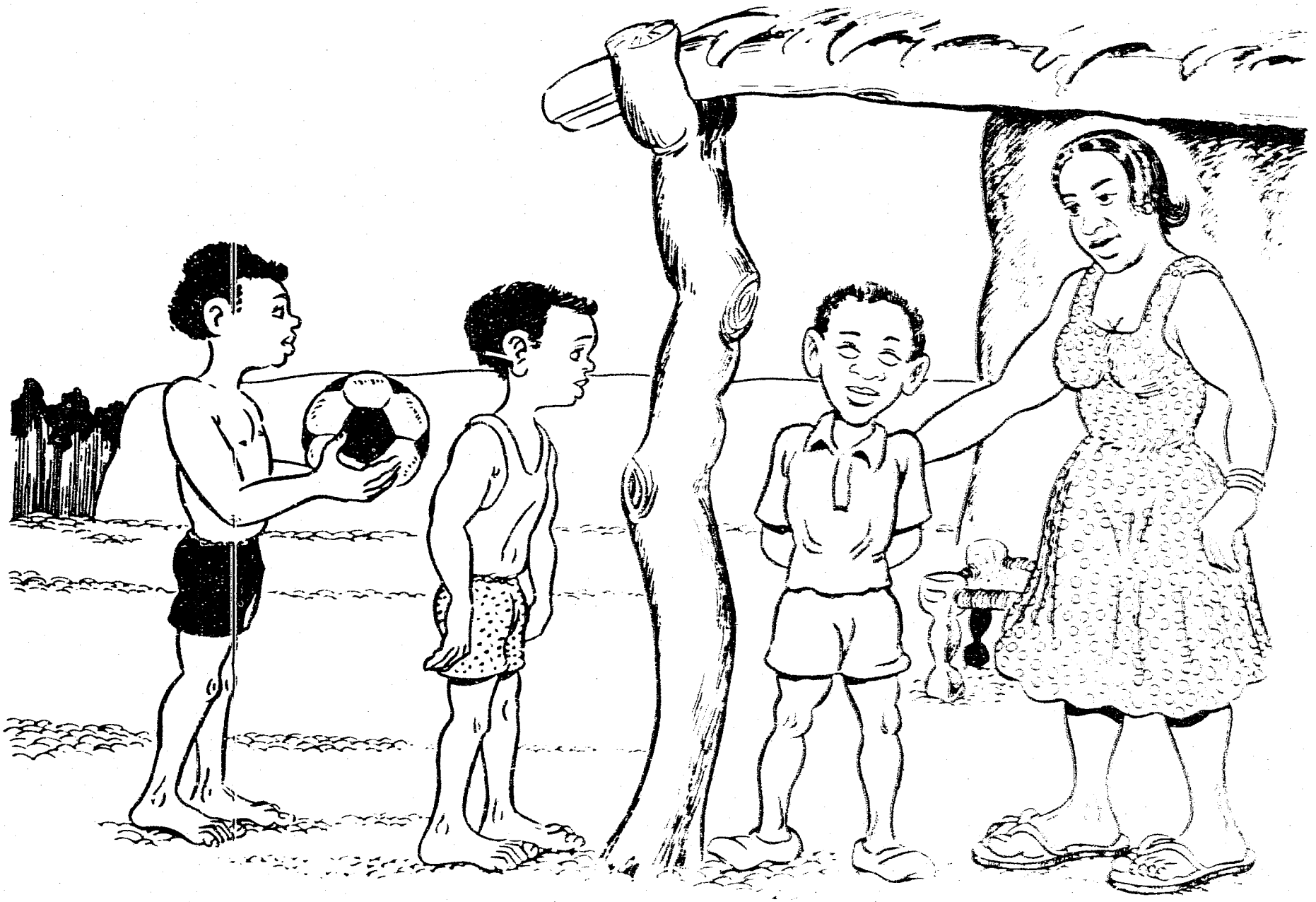
Name	International Units per 100 grams
Vegetables:	
Carrot	3,500 - 11,700 IU
Cassava leaves	13,800 IU
Cowpea leaves	1,800 IU
Jirjir *	2,042 IU
Lettuce leaves	3,300 IU
Mollokhia *	2,027 IU
Onion	2,000 IU
Parsley	2,600 IU
Peanut (groudnut) leaves	12,700 - 13,100 IU
Pepper, red seeds (shetta)	6,600 IU
Pepper, red (vegetable)	7,900 IU
Pumpkin, dark yellow	5,600 - 6,300 IU
Pumpkin leaves	6,000 IU
Spinach leaves	3,800 - 6,400 IU
Sweet potato leaves	3,800 - 11,700 IU
Tomatoe	1,100 IU

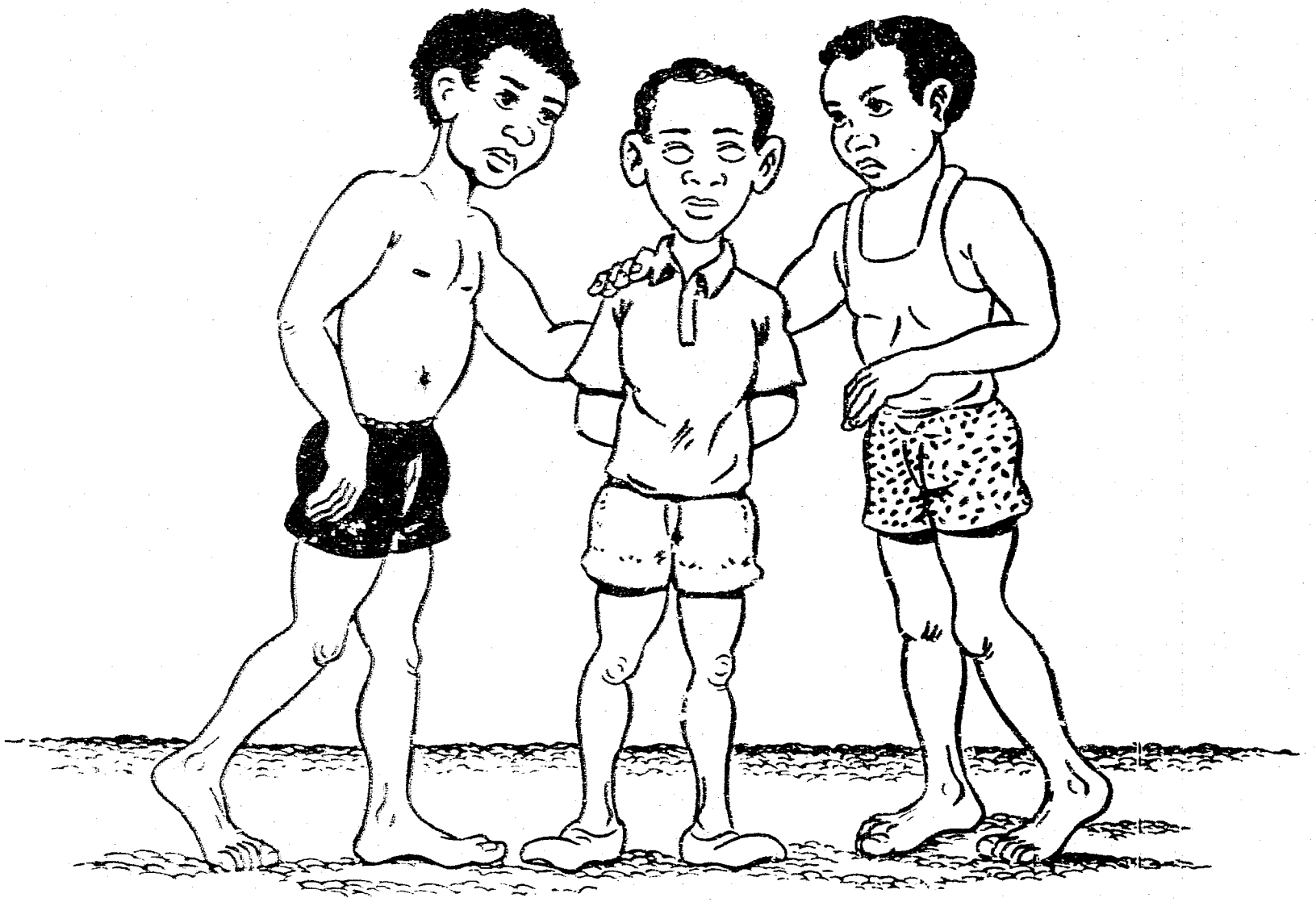
Sources:

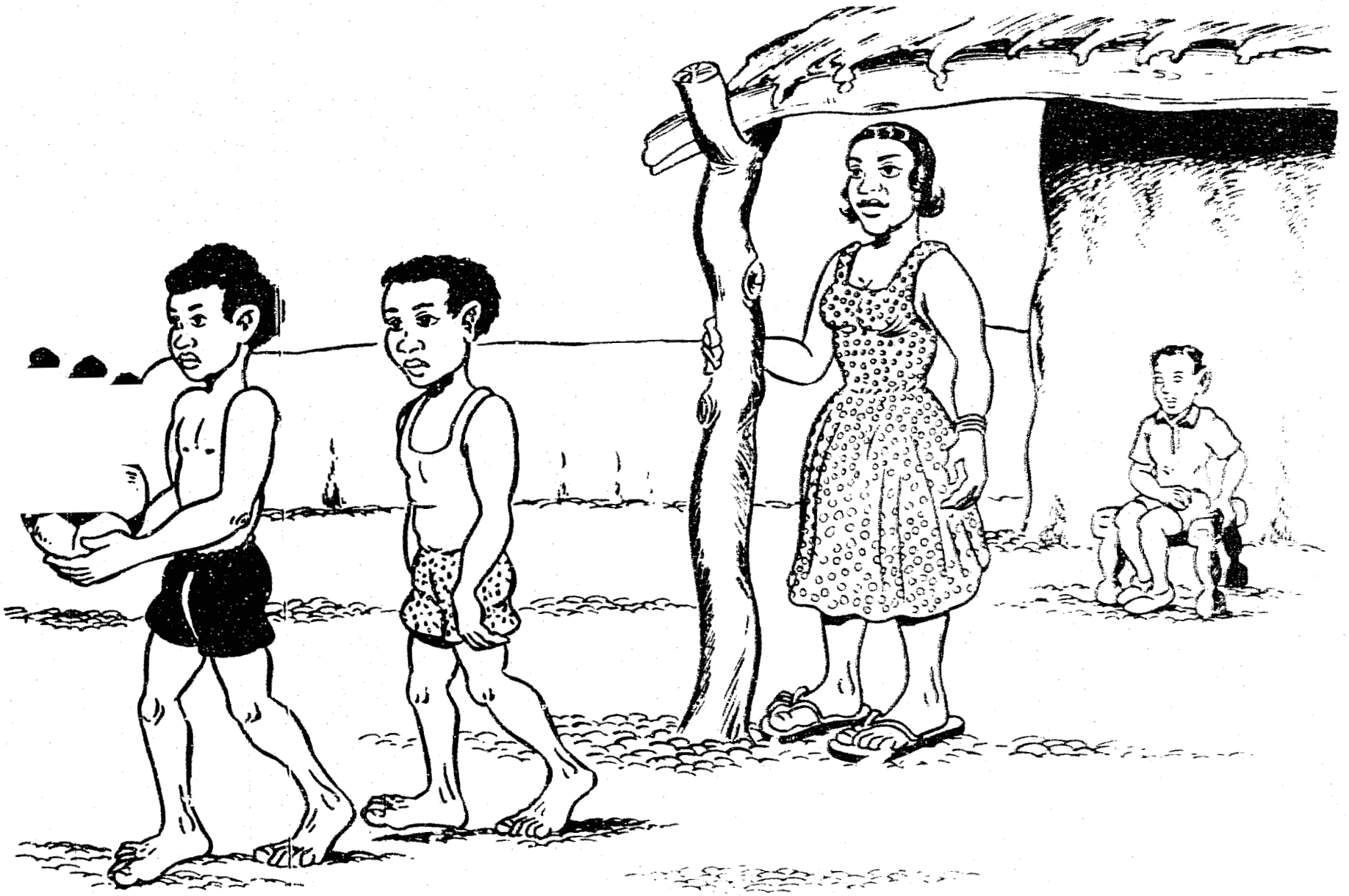
"Tropical Content of Vitamin A Foods"
Published in Vitamin A + Sieve
Rodale Press, Inc., USA, 1986

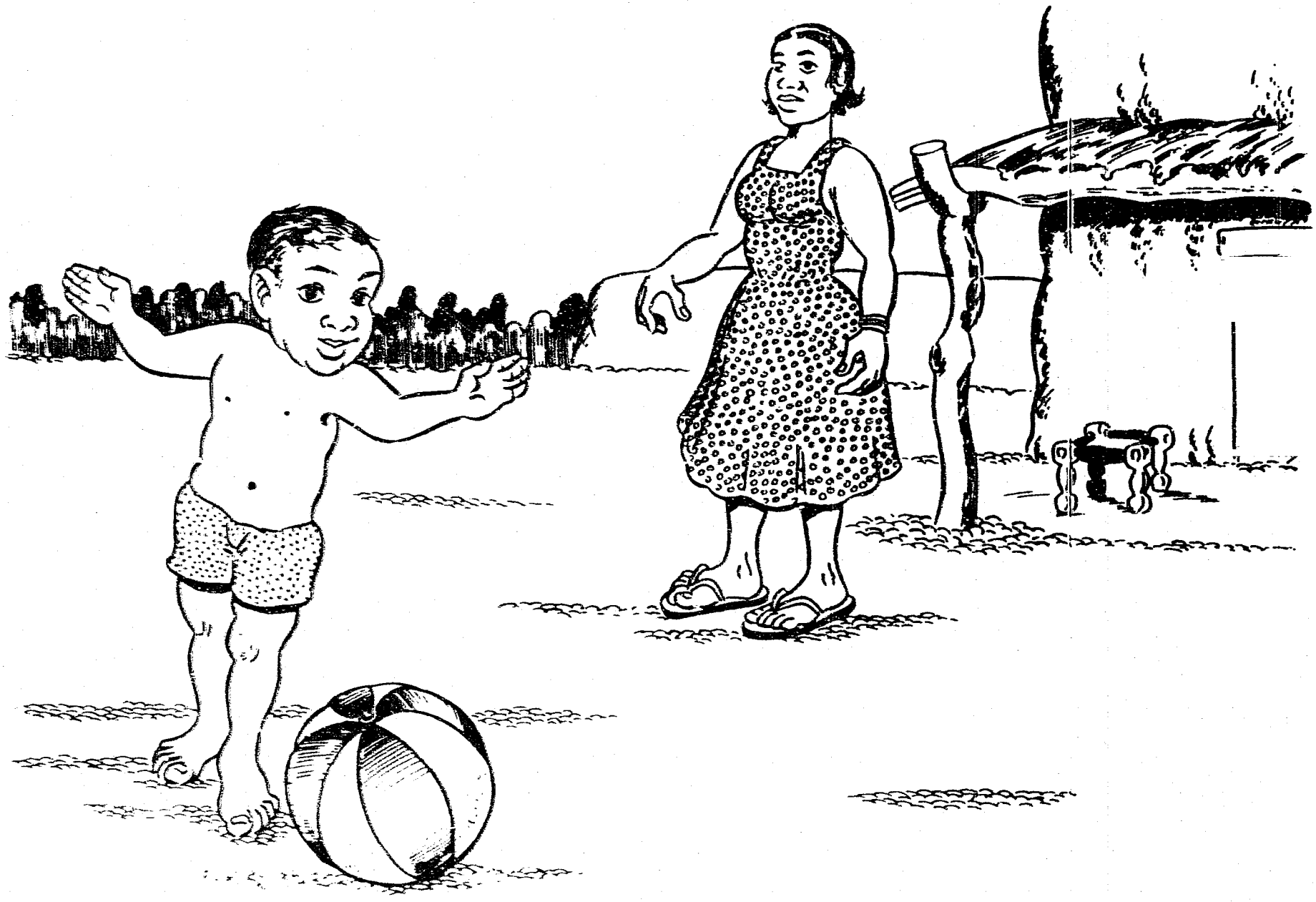
* Values for Jirjir and Mollokhia
M.Y. Sukkar, Khartoum
Ithaca Press, London, 1985

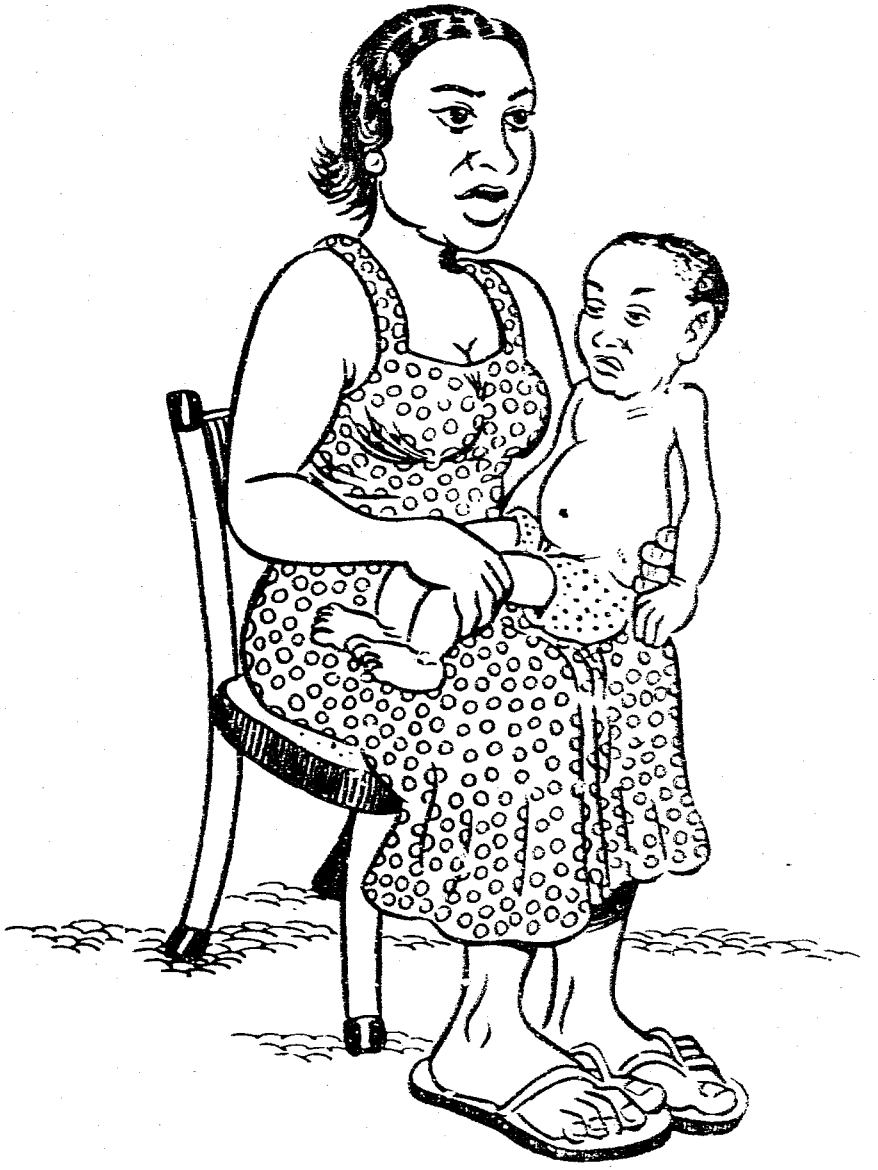


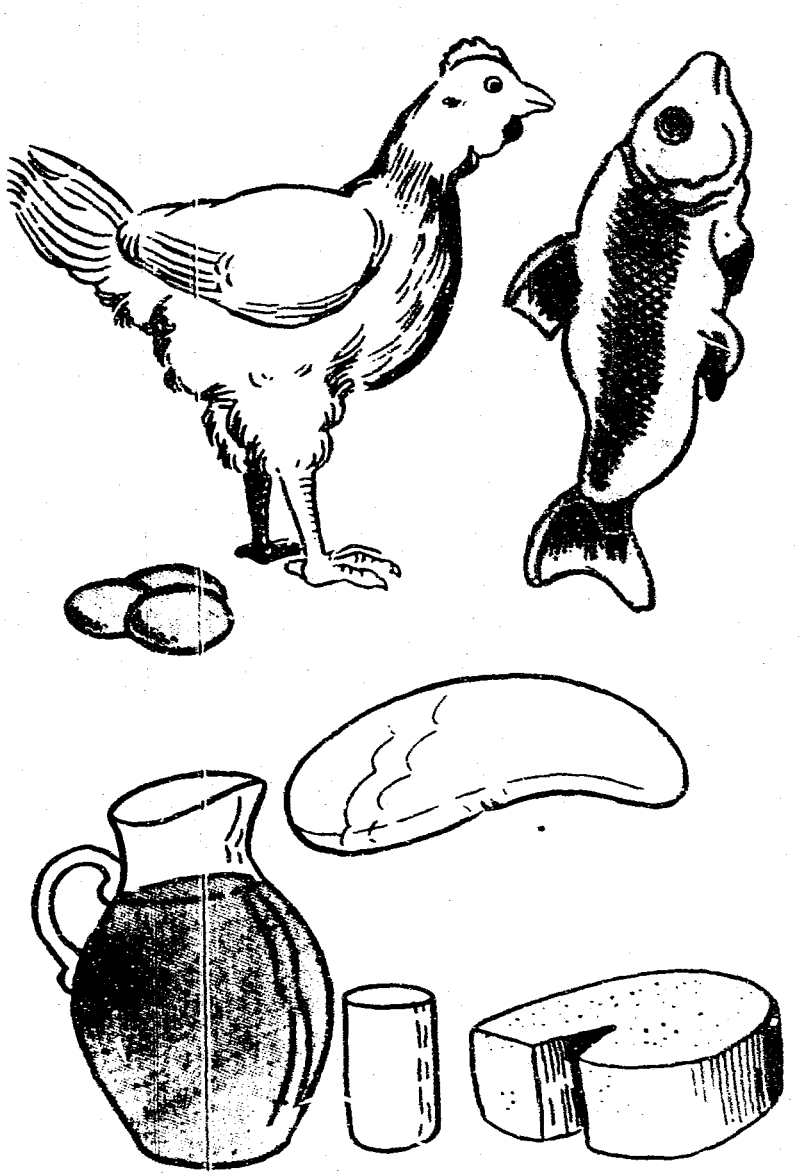


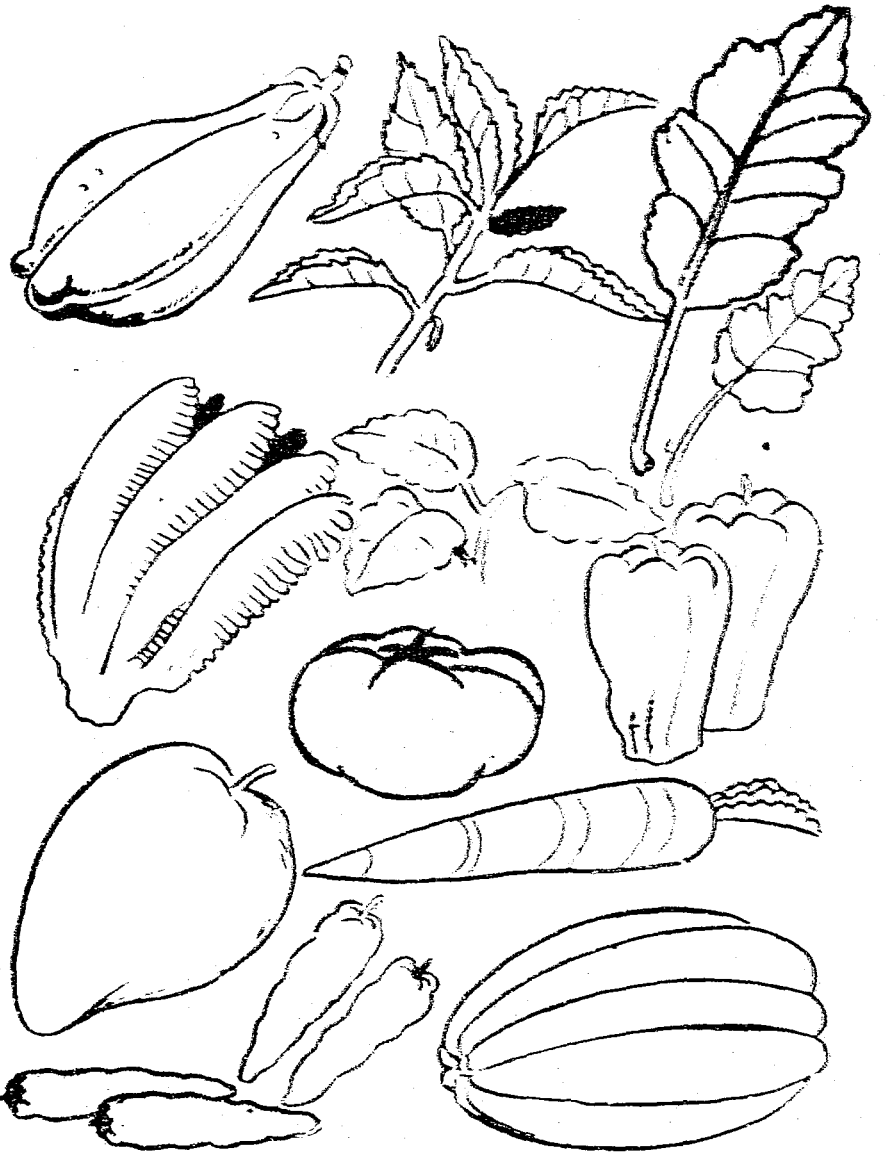


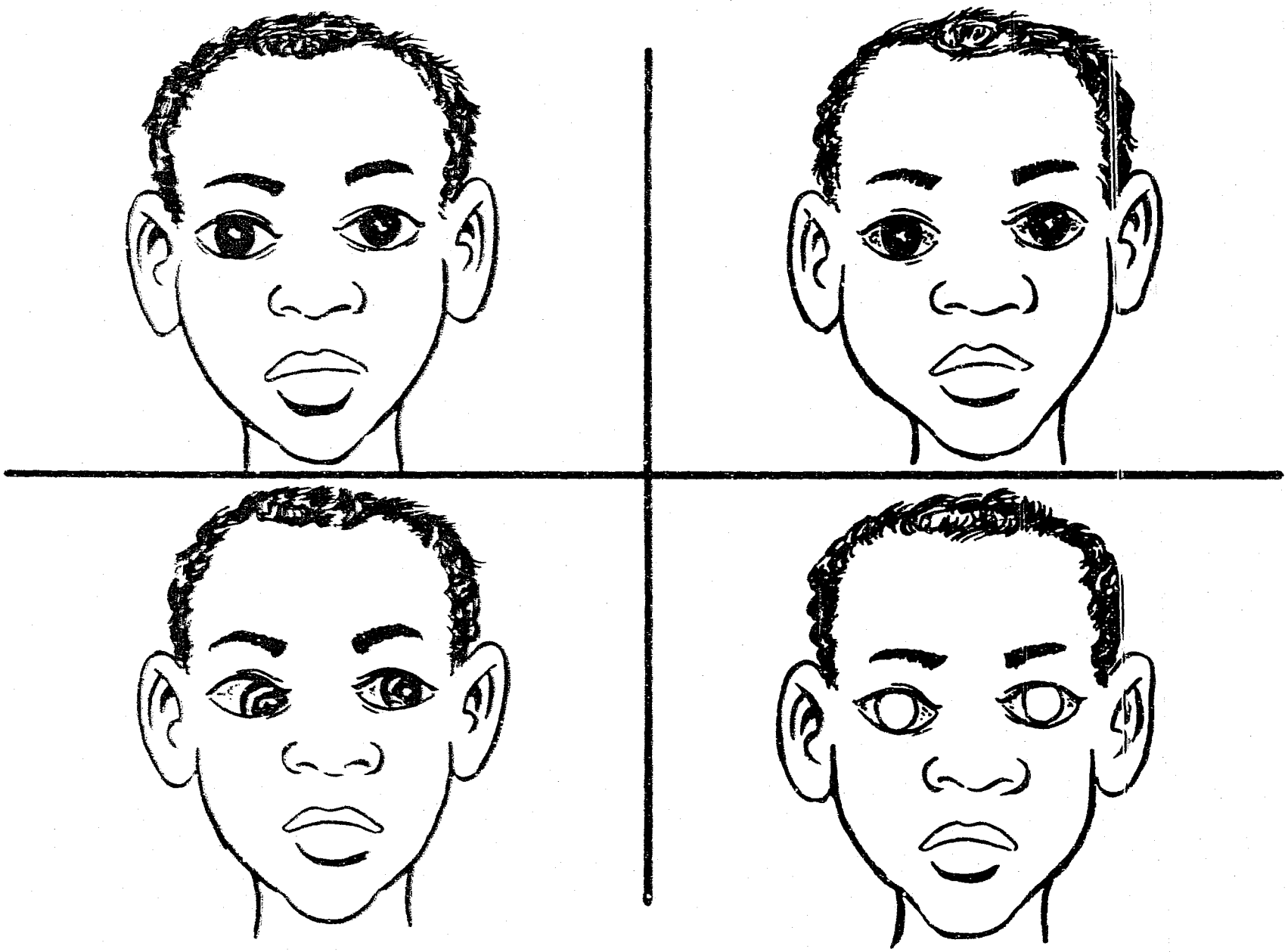


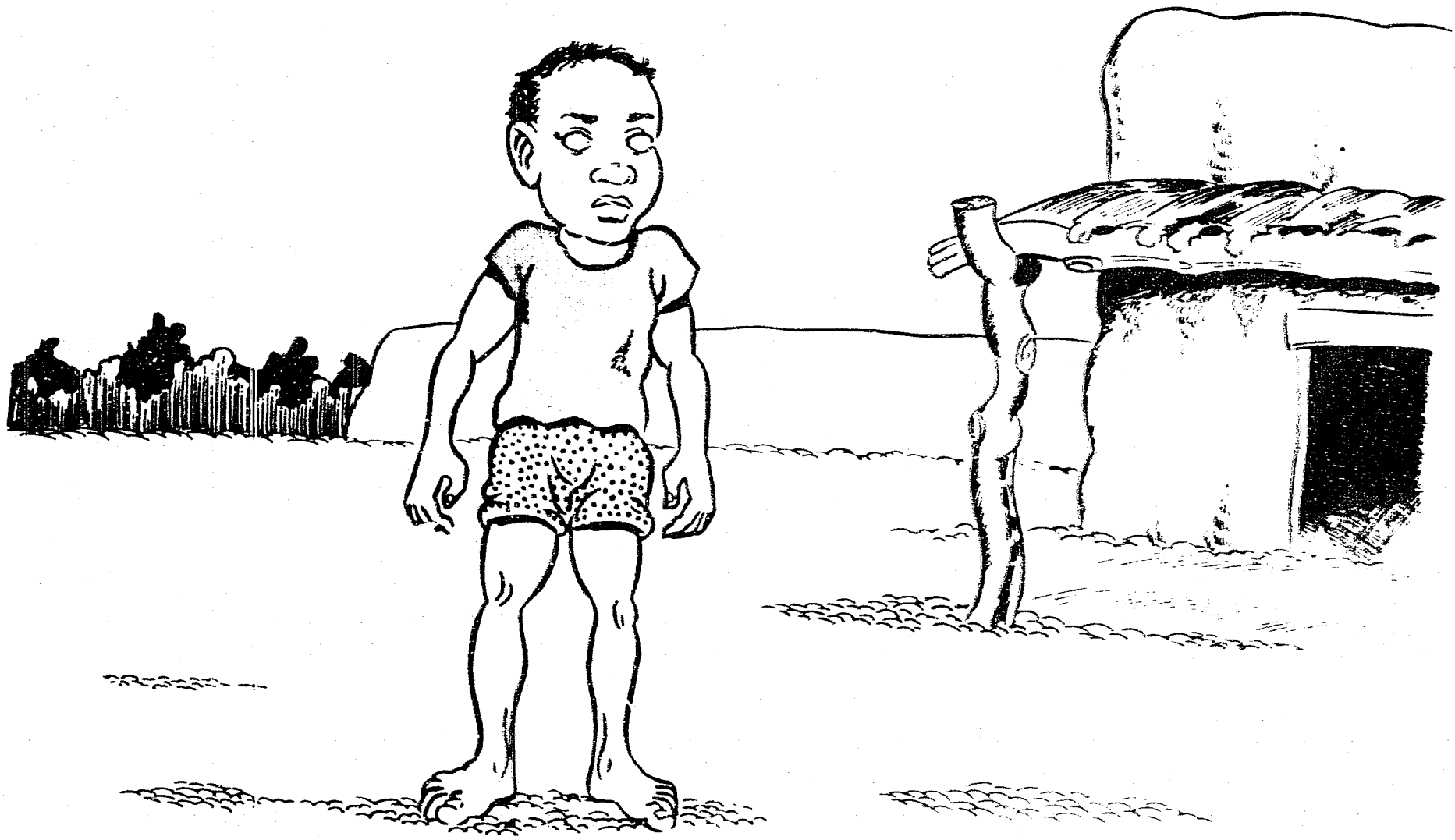


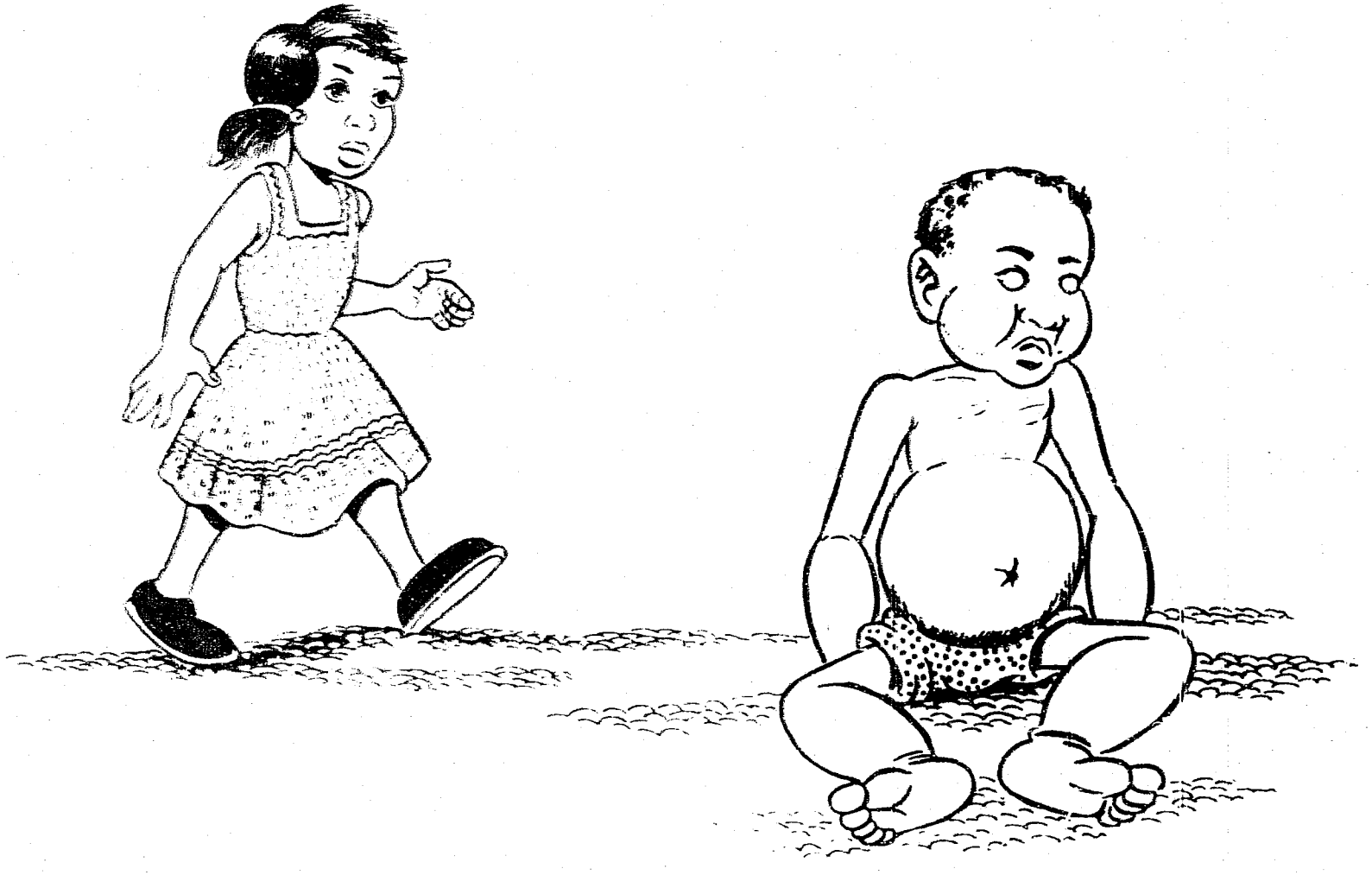


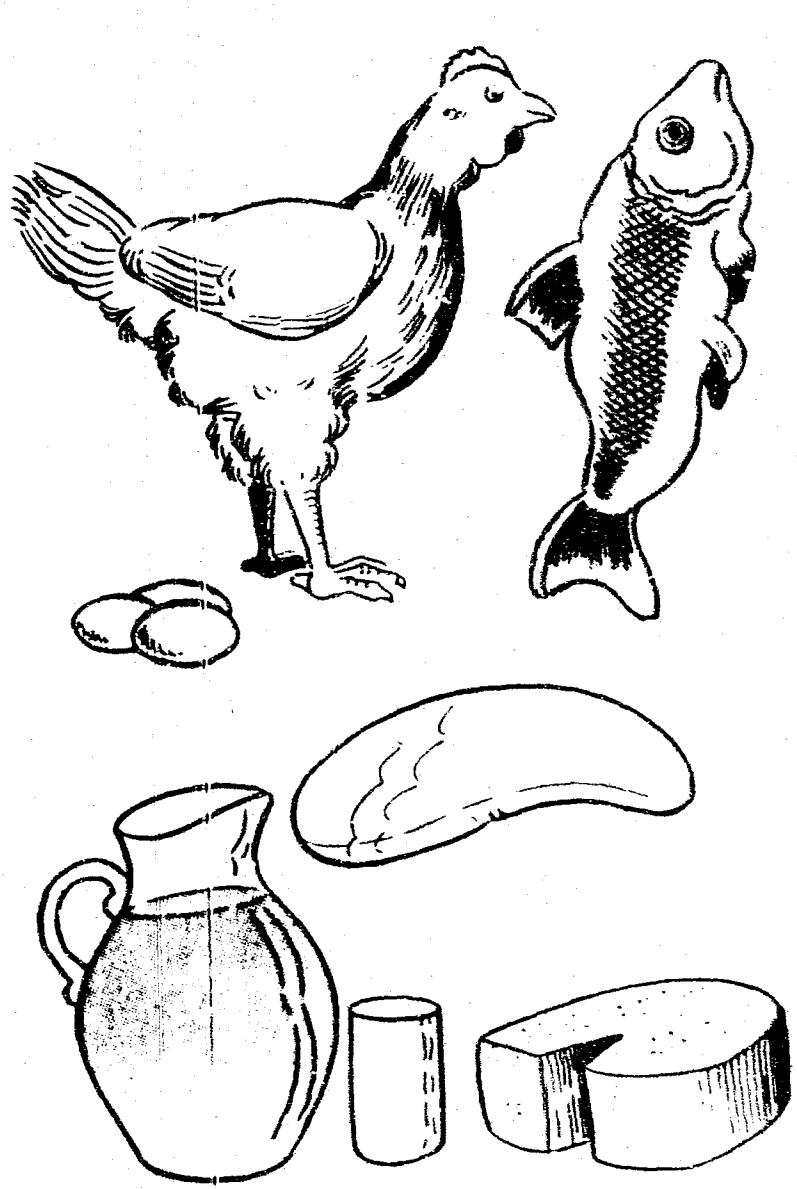


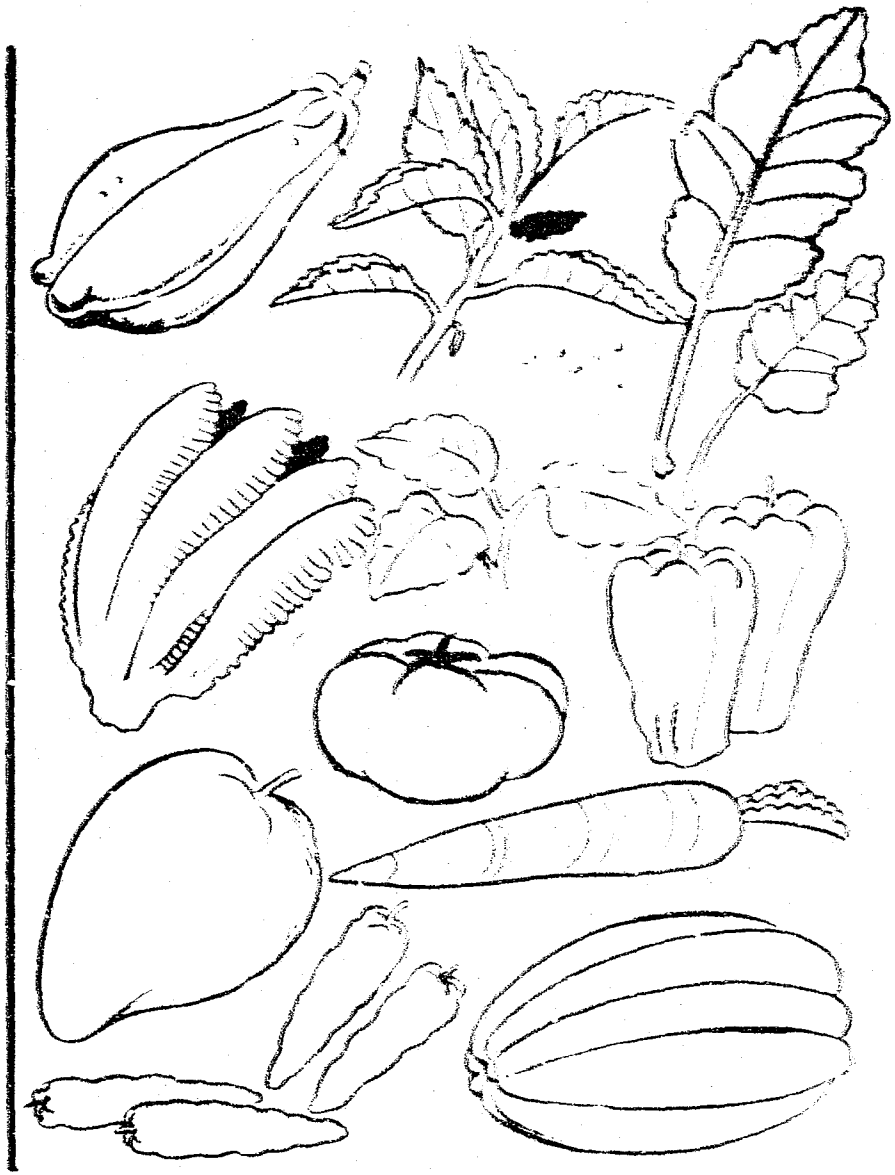


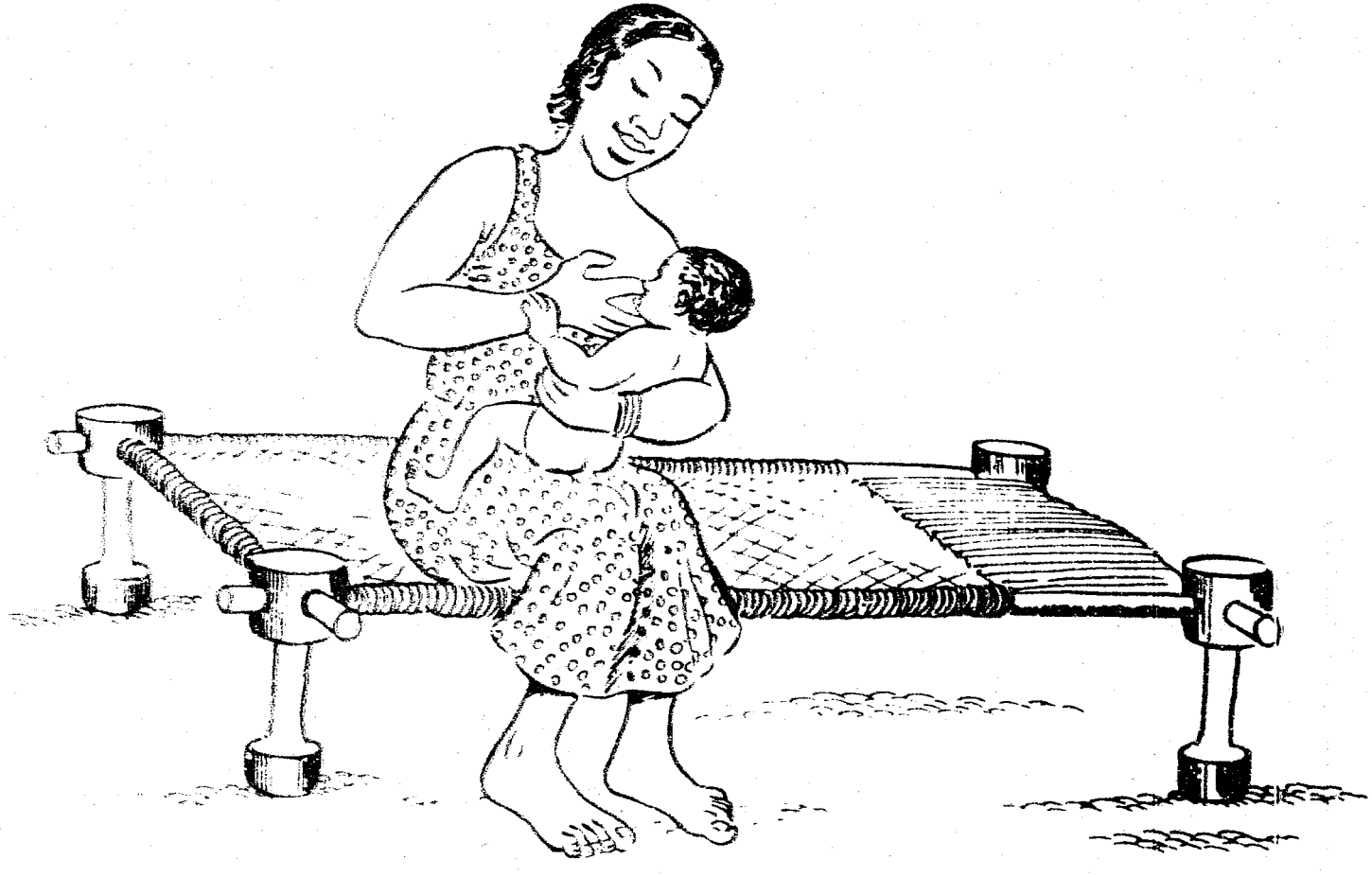












Due to Vitamin A Deficiency (Xerophthalmia)

A. Definition of Xerophthalmia:

Drying of the conjunctiva and cornea followed by destruction of the cornea and blindness. This is due to **lack** of foods rich in vitamin A in the diet.

B. Importance:

In areas where people **do not** get foods rich in vitamin A, xerophthalmia is the major priority in the prevention of blindness. This is because of the following points:

- Xerophthalmia causes blindness in children under the age of 6 years.
- Xerophthalmia can cause destruction of the cornea and blindness in 48 hours if not treated.

C. Recognition of the signs and symptoms of xerophthalmia:

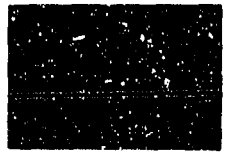
1. **Night blindness**—the first symptom of xerophthalmia. A child cannot see to get around after dark or in a dark room.

2. **Bitot's spots**-although Bitot's spots differ somewhat in size, location, and shape, they have a similar appearance. They are accumulations of foamy, cheesy material on the conjunctiva, often in association with other signs of xerophthalmia such as night blindness.

3. **Conjunctival xerosis**—the conjunctiva becomes dry. When you examine the white part of the eye, the conjunctiva appears wrinkled.

4. **Corneal xerosis/ulceration**—the cornea becomes dry (xerosis). If the disease is not treated, the xerosis can progress within hours to an ulcer on the cornea.

5. **Keratomalacia**—if the disease is not treated, a corneal ulcer can lead to "melting" or "wasting" of the cornea (keratomalacia).



6. **Corneal scar**—keratomalacia can lead to perforation of the cornea. At this stage, a corneal scar will remain in the eye. The sooner the disease is treated, the smaller the ulcer and the smaller the scar will be remaining. If treated early, corneal scars and blindness can be prevented.

D. Treatment of the signs and symptoms of xerophthalmia is 200,000 International Units (IU) vitamin A capsule:

Give to all children with signs and symptoms of xerophthalmia:

1. **Immediately** —one 200,000 IU vitamin A capsule.
2. **Following day** —one 200,000 IU vitamin A capsule.
3. **Two weeks later** —one 200,000 IU vitamin A capsule.

For children aged less than one year, reduce the dosage by half (100,000 IU)

Capsules of vitamin A are **safe if used as directed.**

E. Prevention:

For children who **do not** have signs and symptoms of xerophthalmia, however, they live in communities where there are **not many foods with vitamin A.** Give the following:

All children up to age 6 years, give one capsule every 4-6 months.

Lactating women: give one 200,000 IU dose within one month after delivery.

F. Foods rich in vitamin A:

1. green leafy vegetables: spinach, amaranth.
2. yellow fruits and vegetables: papaya, mango, pumpkin, chillies, carrots.
3. milk, cheese, yogurt, butter, eggs.
4. liver, small fishes.

العمى
الناتج من نقص فيتامين « أ » (مرض العمى الغذائى)

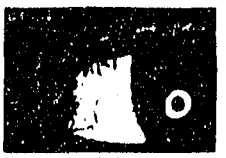
أ- تعريف العمى الغذائى:
هو جفاف بياض العين والقرنية الذى يتبعه تلف القرنية والعمى . . وهذا يحدث نتيجة لفقد الأطعمة التى تحتوى على فيتامين « أ » فى الوجبات.

ب- هـــام
فى المناطق التى لا يتناول فيها الناس الأطعمة الغنية بفيتامين « أ » ، مكافحة مرض «العمى الغذائى» تأتى فى المرتبة الأولى لمكافحة العمى . . وهذا بنسبة للآتى:

- مرض «العمى العدائى» يسبب العمى للأطفال دون سن السادسة.
- ومرض «العمى الغذائى» يمكن أن يسبب اتلاف القرنية، وبالتالى العمى خلال ٤٨ ساعة إن لم تتم معالجته.

جـ- كيفية التعرف على علامات وأعراض مرض «العمى الغذائى»:

١- **العمى الليلى (العشى — الجهر)**: — هو أول أعراض العمى الغذائى، حيث لا يستطيع الطفل الرؤية بعد حلول الظلام أو داخل حجرة مظلمة.

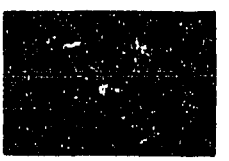


٢- **نقاط بيتوت**: على الرغم من أن هذه النقاط تختلف فى أحجامها ومواقعها بالعين، وشكلها، إلا أنها تظهر جميعها بنفس الصورة.
فهى تراكمات لمواد من بياض العين، والذى غالباً تصحبه أعراض أخرى لمرض «العمى الغذائى» مثل العمى الليلى.

٣- **جفاف بياض العين**: يصبح بياض العين جافاً، وعندما تقوم باختباره، يبدو لك متجعداً.

٤- **جفاف القرنية وتقرحها**: تصبح القرنية جافة . . وإن لم يعالج المرض يمكن أن يتطور الجفاف خلال بضع ساعات إلى تقرح فى القرنية.

٥- **الكيراتومالاسيا**: إذا لم يعالج المرض فإن القرنية ستتقرح مما قد يؤدى إلى ذوبانها وانتهائها.



٦- **جرح القرنية**: ويمكن أن يؤدى الكيراتومالاسيا إلى بروز القرنية، وفى هذه المرحلة يظل جرح القرنية فى العين، وكلما استعجلنا علاج المرض، كلما ظل الجرح والتقرح صغيراً . . وإن تم العلاج مبكراً فإن ذلك سيمكن من منع تقرح القرنية ومنع العمى.

د- علاج علامات وأعراض مرض «العمى الغذائى» يكون بتناول كبسولات فيتامين « أ » ذات الـ ٢٠٠,٠٠٠ وحدة عالمية.

أعط جميع الأطفال الذين تظهر عليهم أعراض مرض «العمى الغذائى»:
١- فوراً — كبسولة واحدة من فيتامين « أ » التي تحتوى على ٢٠٠,٠٠٠ وحدة عالمية.
٢- في اليوم التالي — كبسولة أخرى من فيتامين « أ » (٢٠٠,٠٠٠ وحدة عالمية).
٣- بعد اسبوعين — كبسولة أخرى من فيتامين « أ » (٢٠٠,٠٠٠ وحدة عالمية).
للأطفال الأقل من عمر عام واحد يجب أن تخفض الجرعة إلى النصف (١٠٠,٠٠٠ وحدة عالمية).
إن كبسولات فيتامين « أ » غير ضارة إن تم تناولها حسب الارشادات.

هـ- الوقاية
للأصحاء الذين لم تظهر عليهم علامات وأعراض مرض «العمى الغذائى»، والذين يعيشون فى مجتمعات لاتتوفر فيها كثيراً الأطعمة التى تحتوى على فيتامين « أ » . . أعطهم الآتى:

كبسولة واحدة من فيتامين « أ » لجميع الأطفال حتى سن ست سنوات مرة كل ٤-٦ شهور.
للنساء المرضعات: أعط كبسولة واحدة (٢٠٠,٠٠٠ وحدة عالمية) خلال الشهر الأول من الولادة.

و- الأطعمة الغنية بفيتامين « أ » هى:

١- الخضروات الورقية الداكنة الخضرة مثل الملوخية والجرجير والسبانخ.
٢- الفواكه والخضروات الصفراء مثل المانجو والبابای والقرع والشطة الخضراء والجزر.
٣- اللبن والجبن والزبادى والزبدة والبيض.
٤- الكبد وصغار الأسماك.
٥-

X

Ahmed "Shileil" and His Sister

Aisha "Oum Eioun"

In the quiet village of Oum El Kheir, in the western region of the Sudan, lived a farmer called Mohamed Adem who was married to a kind woman whose name was Fatima Bint El Zain. Mohamed had two children, Ahmed, who was five years old and his sister Aisha who was only three years old.

Another farmer called Abdalla Osman was the neighbor of Mohamed Adem. Abdella was married to a very active and clever woman named Amna. He had three boys, Omer who was six years old, Khalid who was four years old, and Hassan who was just two years old.

Everybody in Oum El Kheir knew that Amna is a very clever lady and very keen at cleaning her home as she was a good cook who does everything to maintain her children healthy and happy. Amna was also very keen at taking her children to the dispensary at least once every month to check their general condition and weight and make sure that they are ever healthy. When Amna hears that the health worker Awad, who lives in the same village, is having a meeting with the people of Oum El Kheir, she would do everything to attend that meeting because she knew that Awad always gives valuable advice to the villagers about their children's health. Whenever she hears a medical advice from Awad regarding the health of her three children, she tries her best to apply it. In fact, she started the habit of visiting the dispensary at least once every month when she heard from Awad the health worker that it is important to do so.

Amna had always tired to make Fatima go to the health worker's meetings to listen for his good advice, but she couldn't succeed in this because Fatima had always refused to go with her.

One day, Amna tried to convince Fatima to attend the meeting with Awad at the boys' primary school, especially because she heard that Awad will talk about good food that should be given to children. But lazy Fatima refused to come and said that these meetings are just a wast of time and she doesn't need to hear from any health worker what to cook for her children. She then asked Amna: "Do you think there is anything better than "assida" and "weika" for children?" Amna then left her and went to the meeting alone.

As the children were next door neighbors, Ahmed became a very good friend for the two brothers Omer and Khalid who were near to his age and he had no brother to play with. So the people of Oum El Keir were so used to seeing the three children, Ahmed, Omer, and Khalid playing football and racing each other in the empty space near their homes. Many people who were not so close to the three children thought they were all brothers from the same father and mother.

During the day, if Ahmed is not at home, his mother Fatima would not be worried because he will definitely be at Amna's home playing with her sons Omer and Khalid.

When Ahmed's uncle Abbas came from the south of Sudan, he brought him and his family a lot of mangos and pineapples. But Ahmed insisted that nobody should eat anything before his friends Omer and Khalid join them and he ran to their house to invite them. His parents were so pleased to see that their son is very faithful to his friends.

Another day, Ahmed asked Amna whether he could be a real brother for Omer and Khalid which made her really happy and then she explained to him that good and sincere friends can be like brothers and even more.

At the nursery where the three children learn Ouoran, one child started a fight with Khalid and his brother Omer was not around. But Ahmed told the boy off and since then, every child knew that he cannot fight with Khalid when Ahmed is around.

One afternoon, the three children went to play football with other children from the village of Oum El Kheir. As the game was very exciting and amusing, the children kept on playing until it was dark and they could no longer see their ball. Omer then suggested that they change the game to start another game called "shileil" which they used to play when it starts getting dark. One of the children is supposed to throw a certain small bone. Whoever finds the bone first will be the winner. Ahmed used to love this game because he was always quick at finding the bone. But that day, Ahmed found himself unable to see properly when it became dark. At first, he thought that it was just a passing thing and decided to go on playing. When a child threw the bone, Ahmed tried to run with the other children to fetch it although he found himself unable to see in front of him. He tried to run amongst the other children and follow the sound of their voices. But Ahmed was confused while racing to get the bone and fell in the ditch which made all the children laugh at him. He stood up feeling dizzy and unable to see. He was so embarrassed and wanted to go home immediately, but he again found it difficult to see the road clearly until he finally got back home. He said nothing to his parents, had his supper, and found his way to his bed by walking slowly because he could not exactly see what was in front of him. He then went to sleep.

The following afternoon, Ahmed went to play football as usual with his friends Omer, Khalid and the other kids. When it was sunset, they wanted to start playing "shileil" again. It started to get darker and Ahmed was unable to see where his friends were, he just noticed their voices. It seemed his eyes could not see properly when the sunlight is gone.

He had to withdraw from the game claiming that he felt some stomach pain. The darker it became, the more difficulty Ahmed had in seeing people and things. Then he only managed to get back home accompanying his friends Omer and Khalid who lived next door to him. They did not notice his night blindness.

As soon as he got in his house, he fell over his mother's "angaraib-bed" and over the small table where his mother has left his supper for him. The dish fell on the ground with the "assida" in it. His mother was very angry and shouted at him: "What is the matter with you? Don't you have eyes?" Ahmed was frightened and trembled. He said nothing other than "sorry!" Then his mother brought him another dish of "assida" which he at with difficulty because he could not see properly. Then he went to sleep.

During the whole of the following week, Ahmed continued his habit of falling over things by night. He could not see where his things were, and his mother kept on shouting at him every time he falls over something or breaks another. He stopped going out to play with his friends so as not to feel embarrassed when he falls.

His friends Omer and Khalid noticed his absence and came to see him. Omer asked him: "What is wrong with you? Why don't you come out and play with us anymore?" And Khalid asked: "Are you angry with us Ahmed?" But Ahmed kept silent and could not reply.

Finally, Ahmed decided to tell his mother because he could'nt hide his problem any longer. His mother was first disturbed, but later thought that it was not serious and that her son will be all right in a few days. She thought what he needs is just cleaning his eyes with hot water and kept on doing this. One month passed and Ahmed's eyes were worse than ever. Not only that, but his sister Aisha started to complain about difficulty seeing by night.

Fatima felt miserable and unhappy every time Ahmed's friends Omer and Khalid came to visit him. She used to complain to the women of the village of how unlucky she was to have both her two kids sick while her neighbor Amna's three boys were all healthy and fit and have good eyes.

Amna heard from another woman what Fatima said to the other women. She went to visit Fatima and greeted both her children Ahmed and Aisha. Then she said to Fatima: "Do you remember Fatima the day I asked you to come with me to the meeting with health worker Awad at the boys' school? You refused to come and said that those were just the government people coming to waste our time, and that you need not hear anyone advise you about good health."

That day, many women from the village of Oum El Kheir came to the boys' school to listen to the health worker's advice. Most of his talk was about good food that ought to be given to the children.

The health worker told them that something called vitamin A is very important for the protection of the children's eyes. He said that this vitamin is found in the milk that infants get during the first months after being born if they are breast-fed directly from their mothers for at least one year. He also said that if the children do not get enough of this vitamin A, they may go blind. This very important vitamin, he said, could also be found in many other sources of food like all the dark green leafy vegetables such as "jir jir", "molokhia", and "sparcely". And also in yellow vegetables like pumpkins and carrots. He told us that vitamin A is also found in yellow fruits like mangos and papaya. And it can be found in eggs, meat, chicken, fish, milk and milk products like cheese, butter, and yogourt. Many of the sources he mentioned were available in Oum El Kheir village like molokhia, pumpkins, milk, meat, and eggs and it should be easy for the women to supply their children with vitamin A to protect their eyes from going blind.

The health worker told the village women to remind their husbands to grow the vegetables and fruits in their farms and to save the money they would spend to buy foods rich of vitamin A, and to try to keep some chickens and goats in their homes to supply them with eggs and milk.

Awad also told them that it wasn't a problem if different sources of vitamin A are found in other regions of Sudan and they can use only some of the sources he mentioned and not necessarily all the sources of vitamin A.

Since that day, Amna started to cook more molokhia, pumpkins, waraq, and salij for her kids Omer, Khalid, and Hassan. And she gave them green salad with "jir jir" and carrots, and also gave them mangos, milk, eggs, meat, and yogourt whenever possible. Amna could not find papaya, but the health worker said to her that it wasn't important to give all these vegetables and fruits and she should give what was available. Amna can give one or two vitamin A foods daily as there are many to choose from. She also asked her husband Abdalla to grow these vegetables and fruits in his farms which he did, so she did not have to buy them from the market. Because of this, her children's eyes were kept in good health. But if she didn't give her children to eat these vegetables and fruits, they could get this night blindness. Fatima insisted on giving her children just "assida", "weika", and whitebeans all the time. This is, of course, not enough. So Fatima is not unlucky as she said, but she is a little bit uncareful.

When Fatima Bint El Zain heard all this, she started to cry and felt sorry to have missed all this important information by not going to hear the health worker. But Amna said to her: "No need to cry now my dear, but you should start now to give your children vegetables, fruits, and other foods rich of vitamin A like "molokhia", pumpkins, "waraq", "salij", "jir jir", carrots, mangos, as well as eggs and fresh milk. Then you will see their eyes become better. Ahmed and Aisha will never catch night blindness again. But first let us take them to the dispensary and ask the medical assistant to see them.

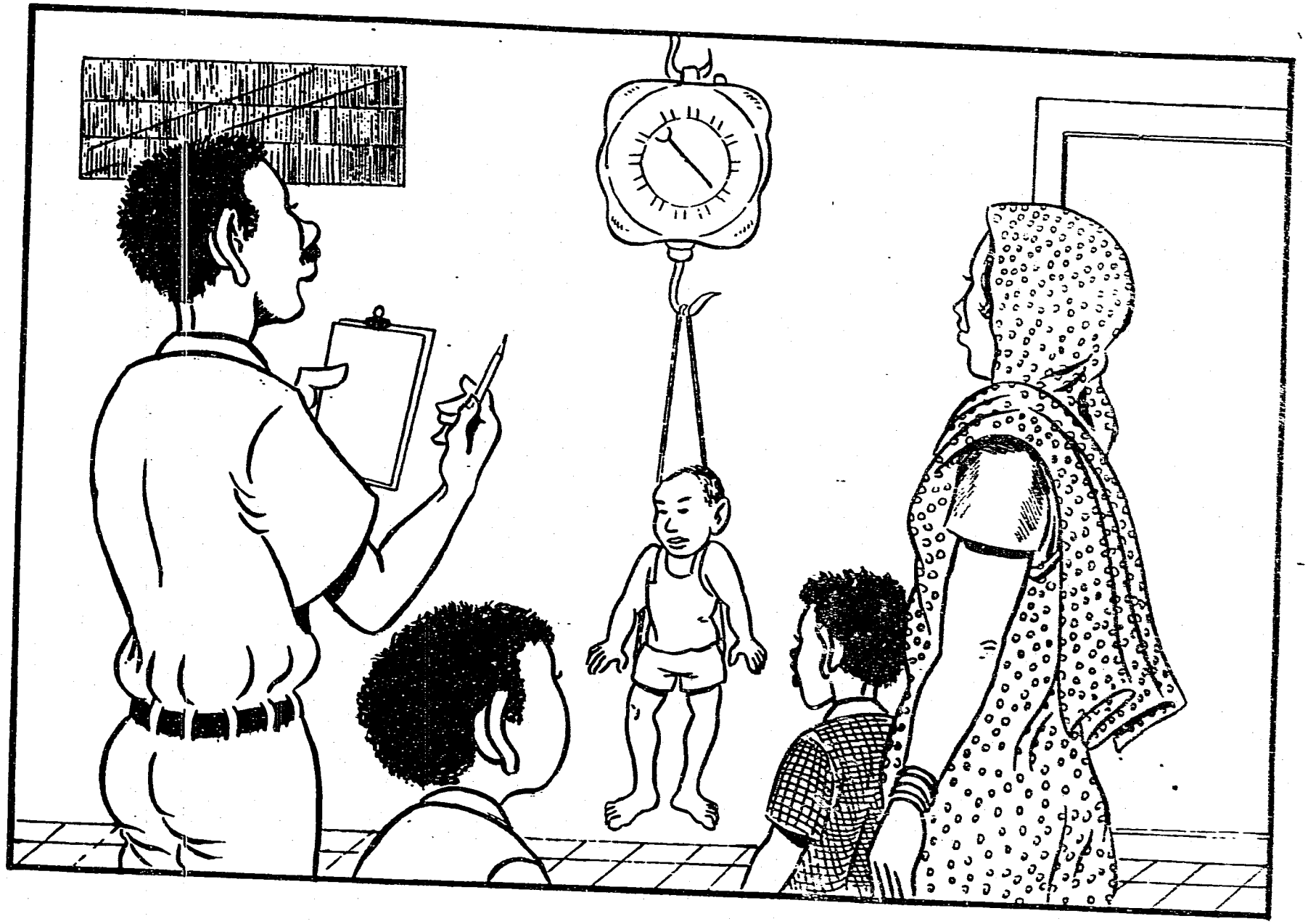
Fatima followed that advice and went with Amna to the dispensary. The medical assistant gave both Ahmed and Aisha one capsule of vitamin A for each. He then told Fatima that she should have brought her children earlier and told her that all this happened because she did not give the right food to her children. He encouraged her again to give her children foods rich of vitamin A such as milk, eggs, "molokhia", "jir jir", carrots, pumpkins, mangos, and meat which are all easy to find in Oum El Kheir. He also told her to bring both children tomorrow for more capsules of vitamin A. He said: "Thank God, Ahmed and Aisha had not gone completely blind, but you should take more care about their health."

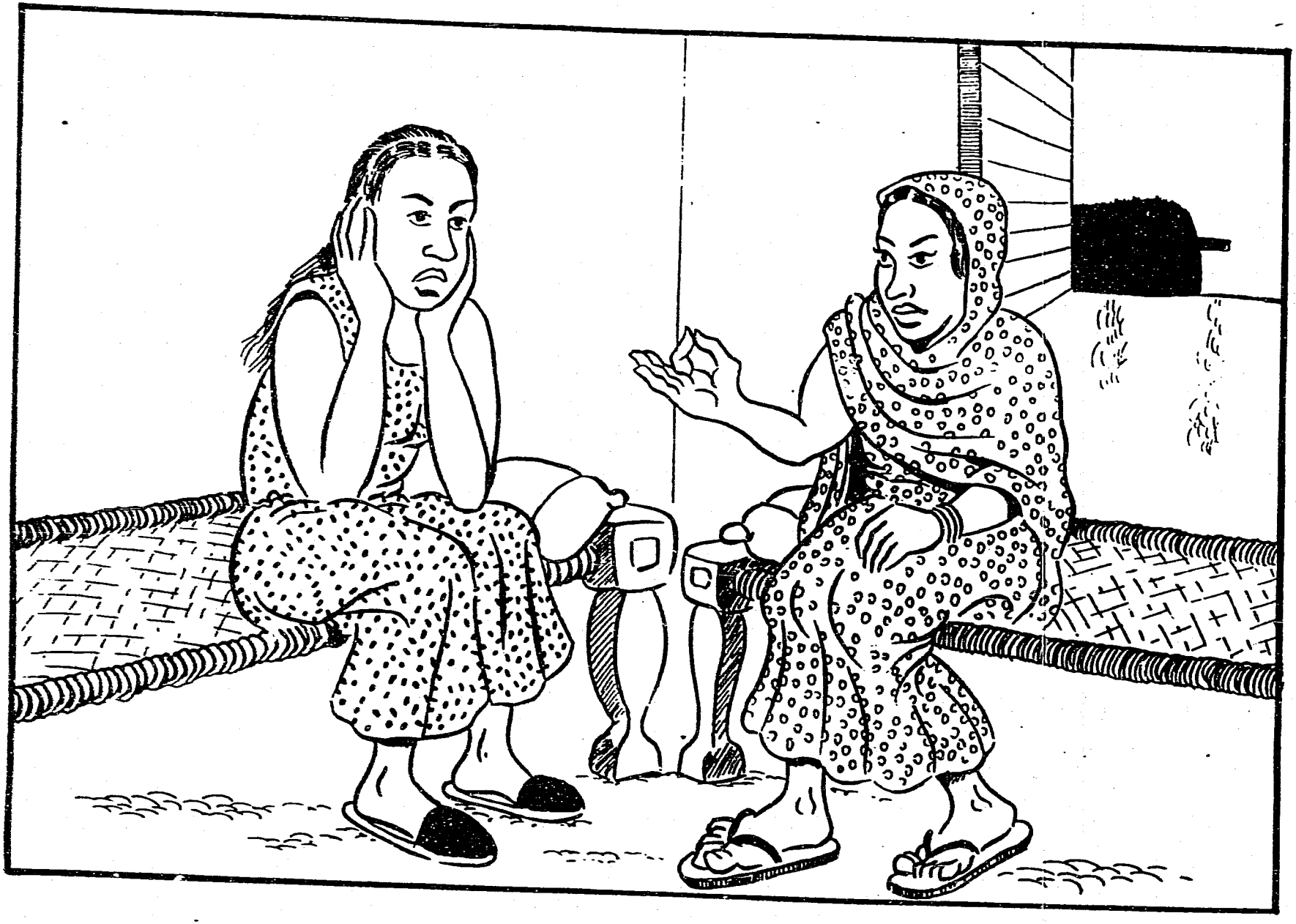
Fatima did what the medical assistant told her and continued her visits to the dispensary for the tablets. She always gave her children vegetables rich in vitamin A like pumpkins, "molokhia", "salij", "waraq", "jir jir", carrots, mangos, and papaya as well as fresh milk and eggs. She also convinced her husband Mohamed to grow more of these vegetables and fruits in his farm.

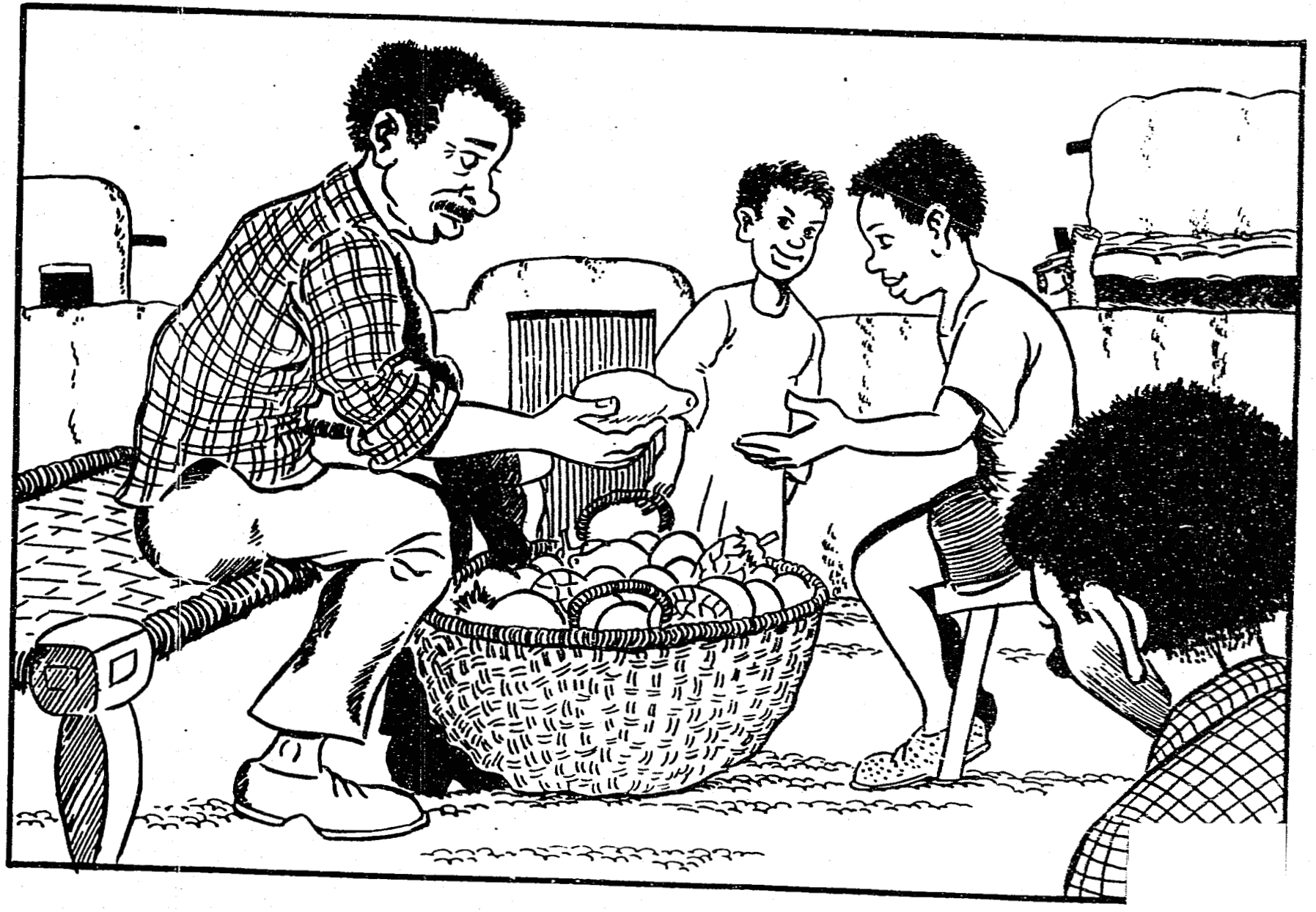
A few weeks later, both Ahmed and Aisha became well and fit. Ahmed's friends were particularly happy to see him play Shileil and football with them again. He even became better and kept on beating them until they called him "Ahmed Shileil".

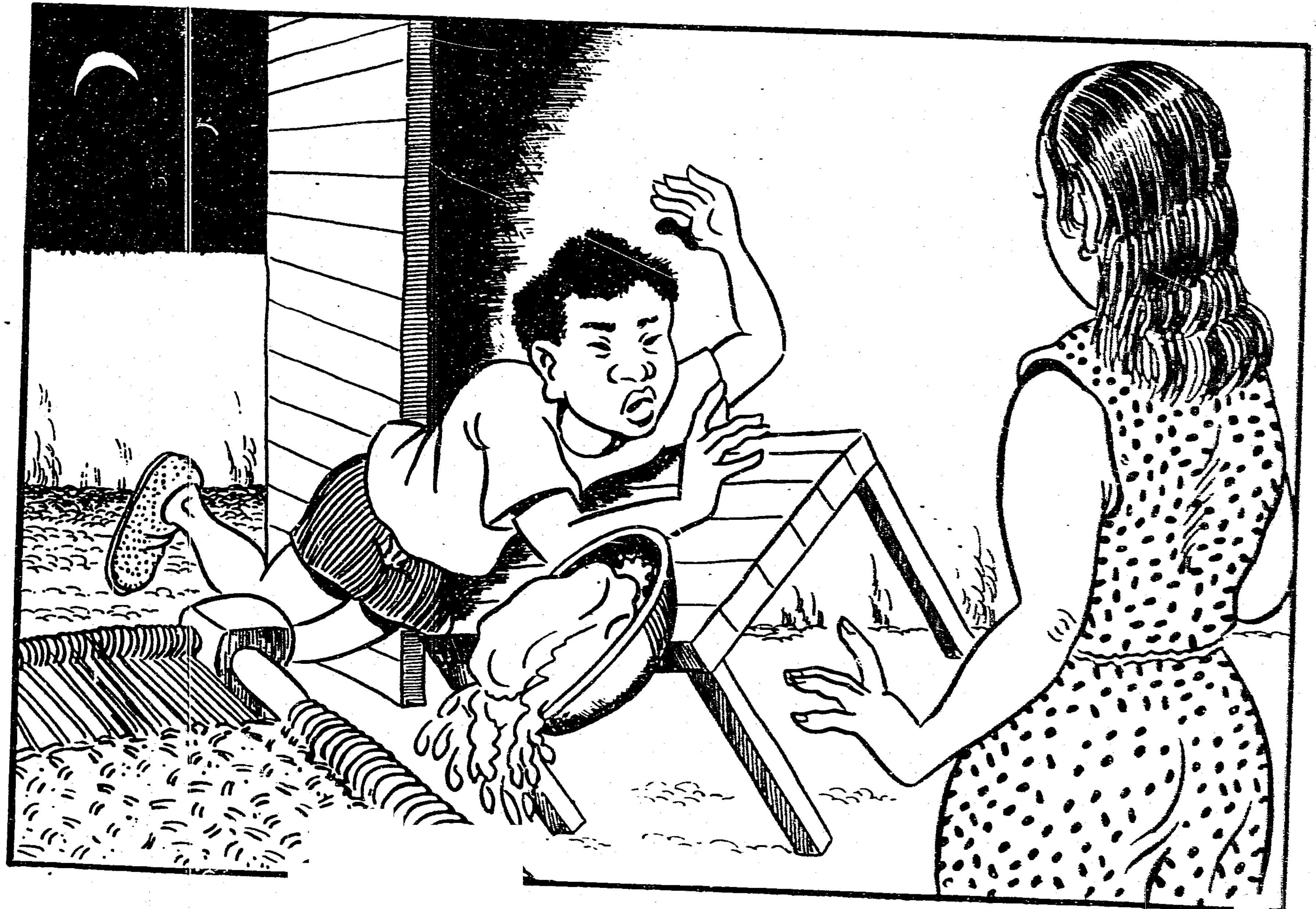
Aisha grew up to become a very pretty girl who has very beautiful eyes until her friends called her "Aisha Oum Eyon" which means "Aisha - the girl with beautiful eyes".

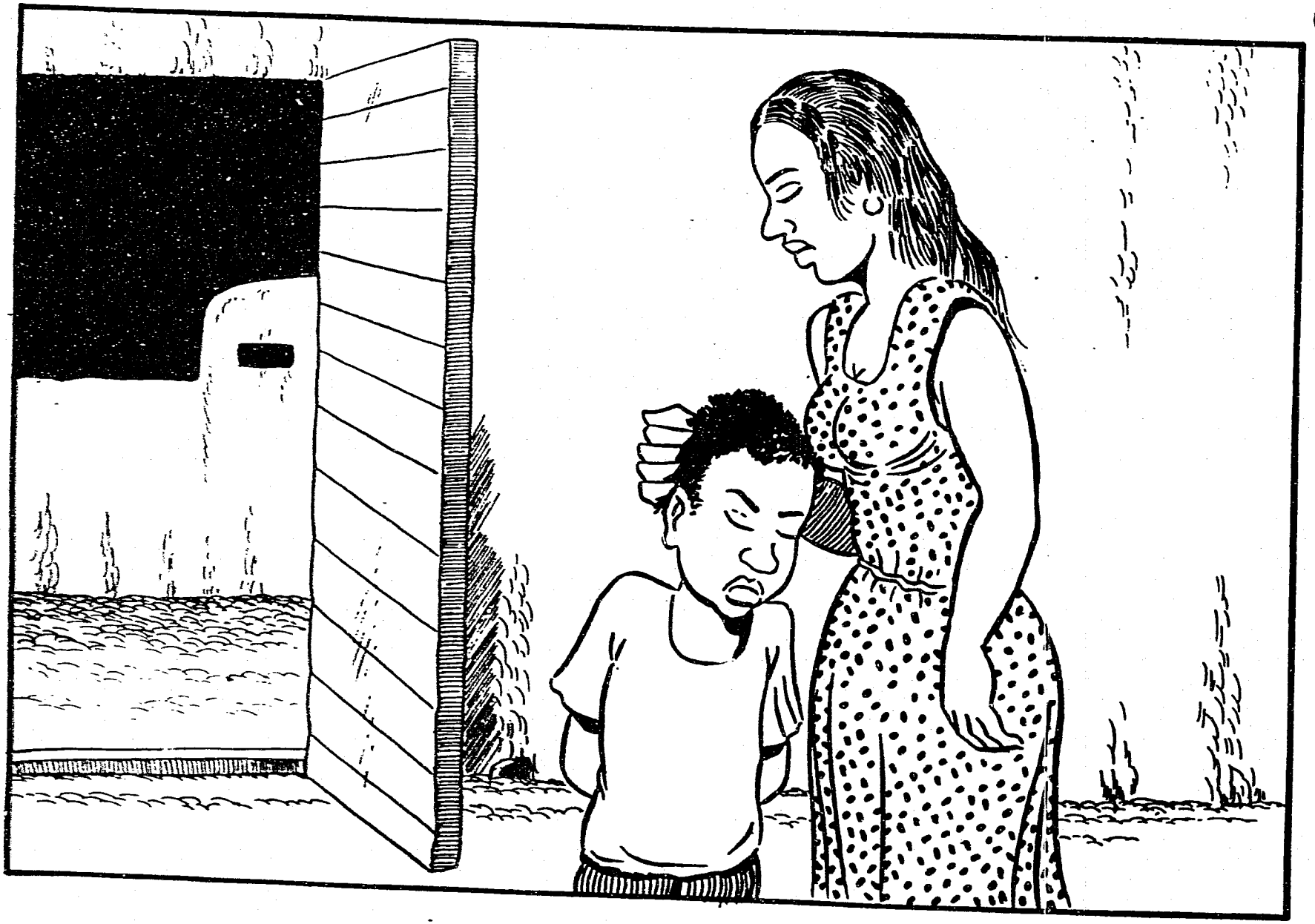
Fatima and Amna became best friends and everybody in the village after that knew how important it is to feed children with vitamin A rich foods like "molokhia", etc. And so the eyes of all the children in the village became healthy and good.

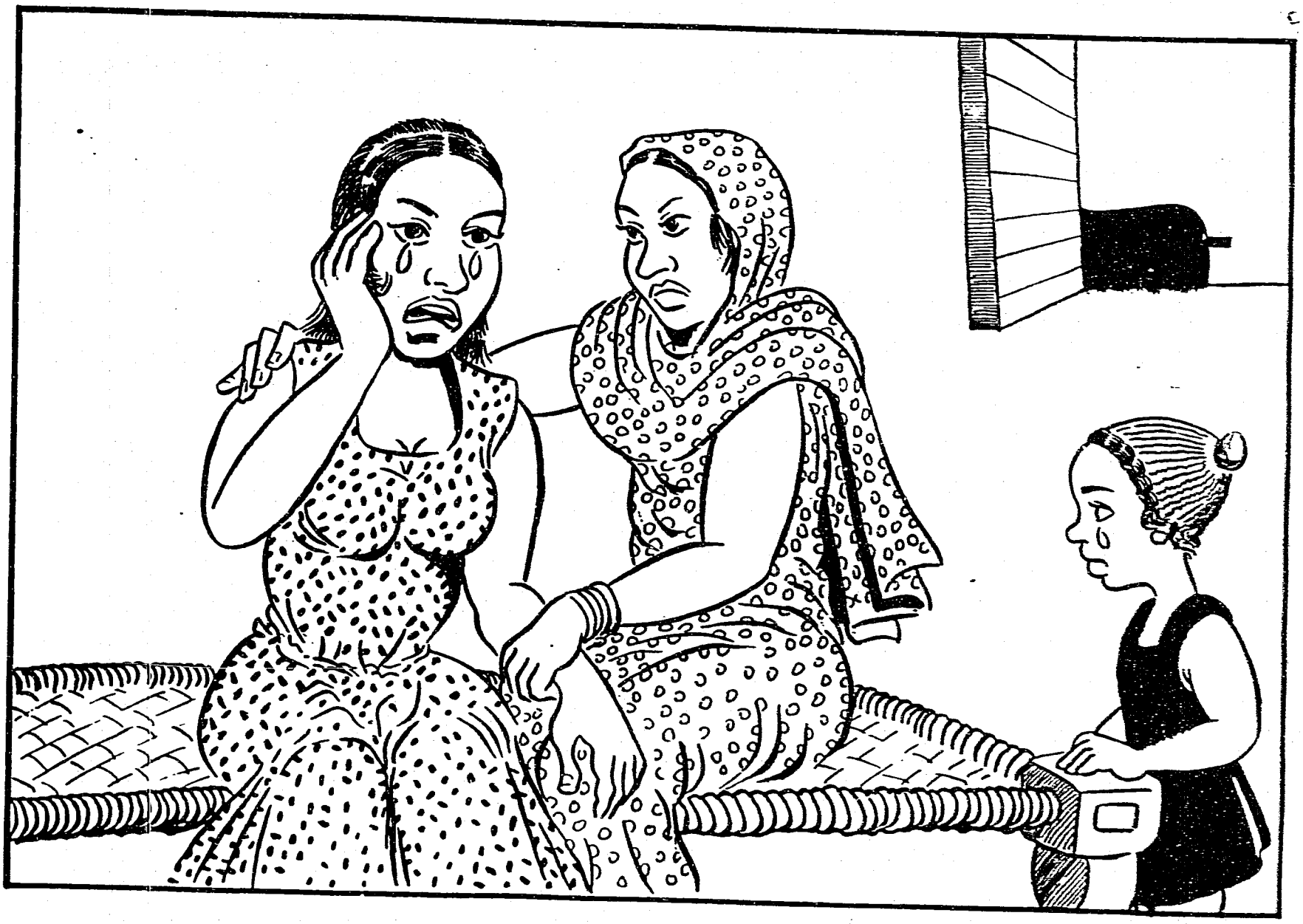


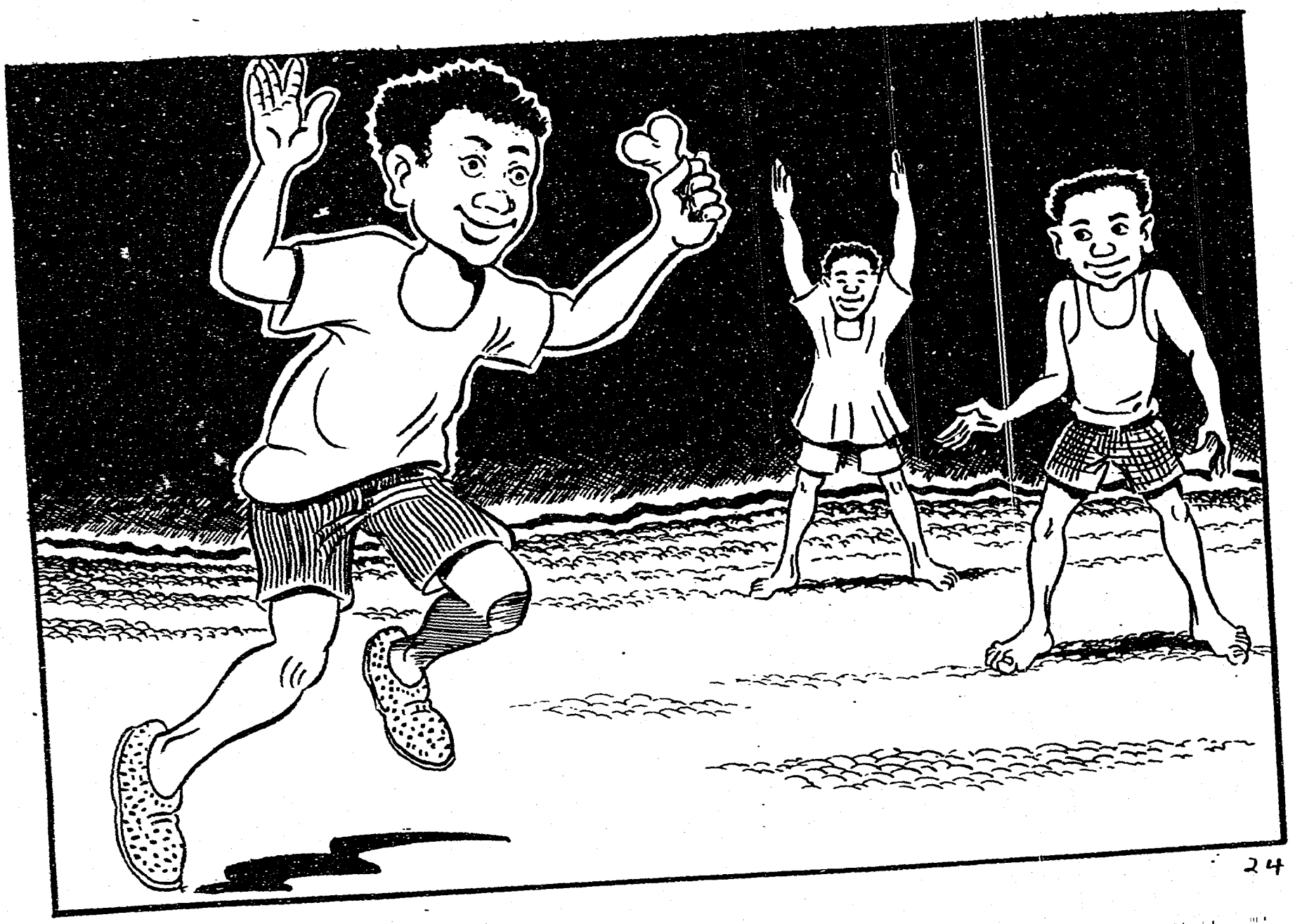












ATTACHMENT XI

Name: _____ District Council: _____

Date: _____ Rural Council: _____

PRE-POST TEST

FOR HEALTH WORKERS IN SUDAN

This is a test to find out how much you know about vitamin A and the prevention of blinding malnutrition.

Read each question and the answer choices completely. Then choose the one best answer. Put a tick next to the answer you choose.

Example:

The purpose of the eye is to:

_____ a. smell.
_____ b. hear.
__√__ c. see.
_____ d. taste.

1. The parts of the eye that are affected by blinding malnutrition are:

_____ a. the eyelids and eyelashes.
_____ b. the pupil and the eyelids.
_____ c. the cornea and the white part.
_____ d. the pupil and the white part.

2. Which vitamin does the eye need to prevent blindness?

_____ a. vitamin A.
_____ b. vitamin B.
_____ c. vitamin C.
_____ d. vitamin D.

3. The people who are at high risk of blindness caused by malnutrition are:

_____ a. school children.
_____ b. girls age 7-10 years.
_____ c. newborns who are breast-feeding.
_____ d. children under age 6 years.

4. The medical word for blinding malnutrition is:

_____ a. cataract.
_____ b. xerophthalmia.
_____ c. cornea.
_____ d. conjunctivitis.

5. The first sysmptom of blinding malnutrition is:

_____ a. night blindness.
_____ b. red eyes.
_____ c. cataract.
_____ d. Bitot's spots.

6. Blinding malnutrition causes the following signs which you can see:

_____ a. Bitot's spots and cataract.
_____ b. corneal ulcers and cataract.
_____ c. Bitot's spots, corneal ulcers, corneal scars.
_____ d. corneal ulcers and cataract.

7. When blinding malnutrition affects the cornea, the eye can become blind in:

_____ a. 1 week.
_____ b. 2 weeks.
_____ c. 5 days.
_____ d. 24-48 hours.

8. Which preventable disease seriously increases the risk of blindness in a malnourished child?

_____ a. tetanus.
_____ b. measles.
_____ c. polio.
_____ d. whooping cough.

9. Which condition seriously increases the risk of blindness in a child with malnourished child?

_____ a. common cold.
_____ b. asthma.
_____ c. diarrhea.
_____ d. scabies.

10. To TREAT a child with the signs and symptoms of blinding malnutrition, how many doses should you give to the child?

____ a. 2 doses every week for 1 month.
____ b. 1 dose every day for 1 week.
____ c. 1 dose every 6 months.
____ d. 3 doses: 1 today, 1 tomorrow, 1 after 2 weeks.

11. The strength of the dose should be:

____ a. 200,000 IU.
____ b. 50,000 IU.
____ c. 200 mg.
____ d. 50 mg.

12. To prevent blinding malnutrition, all children in high risk communities should receive one dose:

____ a. every year.
____ b. every month.
____ c. every 6 months.
____ d. every 2 months.

13. The vegetables that prevent blinding malnutrition are:

____ a. cucumber, millet.
____ b. leafy green vegetables, carrots.
____ c. potatoes, millet.
____ d. dura, cassava.

14. The fruits that prevent blinding malnutrition are:

____ a. lemon, guava.
____ b. grapefruit, watermelon.
____ c. figs, dates.
____ d. mango, papaya.

15. Good weaning practices prevent blinding malnutrition in infants. Fruits and vegetables should be added to the child's diet at age:

____ a. 4-6 months.
____ b. 6 weeks.
____ c. 1 year.
____ d. 1-2 months.

16. The mass distribution of doses to prevent blinding malnutrition must be done at the time when children are at hightest risk of blinding malnutrition. This time is:

____ a. after the harvest seasons.
____ b. during Ramadan.
____ c. before the harvest of fruits and vegetables.
____ d. during Eid.

17. Other foods that prevent blinding malnutrition are:

____ a. Eggs, forsa, robb, liver.
____ b. Oranges, grapefruits.
____ c. Pepsi, Vimto.
____ d. Bread, cake.

18. When you treat a child for blinding malnutrition, you should record:

____ a. How many brothers and sisters the child has.
____ b. The date and dosage given.
____ c. The color of the child's eyes.
____ d. If the child goes to school.

19. You must send in a report to the district health office conerning the children that you treated for blinding malnutrition. You must send in this report:

____ a. Daily.
____ b. Weekly.
____ c. Monthly.
____ d. Every six months.

20. One of the most important activities that you can do to prevent blinding malnutrition is to:

____ a. do regular reports.
____ b. attend seminars.
____ c. read about nutrition.
____ d. do nutrition education in the community.

Answer Key:

1. c
2. a
3. d
4. b
5. a
6. c
7. d
8. b
9. c
10. d
11. a
12. c
13. b
14. d
15. a
16. c
17. a
18. b
19. c
20. d

FOR TEACHING HEALTH WORKERS IN SWAZI

ATTACHMENT XII

PREVENTION OF VITAMIN A DEFICIENCY AND BLINDING MALNUTRITION

NO.	TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
1.	Opening Remarks	15 mins.	General 1. Participants meet each other and understand that they will learn and work together. Specific 1. Participants know each other's names and work together.	1. Classroom	1. Discussion.	1. Name tags	1. Ask each participant to introduce him or herself and say where they come from. 2. Remember, they must not be shy because they will practice eye examinations on each other.
2.	Pre-Test	30 mins.	1. To learn what each student already knows about vitamin A deficiency and blinding malnutrition.	1. Classroom	1. Practice	1. Pre-Tests 2. Blackboard	1. Explain the test and the types of questions used. Explain the multiple choice and the True/False questions and how the participants should make the answers. 2. Observe the participants. Ask if anyone is having difficulty understanding the test.
3.	I. Introduction	15 mins.	General 1. Participants understand that vitamin A deficiency can lead to blindness in children. Specific 1. Participants will understand that most of this blindness is preventable or curable. 2. They can explain their role in preventing blindness.	1. Classroom	1. Lecture 2. Discussion	1. Training Manual pg. 3 2. Blackboard	1. Explain that blindness can be prevented. 2. Ask the participants if they know how blindness affects an individual a family, a community, a country. 3. Ask the participants if they know anyone who is blind and how it affects that person and his family.

24

TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
II. Vitamin A Deficiency and Xerophthalmia	3 hours					
A. Definitions	1 hour	General 1. Participants understand the definitions of vitamin A, vitamin A deficiency, xerophthalmia. Specific 1. They are able to explain the meanings of these words.	1. Classroom	1. Lecture 2. Question & Answer.	1. Training manual pg. 4 7 2. Blackboard.	1. Ask the participants to take turns reading the definitions. 2. Ask them to discuss what happens to the remaining vitamin A after the body has used all that it needs for the day. 3. Ask them how long vitamin A can be stored in the liver.
B. At Risk Groups and Contributing Factors	2 hours	General 1. Participants understand that certain groups of people are at risk of blinding malnutrition. Specific 1. They can list the groups who are at high risk of blinding malnutrition. 2. The can explain which groups in their communities are at high risk and why.	1. Classroom	1. Lecture. 2. Question & Answer. 3. Discussion.	1. Training manual pages 5,6,7. 9	1. Ask the participants list the groups at high risk of vitamin A deficiency and blinding malnutrition. List the groups on the blackboard. 2. After each group listed, write the names of the vitamin A foods that each group eats. 3. Ask the participants to tell you when these foods can be missing from the diet and why.

NO.	TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
7.	C. Ocular Signs and Symptoms	1½ hours	General 1. Participants understand how a normal eye should look. 2. Participants understand that blinding malnutrition causes symptoms and signs that they should know and be able to recognize. Specific 1. Participants can name the parts of the eye that they can see. 2. Participants can name the symptoms and signs that that are caused by vitamin A deficiency. 3. Participants can show where the signs appear in in the eyes. 4. Participants can tell you which is the most serious sign which can lead to blindness.	1.Classroom.	1. Lecture. 2. Demonstration. 3. Question & Answer. 4. Practice. 5. Role Play.	1. Training Manual pages 8,9,10. page 4. 2. Blackboard. 3. Photocards. 4. Each others Eyes.	1. Ask the participants to memorize the 4 Rules for a Normal, Healthy Eye. 2. Ask the participants to look at the diagram of a normal eye. Then, ask them to each take a partner and look at each other's eyes and find the parts of the eye seen in the diagram. 3. Ask the participants to look at the diagrams of the eye signs shown in the manual and find them also on the photocard. 4. Ask them to be sure to see the normal, clear corneas in their own eyes. Then point out the serious changes that happen to the cornea that lead to blindness. 5. Ask them if they have ever seen a child with night blindness. Have they heard the words "jakar", "asha lele", or "abganfate". Are there other local words for night blindness?

NO.	TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
	1. Field Trip to Pediatric Ward. 1. Review 2. Field Visit	4 hours 1 hour 3 hours	General 1. Participants understand the importance if being able to examine an eye and to look for the signs of blinding malnutrion. Specific 1. They are able to explain and to examine an eye. 2. They can tell the trainer if they find any child with eye signs of vitamin A deficiency.	1. Classroom. 2. Pediatric Ward.	1. Lecture. 2. Demonstration. 3. Question & Answer. 4. Practice.	1. Training Manual pg. 11.	1. First thing in the morning, review the symptoms and signs of blinding malnutrition. 2. When they go to the pediatric ward, ask the participants to break into groups of 4 people per group. Each group should examine the children's eyes and look for signs of blinding malnutrition. 3. When a health worker finds child with any eye signs of blinding malnutrition, the health worker should call the teacher to come and also examine the child. If the child has any signs of blinding malnutrition, or if the mother says that the child has night blindness, the other participants also should examine the child.

			OBJECTIVES	ACTIVITY			
9.	E. Treatment of Xerophthalmia.	1½ hours	General 1. Participants understand the correct dosage of vitamin A used for treatment. 2. Participants understand the correct technique for giving vitamin A to children. Specific 1. Participants can explain the recommended dosage of vitamin A for children who have signs and symptoms of blinding malnutrition and for children who have measles. 2. Participants can explain which patients they can treat with vitamin A and which patients they must refer to the medical assistant for treatment. 3. Participants can explain what they should do if they find a pregnant or lactating woman with signs and symptoms of blinding malnutrition. 4. Participants can explain what they should do for children who have diarrhea.	1. Classroom.	1. Lecture. 2. Question & Answer. 3. Practice. 4. Role Play.	1. Training Manual pages 12, 13,14,15. 2. Blackboard. 3. Photocards. 4. Vitamin A capsules. 5. Scissors or a knife. 6. Vitamin A liquid. 7. Large syringes.	1. Read page 12 in the manual 2. Point out the treatment schedule on the photocards. 3. Ask the participants what is the amount of vitamin A that is in one dose, how many doses are given for treatment, and what is the dosage amount for children aged less than one year. Write these on the blackboard. 4. Ask the participants to once again take a partner. Pass out the vitamin A capsules and ask the participants to practice cutting off the nipple and squeezing out the vitamin A. 5. If you have liquid vitamin A, let the participants practice drawing out the liquid vitamin A and squeezing out 1 ml. which is one 200,000 IU dose. 6. Ask the HAs, CHWs, and Midwives when they should give a 200,000 IU dose of vitamin A to a new mother. 7. Ask the CHWs to tell you which people they can treat with vitamin A and which people they should refer to the medical assistant for treatment.

NO.	TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
18.	F. Prevention of Vitamin A Deficiency	2½ hours	General 1. Participants understand that vitamin A deficiency and blinding malnutrition can be prevented. 2. They understand that prevention is done with proper foods and with vitamin A when necessary. 3. They understand that other child care activities (GOBI-FFF) work together with vitamin A to prevent blindness. Specific 1. Participants can explain the dosage, number of doses, and schedule for distributing vitamin A to prevention of blinding malnutrition. 2. They can tell you which age group receives the prevention dose of vitamin A. 3. They can list the foods found in Sudan that are rich in vitamin A. 4 They can tell you which food preparations contain vitamin A and are good for children	1. Classroom.	1. Lecture. 2. Discussion. 3. Demonstration. 4. Question & Answer.	1. Training Manual pages 16,17. 2. Appendix I. 3. Appendix II. 4. Photocards. 5. Blackboard.	1. Read the manual pages 16 and 17. 2. See the prevention schedule on the photocards. 3. Ask the participants to break into groups of 4 for 30 minutes. In their groups, they should take turns reading each section of Appendix I. 4. Then ask them to read Appendix II which is the food values list. 5. After 30 minutes, they should come back again to one group. Ask the participants to list the 10 foods which are highest in vitamin A (over 5,000 IU per 100 grams of edible food). List them on the blackboard. 6. Ask the participants to list the food preparations that contain vitamin A foods. List them on the blackboard. 7. Ask the participants if they know about any other food preparations that contain vitamin A foods and that children will like. Write these on the blackboard.

NO.	TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
11.	III. Nutrition and Public Education.	1½ hours	General 1. Participants understand the importance of doing nutrition education in their communities. Specific 1. Participants can list groups of people who would be good to talk to about nutrition education. 2. They can demonstrate the use of the flip chart for teaching people how to prevent blinding malnutrition with vitamin A foods.	1. Classroom.	1. Lecture. 2. Demonstration. 3. Question & Answer. 4. Practice. 5. Role Play.	1. Training Manual pg.18. 2. Photocards. 3. Flip Chart.	1. Read page 18 of the manual. 2. Ask the participants to list the groups of people to talk to about nutrition education. Ask them if they know of any other good groups to talk to. Write the list on the blackboard. 3. Ask the participants of ways that mothers can prepare vitamin A foods so that children will like them and eat them. 4. Ask the participants to each take a partner and practice demonstrating the story in the flip chart to each other.

IC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
erding erting.	1 hour	General 1. Participants understand the importance of proper record keeping and reporting. Specific 1. The participants can explain the information that should be written on the clinic card or the RTH card of a child who has been treated with vitamin A. 2. They can explain how to to submit monthly reports showing how many children were treated with vitamin A and how many doses were given out. 3. They can show you how to keep a register for all children under age 6 years who received a prevention dose of vitamin A. 4. They can explain how to submit a report to the district health office showing the number of children under age 6 years who recieved the prevention dose, how many doses are remaining in stock, and how many doses will be needed for the next 6 months.	1. Classroom.	1.Lecture. 2.Demonstation. 3.Practice.	1.Training Manual 19,20,21. 2.Sample Record Forms. 3.Pencils. 4.Blackboard.	1. Ask the participants to read pages 19,20, and 21 in the manual. 2. Discuss the important information that must be written on the clinic and RTH cards, and in the reports that go to the district health office. 3. Pass out the blank forms for that show a sample clinic card, monthly report, prevention dose register, and prevention dose report. Make up names and other information and ask the participants to practice writing the information on the forms. 4. Observe if any of the participants are having any problems filling in the forms. If so, help them to fill in the forms correctly.

NO.	TOPIC	TIME	INSTRUCTIONAL OBJECTIVES	LEARNING ACTIVITY	METHOD	TOOLS	TEACHER'S NOTES
13.	Post-Test	30 mins.	1. To see if the participants have learned the information well. 2. To evaluate how well the training program has done.	1. Classroom.	1.Practice.	1.Post-Tests. 2.Blackboard.	1. Pass out the post-tests. Explain that this is the same test that they took at the begining of the program. 2. Observe the participants to see if anyone is having a problem. If so, help them.
14.	Closing Remarks	Few mins.		1. Classroom.			1. Thank the participants for their attendance and their attention. Add your own closing remarks.

ATTACHMENT XIII

VITAMIN A PROGRAMME

There are two vitamin A regimens. The first is for treatment of active vitamin A deficiency and the second is a prophylactic programme.

TREATMENT OF ACTIVE VITAMIN A DEFICIENCY

Vitamin A capsules containing 200,000 iu will be used. The dosage is as follows:

Today	1 capsule of 200,000 iu
Tomorrow	" "
Two weeks later	" "

Children between 6 and 11 months get half a dose, ie 100,000 iu.

Children with measles get a full 3 dose course of treatment.

Lactating women get one dose of 200,000 iu immediately after delivery or during the first month of delivery only.

PREGNANT WOMEN MUST NEVER BE GIVEN HIGH DOSES OF VITAMIN A.

PROPHYLACTIC PROGRAMME

Give to all children between 1 and 6 years:

One 200,000 iu vitamin A every 6 months

The dose for children between 6 and 11 months is:

Half a 200,000 iu capsule, ie 100,000 iu, every 6 months

DOSING TECHNIQUE

Cut the nipple off the capsule. Squeeze the contents of the capsule directly in to the child's mouth. If the child is less than one year, and only 100,000 iu are to be given, squeeze out and discard half the capsule. Then squeeze the remaining vitamin A directly in to the child's mouth.

Never give a child a capsule and assume he has swallowed it.

All people receiving Vitamin A must have the quantity + date recorded on the health/EPI card.

ATTACHMENT XIV

Population and PVOs Responsible for
Refugee Camps in Eastern Sudan

Camps	Population	PVO Responsible
I. Reception Centers		
Safawa I & II	18,403	American Refugee Committee (ARC)
Shagarab I	20,001	Christian Outreach
Shagarab II	12,129	Christian Outreach
Shagarab III	13,365	Christian Outreach
Wad Sherefe	10,024	Swiss Red Cross
II. Settlement Camps		
Abuda	4,799	Llamba
Abu Rakham	3,640	International Rescue Com. (IRC)
Adingrar	5,440	Sudan Council of Churches (SCC)
Dehema	5,950	SCC
Fau V	4,161	ARC
Hawata	3,517	YMCA/IRC
Karkora	11,904	Save the Children-U.S. (SCF) & SCC
Kashmel el Girba	11,798	InterAid
Kilo 5	2,577	COR
Kilo 7	1,664	SCC
Kilo 26	12,069	League of Red Cross
Mefaza	3,211	IRC
Salmin	6,990	SCC
Suki Alsid	2,512	SCC
Tawawa	13,063	Rada Barnen/IRC
Tenedba	2,713	SCC
Um Ali	3,000	Lalmba
Um Brush	5,560	SCC
Um Gargur	8,244	SCC
Um Gulja	5,282	SCF (U.S.)
Um Rakuba I	8,629	SCC
Um Rakuba II	2,709	Rada Barnen
Um Sagata	7,516	SCC
Wad Awad	1,331	IRC
Wad el Heleau	12,010	Lalmba

GUIDELINES FOR THE PREVENTION OF VITAMIN A DEFICIENCY AND XEROPHTHALMIA

REFUGEE CENTERS AND SETTLEMENTS

A. Definitions:

1. Vitamin A.

Vitamin A is needed so that the body, and especially the eyes, can remain healthy. The retina in the back of the eye needs vitamin A to function well after dark and when there is very little light. Also, the tears need vitamin A to be of good quality in order to nourish the cornea and conjunctiva so they remain wet and shiny.

Foods which are rich in vitamin A are dark, leafy green vegetables such as spinach, mollokhia, and jirjir. Yellow vegetables such as carrots and yellow pumpkin. Fruits such as mango and papaya. Animals sources rich in vitamin A are milk, eggs, liver, meat, small fish, and fish oil.

Every day, the body uses some of the vitamin A eaten in foods. The rest of the vitamin A that is not used is stored in the liver. Vitamin A that is stored in the liver can be used when the need for vitamin A is great (time of fever, measles, diarrhea) or when a child is not eating enough foods with vitamin A. If a child cannot eat some vitamin A foods every day, the child will begin to take vitamin A from the liver store. The vitamin A stored in the liver will last for about 4 to 6 months only. Children must eat some vitamin A foods every day so that the vitamin A in the liver can remain to be used only when the need is great.

2. Vitamin A Deficiency.

If children do not eat some vitamin A rich foods daily, their bodies begin to use the vitmain A that is stored in the liver. As the liver store runs low and is not replaced, they develop vitamin A deficiency. Children with vitamin A deficiency are at risk of blindness.

3. Xerophthalmia.

"Xerophthalmia" is the medical word which describes the group of eye signs and symptoms caused by vitamin A deficiency. Vitamin A deficiency can lead to "xerophthalmia" which is more commonly called "blinding malnutrition".

B. Importance

In communities where people do not get foods rich in vitamin A, xerophthalmia is the major priority in the prevention of blindness. This is because of the following points:

1. Xerophthalmia causes blindness in children under age 6 years.

2. Corneal signs of xerophthalmia can cause destruction of the cornea and blindness in 24-48 hours if not treated.

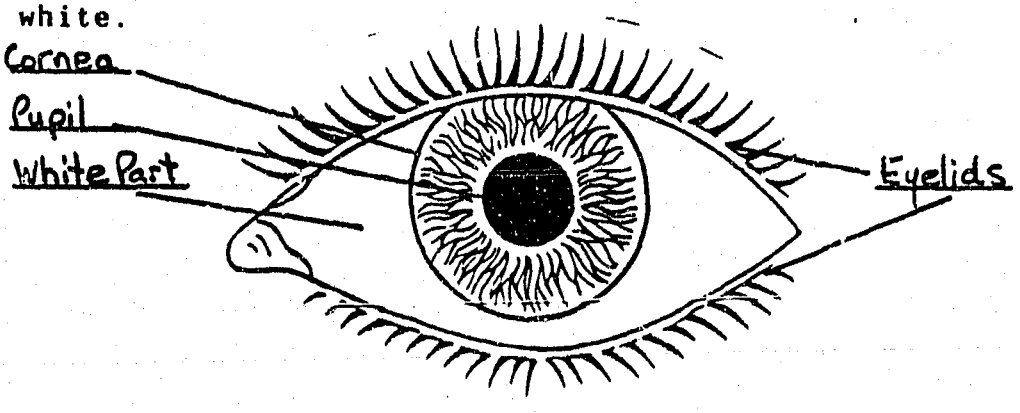
C. Recognition of the signs and symptoms of xerophthalmia:

We must know the parts of the eye so that we can tell the signs of blinding malnutrition. First we will learn the four rules for a normal, healthy eye:

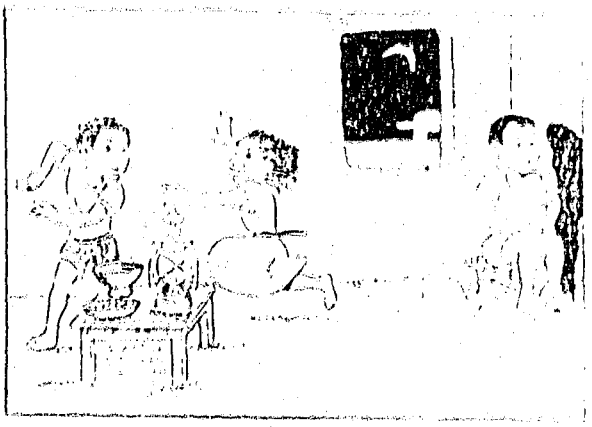
Four Rules for a Normal, Healthy Eye:

1. The cornea should be clear.
2. The pupil should be black.
3. The white part should be white.
4. The eyelids should open and close properly.

Below is a diagram of the parts of the front of the eye. You will also see the "conjunctiva". The conjunctiva is a clear covering of the white part of the eye. When the conjunctiva is clear and normal, the white part remains white.



Signs and symptoms of xerophthalmia:



1. Night blindness:

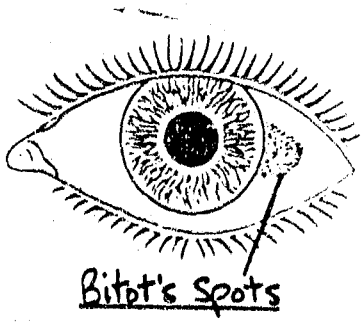
   Night blindness is the earliest symptoms of xerophthalmia. The affected child does not see under conditions of reduced light such as at dusk or in a darkened room. He may stumble over objects or may not eat his evening meal because he cannot find his food.

2. Conjunctival xerosis:

   The conjunctiva appears dry and dull. It is not shiny bright. Sometimes, in severe stages, it appears wrinkled and skinlike.

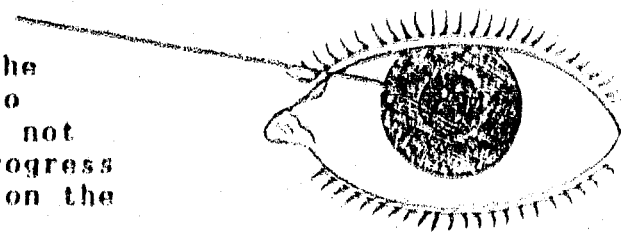
3. Bitot's spots:

   Although Bitot's spots differ somewhat in size, location, and shape, they have a similar appearance. They are accumulations of whitish grey material on the conjunctiva and appear as foamy or cheesy white spots.



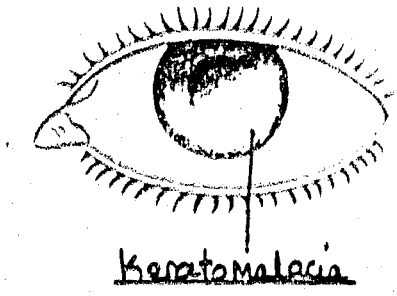
4. Corneal xerosis/ulceration:

"Xerosis" means dryness. The cornea becomes dry and is no longer clear and shiny. If not treated, the dryness can progress very quickly into an ulcer on the cornea.



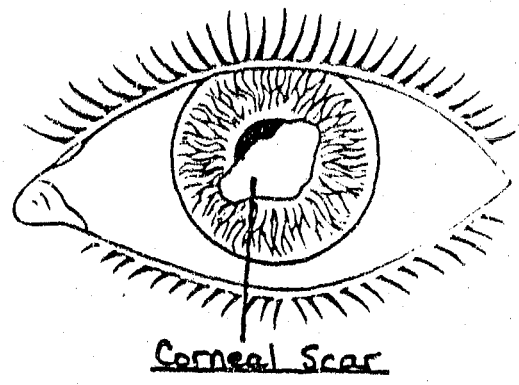
5. Keratomalacia:

"Kerato" refers to the cornea. "Malacia" means wasting. If the child is not treated, the corneal ulcer can lead to "melting" or "wasting" of the cornea.



6. Corneal scar:

Keratomalacia can lead to perforation of the cornea. A corneal ulcer and keratomalacia will heal leaving a scar. The sooner the child is treated when the ulcer is still small, the smaller will be the scar remaining. If the child is not treated early, the ulcer becomes large and the eye will remain with a large scar on the cornea and blindness.



D. High risk groups:

In the refugee centers and settlements, there is a lack of varied foods in the diet and most of the ration foods do not contain any vitamin A. For this reason, all children in refugee communities, especially children under age 6 years, are at risk of xerophthalmia caused by vitamin A deficiency. However, groups at highest risk and where special attention must be paid are:

1. Children who are malnourished (less than 80% wt/ht).

2. Children suffering from any of the following illnesses:

Measles:

A child with vitamin A deficiency together with measles is at great risk of blindness from xerophthalmia. A child with vitamin A deficiency has a low store of vitamin A in his/her liver. Also, the tears are not good tears because they lack some of the oils that are provided by vitamin A. When the tears are not good, the eye can become dry and at risk of blindness.

Measles causes fever. When there is fever, the body uses more vitamin A. The need is great and the body must go to the liver for more Vitamin A. If the liver store is low, the body quickly lacks vitamin A completely. Now, the eyes can become very dry and weak. Also, the measles virus can attack the dry, weak eyes and cause blindness. Many children become blind when they get measles together with Vitamin A deficiency.

Diarrhea:

Fever can accompany diarrhea and cause the body to use more vitamin A. Also, because of the diarrhea, children cannot keep most of the nutrients from the foods they eat Severe dehydration causes the body to draw more vitamin A from the liver. If the vitamin A store in the liver is low, the child with diarrhea can quickly use all of the vitamin A from the liver. If the vitamin A quickly goes from the body, the eyes can become dry and weak and susceptible to corneal signs of xerophthalmia. Children who with diarrhea, especially repeated episodes, are at risk of xerophthalmia and blindness because of vitamin A deficiency.

When you examine a child with measles, diarrhea, cough, respiratory infections, or fever, be sure to also examine the eyes.

E. Treatment Schedule:

Children up to age 6 years are at the highest risk of xerophthalmia and blindness. However, children over age 6 years can also show signs of xerophthalmia. Children over age 6 years with signs and symptoms of xerophthalmia also should be treated.

The only source of vitamin A to young infants is breastmilk. It is recommended that one dose of 200,000 IU vitamin A be given to the mother within the first month after delivery. High doses of vitamin A should never be given to a mother during pregnancy because it can be toxic to the fetus. The recommended dosage is no more than ten thousand IU per day.

Vitamin A should be given orally according to the following schedule:

Recommended Dosage:

Today	- 200,000 IU vitamin A capsule or liquid
Tomorrow	- 200,000 IU vitamin A capsule or liquid
Two weeks later	- 200,000 IU vitamin A capsule or liquid

Children under age 1 year should be given half the dose (100,000 IU each dose).

Children with measles, give the treatment dosage of three doses of vitamin A.

Lactating women: give one dose of 200,000 IU vitamin A immediately after deliver or during the first month after delivery only.

Pregnant women should never be given high doses of vitamin A. They should get only ten thousand IU vitamin A every day during pregnancy. Then, they get 200,000 IU vitamin A once immediately after delivery.

Treatment schedule review:

Xerophthalmia:

Children with any of the signs and symptoms of xerophthalmia should receive three doses of 200,000 IU of vitamin A.

Measles:

Children with measles should receive three doses of 200,000 IU of vitamin A.

Diarrhea:

Children with severe diarrhea should receive ORS and be given vitamin A foods and water to prevent dehydration and vitamin A deficiency. If the child develops xerophthalmia due to the severe diarrhea, treat the child with three doses of 200,000 IU of vitamin A.

F. Prevention Schedule:

For children who live in communities where there are not many foods with vitamin A and these children are at risk of xerophthalmia, give the following:

Give to all children under age six years:

One 200,000 IU dose of vitamin A once only every 6 months.

Children under age 1 year, give half the dose (100,000 IU).

G. Dosing technique:

1. Liquid vitamin A.

Draw the liquid vitamin A into a syringe. One milliliter (1 ml = 200,000 IU vitamin A) should be given directly into the child's mouth.

2. Capsules.

a. Older children:

Older children can chew and swallow the capsule. Be sure to watch that the child has swallowed the capsule and that he does not spit it out.

b. Infants:

Cut the capsule or nip off the nipple. Squeeze the contents of the capsule directly into the child's mouth. For children under age one year, give half the dose (100,000 IU). Squeeze out two drops of vitamin A and throw away. Then squeeze the remaining vitamin A directly into the child's mouth.

Caution: Vitamin A is safe for children if given as recommended above.

H. Recording:

Every case of xerophthalmia identified should be properly documented. Minimum information on the clinic card should be:

1. Name, age, sex, address of case.
2. Symptoms and/or signs seen.
3. Date and dosage of vitamin A given (200,000 IU or 100,000 IU).
4. Follow-up: date, condition of eyes, changes seen.

The prevention dose given every 6 months should be recorded in two places:

1. Record in a register all children given the prevention dose of vitamin A. Each entry should include the child's name, age, sex, block number, house number (wareda), and name of house-hold head.

2. Record the date and dosage (200,000 IU or 100,000 IU) on the Road to Health (RTH) Card. For children with no RTH Card, record the information on the clinic card.

I. Reporting:

Monthly report:

1. Number of cases of xerophthalmia:

   a. Under age 6.
   b. Over age 6.
   c. Sex.

2. Report after each cycle of prevention dose mass distribution:

   a. Number of capsules distributed to children under age 6 years.
   b. Preparation of vitamin A used: capsule or liquid, brand name, source.
   c. Available stock of vitamin A (current).
   d. Additional needs of vitamin A for the next 6 months.

3. Report any side effects which you feel were caused by vitamin A.

Where to send reports:

Send to the COR Health Unit, Showak:

1. Monthly Morbidity Report (Xerophthalmia).

2. Post prevention dose every 6 months after mass distribution.

Prepared by Helen Keller International

Dr. Solomon Iyasu
HKI Country Director
PO Box 48
Khartoum

ATTACHMENT XVI

EMERGENCY GUIDELINES FOR THE TREATMENT AND PREVENTION OF XEROPHTHALMIA (VITAMIN A DEFICIENCY)

1.0 Definition

Xerophthalmia (i.e. dry eyes) is characterised by a group of eye symptoms and signs as a result of no or marginal Vitamin A intakes from the diet. Vitamin A rich foods become scarce during times of famine. Affected populations become at risk of blinding malnutrition. Untreated active xerophthalmia can lead to blindness in 48 hours.

2. Diagnosis

Xerophthalmia is diagnosed by history of night-blindness and the following eye signs upon examination:-

(a) Night-blindness

Poor vision at dusk or under conditions of reduced light such as darkened rooms. The affected child is less active, may stumble over objects or may not eat his evening meal because he cannot find his food.

(b) Conjunctival Xerosis (dryness)

The white part of the eye (conjunctiva) becomes dry, unwettable or roughened.

(c) Bitots' spots

White foamy or cheesy materials are found on the conjunctiva.

(d) Corneal Xerosis (dryness)

Loss of lustre, dryness or haziness of the cornea.

(e) Corneal Ulcer/Keratomalacia

Softening, ulceration and finally destruction of the cornea, followed by blindness.

(f) Corneal scars

White scars of varying size on the cornea. These originate from corneal ulcers. Large scars lead to blindness. Small peripheral scars leave some useful vision.

3. Population at Risk

(a) Infants

(b) Children up to age of 15 years

(c) Pregnant/lactating women

4. High Risk Priority Groups

(a) Severely malnourished children (< 70% Wt/Ht)

(b) Children with measles, severe diarrhoea and lower respiratory tract infection

(c) Children with active Xerophthalmia

5. Health Screening

Ocular screening of populations at risk should be done along with other health and nutrition screening at time of first contact to identify cases with symptoms and signs of Xerophthalmia and those at increased risk (i.e. children < 70% Wt/Ht and measles). Immediate treatment should be started as per treatment schedule shown below. All other children below 15 years should be given one prophylactic dose of Vitamin A. Vaccination for mealses is strongly recommended at the same time.

6. Treatment Schedule

6.1 Treat the following:-

(a) children below 15 years with active xerophthalmia;

(b) adults with active xerophthalmia (except prenant/lactating women and women of child-bearing age);

(c) children who are severely malnourished (< 70% Wt/Ht) and children with measles.

6.2 Give:-

immediately on diagnosis	one 200,000 IU Vitamin A orally
following day	one 200,000 IU Vitamin A orally
one week later.....	one 200,000 IU Vitamin A orally

half dose for infants less than 12 months
(NB cut capsule and discard two drops and put rest directly into the mouth of the child.

6.3 Pregnant/lactating women

Pregnant/lactating women with signs and symptoms of Xerophthalmia should be treated by small daily Vitamin A supplements (e.g. multivitamins) and/or fortified dietary supplements (e.g. DSM or CSM).

Give:-

throughout pregnancy or for 40 days of lactation	5,000 to 10,000 IU Vitamin A daily
additionally, within the first month after delivery	one massive dose of 200,000 IU Vitamin A.

7. Prevention Schedule

(a) To children aged 1 to 15 years, give one 200,000 IU Vitamin A capsule orally at first screening (of new arrivals) preferably combined with measles vaccination. Repeat after 3 months and evaluate after 6 months.

(b) Children below 12 months are given half the dose.

NB (i) Prophylaxis for adults is not recommended.

(ii) Vitamin A as used above is safe.

Prepared by Helen Keller International

Dr. Solomon Iyasu
HKI Director
P.O. Box 48
Khartoum

FINAL REPORT

QUALITY CONTROL OF PRIMARY HEALTH CARE IN COSTA RICA

Dr. Joseph J. Valadez, PH.D., MPH
Lic. Silvia Boada Martinez
Harvard Institute for International Development

Lic. William Vargas Vargas
Dr. Juan Ignacio Barrios A., MD
Ministry of Health of Costa Rica

Collaborating Institutions:[1]

Ministry of Health of Costa Rica
Harvard Institute for International Development
Pan American Health Organization
PRICOR (Under a Cooperative Subagreement from the Office of Health, Bureau for Science and Technology, Agency for International Development)
National Research Council/Ford Fellowship
BOSTID (CRG Grant No. RGA-CR-1-87-71).

May 7, 1988

---

[1]Very special recognition is given to Dr. Carlos Valerin, (Director General of Health), Dr. Hugo Villegas, (National Representative for PAHO), Dr. Carlos Ferrero, (PAHO Regional Advisor in Health Information Systems), Dr. John Wyon (Harvard School of Public Health), and Dr. Donald Shepard (Harvard Institute for International Development), without whose support and creativity this project would not have been possible. We give our thanks to INISA and to all other individuals in the Costa Rica Health System who worked in the project.

HIID

HARVARD INSTITUTE FOR INTERNATIONAL DEVELOPMENT
One Eliot Street, Cambridge, Massachusetts 02138

Tel. (617) 495-9361
Cable Address: HIID
Telex: 92[illegible]
TWX No. 710-320-1115
FAX (617) 495-0527

In 1975 the Harvard Institute for International Development (HIID), whose goal is to strengthen the participation of the University in projects overseas, committed itself to improving the health systems of developing countries. Dr. Derek Bok, the President of Harvard, is a strong supporter of the efforts of HIID to develop an active Latin American and Caribbean Health Program. The main goal of HIID's Health Program in Latin America and the Caribbean, and throughout the Third World, is to help develop national health care systems, and thereby improve the health of the populations in need of better health care.

The initial stage of the project, "Quality Control of Primary Health Care in Costa Rica", which is presented in this document, reflects our interest in designing and applying quantitative methods which will enable the authorities of Costa Rica to identify the existing problems in health care delivery at the regional level.

The sampling method used in this project, Lot Quality Assurance Sampling (LQAS), has proven to be both innovative and valuable for assessing the quality of basic services provided by the Primary Health Care system to the Costa Rican population.

The second phase of the project is currently underway in Costa Rica. Its goal is to identify possible causes of the problems identified during phase one. For example, the quality of services with respect to measles vaccination will be analyzed, and solutions will be designed and implemented to address the problems identified.

Not only will Costa Rica benefit as a result of this project, but other countries who are interested in applying LQAS methodology will also benefit.

I would like to sincerely thank the Ministry of Health of Costa Rica for its support of this project. In addition, I would like to express my gratitude both to PRICOR for subcontracting one of its nation studies to HIID, and to PAHO/WHO for its valuable collaboration.

Dwight Perkins
Director

The Ministry of Health has stated a group of policies and strategies for health. The General Director of Health is putting them into operation. The process of technical - and administrative decentralization has been completed - the stages of basic data for the diagnostic of the health - attention and the processes of programming, management and control.

This document is a report on the project on Quality - Control of the health services applied to Primary Health - Care. It was prepared by th Ministry of Health in Costa - Rica and the Institute for International Development of Harvard University, with the previous agreement of PRICOR.

A group of professional were involved in this project and they have invested a lot of time and efforts. We - sincerely apreciate what was done by all of them and we - expect that this effort will allow a better local of health for Costa Rica and other countries of the world.

Very truly yours,

Dr. Carlos E. Valerín Arias
GENERAL DIRECTOR OF HEALTH
MINISTRY OF HEALTH
COSTA RICA

TABLE OF CONTENTS

INTRODUCTION 1

SAMPLING FRAME 4
PREPARATION AND UPDATE OF THE MAPS 5
SELECTION OF INTERVIEWERS 6
COMPILATION OF INFORMATION 7
QUALITY CONTROL TEAM 8

RESULTS 10

HOME VISITS 10
VACCINATIONS 12

I. Screening Health Facilities According to Ministry of Health Standards 12

First Polio and DPT Doses 13
Second and Third Polio and DPT Doses: 15
Measle: 16

II. Evaluation of Vaccination According to WHO Atandards: 16

REFERRAL OF PREGNANCIES 17
REFERRAL OF NEWBORNS 17
ORAL REHYDRATION THERAPY 18

ANNEXES 20

ANNEX 1 OPERATING CHARACTERISTIC CURVE 21

ANNEX 2 PROBABILITIES FOR A SAMPLE = 28. 22

ANNEX 3 TABLE 1: COVERAGE AT THE REGIONAL AND NATIONAL LEVEL 23

ANNEX 4 LIST OF HEALTH FACILITIES BY TOTAL NUMBER OF SERVICES FOUND TO BE DEFECTIVE: 1987 38

ANNEX 5 LIST OF HEALTH FACILITIES CLASSIFIED AS HAVING ACCEPTABLE OR DEFECTIVE POLIO VACCINATIONS: 1987 . . 40

ANNEX 6 LQAS PROJECT: PRIMARY HEALTH CARE QUALITY CONTROL MINISTRY OF HEALTH HARVARD UNIVERSITY (HIID) LIST OF DEFECTS FOR EACH HEALTH FACILITY IN 28 OBSERVATIONS OF POLIO VACCINATIONS 1987 56

ANNEX 7 LQAS PROJECT: PRIMARY HEALTH CARE QUALITY CONTROL MINISTRY OF HEALTH, HARVARD UNIVERSITY (HIID) LIST OF DEFECTS FOR EACH HEALTH FACILITY IN 28 OBSERVATIONS OF POLIO VACCINATIONS: 1987 74

ANNEX 8 PROCESSING THE DATA 93
COMPUTER PROGRAMS RUN 94
D.B.F. FILES 96
F.R.M. REPORTS 98

ANNEX 9 INSTRUMENTS USED 101
INFORMATION SOURCES MOST USED 101

ANNEX 10 Calculating Coverage Proportions and Confidence Intervals with LQAS Data 102

ANNEX 11 A Hypothetical Application of LQAS 104

PREFACE

Over the past decade, national and international commitment to extending basic health services to underserved urban and rural populations in developing countries has led to major investment in primary health care (PHC) and child survival program strategies. However, these programs continue to face persistent problems with underutilization of services, lack of knowledge and acceptance of home-based interventions, and at times, inadequate quality of services provided. Typically, program managers lack specific information about how service delivery activities and support functions such as supervision, are routinely carried out.

While surveys and evaluations have tended to focus on measuring program inputs (such as training and supplies), outputs (such as number of services delivered) and impacts (such as changes in morbidity rates), relatively little attention has been devoted to analyzing the performance of the activities that produce a given outcome. Yet, opportunities to improve the effectiveness of PHC and child survival programs at the operational level clearly depend on strengthening these service delivery and support processes.

Responding to the need for better information on the process of service delivery, the Agency for International Development has launched, through the Primary Health Care Operations Research Project (PRICOR) Project, a major international effort to document and analyze the activities of PHC programs in developing countries. PRICOR was established in 1981 under a cooperative agreement with the AID Office of Health to help developing countries improve their PHC and child survival programs through practical, decision-oriented management studies and operations research. In its second phase, a major PRICOR objective is to develop new and innovative ways of identifying and diagnosing discrete problems in the process of service delivery that will lead to measurable improvements in program performance.

PRICOR staff now are refining and applying a systems analysis approach that allows program managers to accurately describe how key components of the PHC program actually operate and to identify the specific weak points and bottlenecks that impede effective delivery of PHC services at the peripheral level. The systems analysis relies on direct observations, key informant interviews, limited surveys, and other rapid assessment methods to provide decisionmakers with a comprehensive picture of program strengths and failures. By shifting the focus from input and outcome measures to process indicators, systems analysis provides concrete data that lead to tangible improvements, through immediate corrective action or short, problem-solving studies.

The PRICOR Country Report series presents the efforts of PRICOR staff and investigators from collaborating institutions to apply in some dozen countries practical methodologies for observing and measuring how PHC service delivery activities are being carried out. This volume presents a PRICOR country study conducted in Costa Rica by the Harvard Institute for International Development which adapted the industrial sampling technique of Lot Quality Acceptance Sampling (LQAS) for use in identifying substandard service delivery performance in health posts.

LQAS is an innovative way of identifying problems in the delivery of basic health services in developing countries. Given the complexity of primary health care systems, it is very difficult to identify weak or problematic areas where systems analysis can be focused. PRICOR views LQAS as a useful screening tool for identifying problematic health posts and service delivery components to which a more in-depth systems analysis methodology can be applied to pinpoint the causes of inadequate performance.

As is true for all analytical methods, sampling is a major concern in the application of systems analysis. A quick statistically sound method for collecting information is needed. Since LQAS uses a relatively small sample size, PRICOR has supported the testing of the LQAS methodology as one possible solution to the sampling problems in systems analysis. The use of LQAS is a potentially valuable method by which the systems analysis process can be shortened and made more efficient.

David D. Nicholas, M.D., M.P.H.
Director
PRICOR Project

INTRODUCTION [2]

Aside from the known decline in infant mortality, morbidity, and disease following the establishment in 1972 of the Primary Health Care program began in Costa Rica, there has never been a systematic assessment of the quality of the services offered to the country nor a check into whether or not these services have been executed both correctly and within the proper time frames.

As the Ministry of Health (MOH) is aware that an inspection of the quality of health care services should help bring about a more efficient and effective use of available resources, the MOH decided to develop this present project in collaboration with the Harvard Institute for International Development (HIID), and the Pan American Health Organization under a Cooperative Agreement with PRICOR.

The essential purpose of this project is to evaluate the Primary Health Care Program at the most decentralized level of organization, namely, health areas, while testing a new rapid method of health facility evaluation: Lot Quality Assurance Sampling (LQAS). The data collected in the project was intended to detect whether or not Health Areas (HA) were performing up to the standards of the MOH and the World Health Organization (WHO) and to permit the calculation of precise coverage proportions both at the national and regional levels of organization.

---

[2] The work upon which this presentation is based was performed in part under a subagreement with the Center for Human Services under its Cooperative Agreement No. DPE-5920-00-A-5056-00 with the U.S. Agency for International Development.

LQAS should be contrasted with the EPI cluster sampling method of evaluation presently used by the Extended Immunization Program (EPI) of WHO which can be used to determine coverage at either national or regional levels. LQAS is able to systematically determine the quality of services offered in each and every peripheral administrative unity or HA and at every progressively more centralized level of organization. It is important to note that whereas LQAS requires small samples (in this project n=28) EPI cluster sampling requires samples of 210.

Another advantage of LQAS is that the same information used to measure coverage can also be used to evaluate the quality of health records in the HA's.

In specific terms, the goal of the project was to classify 60 of 700 HA's throughout Costa Rica according to their quality of health service coverage by the following services: delivery of the complete series of polio, DPT, and measles vaccinations; competent use of oral rehydration therapy; referrals of pregnant women and new borns to doctors; and, home visits by community health workers (CHW) in each of the Primary Care Areas selected. Adequate coverage was assumed to be 80% or better; the lowest quality coverage was assumed to be 50% or less. LQAS has been designed as a rapid assessment technique that classifies health areas with the lowest coverage (i.e., ≤50%) from those areas with excellent coverage (i.e., ≥80%). Thus, areas in which the population is under the greatest risk can be identified for a concerted investment aimed at improving services and reducing health risks. Correspondingly, HAs with high levels of coverage also need to be

identified in order to avoid unnecessary investment into HAs that do not need it. The areas with coverage levels between 50% and 80% are neither adequate nor the highest priority for improvement. Accordingly, the closer an HA is to either 50% or 80%, the greater the likelihood that it will be classified as substandard or adequate, respectively. In this study with a sample of 28, there is only a 5% chance that HAs with coverage $\leq$50% or $\geq$80% will be misclassified. This level of error is obtained using the following decision rule. An HA is classified as below standard if more than 9 of 28 children have inadequate coverage for a given activity. See Annex 11 for a discussion of Lot Quality Acceptance Sampling.

The results of this project will allow for the identification of any of the services that are problematic in each HA and the portions of the regional and national populations affected by these problems.

The names of each HA are arranged in Annex 4 according to Health Center and region, and their status as either acceptable or deficient for each service examined.[3] The coverage proportion for each Primary Health Care service in all 60 HAs and their respective confidence intervals are listed in Table 1.[4]

---

[3]Health Areas (HAs) are administered by Health Centers (HCs). Each HC is responsible for adminstration of about 9 HAs. HCs are administered by Health Regions who in turn are administered by the MOH from San Jose.

[4]During 1988, a set of deficient Areas will be diagnosed in order to identify the causes of the substandard service delivery. At that time, a plan of action will be implemented in an attempt to eliminate these problems. During the life of the project the changes to the HAs will also be evaluated to determine whether improved service delivery occurred.

The project randomly selected a sample of 28 children under 3 years of age from each of the 60 HAs. Although this sample size is larger than the number which we expect to be used regularly by the Costa Rican National Primary Care system, it was selected for this first test of LQAS since both Type I and Type II classification errors were less than 5%. In total, 1680 children from 39 rural and 21 urban Areas from the 6 different regions of the country were randomly selected to be studied (See Annex 1 for the Operating Characteristic Curve applicable to this sampling design).

The number of HAs selected to be studied was determined by the budgetary limits of the project. Nevertheless, the project's measure of coverage by each PHC Service at both national and regional levels yield small confidence intervals ($\pm$2%) thus indicating their precision.

SAMPLING FRAME

Copies of maps from the most recent census, 1984, were used as the project's sampling frame. This decision was made for two reasons:

1) The majority of the hand drawn maps normally made by HAs were out-of-date and, therefore, it was highly probable that many families in target HAs would not be listed in them. Thus, these maps were eliminated from the study.

2) The project's sampling frame had to be independent of the health system since the study was intended to evaluate the health information system, and determine the proportion of families that had been identified by each HA's health worker.

PREPARATION AND UPDATE OF THE MAPS

A team consisting of a map maker and a permanent member of the project staff visited each of the 60 HAs and, with the help of the CHW delineated the portion of the map produced by the 1984 census which represented his/her HA. The boundaries of these catchment areas were assessed for face validity by supervisors. The team then updated the maps to ensure that all families (to the extent possible) were included in the maps. A combination of supplemental information sources were used. Firstly, the hand drawn maps found in each HA were used since CHWs may have located houses that escaped census takers. Secondly, CHWs were interviewed since houses they located were not always transferred to their own maps. Thirdly, the project team reconnoitered the project area to visually validate the map. New houses were added as necessary. On one occasion, a map produced by the malaria campaign near the Nicaraguan border was used.

After the maps were updated, they were organized into a sampling frame in the following manner.

1) Each house in a given Area was assigned a unique number.

2) The total number of houses in each Area was divided by 28 (the size of the sample) in order to obtain the sampling interval. To identify the first house to visit, a number between 1 and the sampling interval was randomly chosen. The subsequent 27 sampling points were selected by adding the number of the house just sampled to the sampling interval. For example, if the first sample point is house 5 and the interval is 10, then

the second sampling point was house 15, the third house 25 and so forth.

3) Arrows were drawn on the maps to designate the direction in which an interviewer should go in the case that there were no children under three years of age found in one of the indicated houses. The average number of houses visited by a given interviewer before finding a child under the age of 3 was 3 houses.

SELECTION OF INTERVIEWERS

Three interview teams were organized for collection of the LQAS data. Each group consisted of three interviewers, a supervisor and a chauffeur (5 people to a group). The selection of the interviewers and supervisors was made in the following manner:

1) For two days, the project advertized the job of interviewer in the national newspaper with the largest circulation. Interested individuals were requested to call a telephone number.

2) During two days, 40 candidates were shortlisted from the telephone calls for a personal interview. Eligible candidates were experienced interviewers who had used maps in the field, had completed college, and were available for extended periods of work outside of the Capital of San Jose for as much as two weeks at a time.

3) From the 40 candidates interviewed personally, 20 were selected for training.

4) The 20 candidates selected were trained by the project staff in interviewing techniques and in the preferred manner to use the LQAS questionnaire. The form and function of the Primary Health Care Program was explained briefly [5] and the documents which they would need to consult while in the field, such as the family health records, the vaccination notebooks, the household registers, the individual control cards, control cards for pregnancies, and other such items, were shown and explained to them.

5) At the end of the training course, the candidates were given both a practical and a written exam to select the 12 strongest candidates. These 12 were organized into 9 interviewers, and 3 supervisors; 2 substitutes were also identified.

COMPILATION OF INFORMATION

Each group of interviewers was given a set of updated maps (at regular intervals), a set of questionnaires[6], assigned a vehicle and a chauffeur, and sent to the appropriate HAs to conduct the LQAS sample. Following the arrows marked out on the maps, the home to be interviewed was located. If no children under the age of three were found in any one of the indicated houses, the interviewer proceeded to follow the

[5] The history and function of the Primary Health Care System were explained to the interviewers so they would be able to understand the crucial role of their work in the development of the PHC system.

[6] Questionnaires were pre-tested and revised many times before being used. All pretesting occurred in marginal areas of San Jose.

direction indicated by the arrows on the map until a household with a child in the proper age range was located. At least 10% of all houses were revisited by supervisors to determine whether this procedure was being followed correctly. No discrepancies were found.

After the mothers of the children in each of the 28 households of an Area were interviewed, the questionnaires were taken to the archives of that Area in order to verify the data collected. Such a verification was implicit in the design of the questionnaire in order that the degree of correspondence between the experiences of families in households and the records of these experiences in HAs could be determined.

QUALITY CONTROL TEAM

In order to determine the reliability of the data, a quality control team was formed. Using the same questionnaire, the team reinterviewed 10% of the mothers previously interviewed. Therefore, 3 mothers from each of the 60 Areas were reinterviewed.

Mothers to be reinterviewed were identified by randomly selecting three questionnaires from each lot of 28. For example: the 28 questionnaires for each HA were numbered consecutively. Next, if 10 interviews were performed by one interviewer, a random number was taken between 1 and 10. The same procedure was followed to select one questionnaire from each of the other two interviewers.

After the three interviews were selected, the ~~corredponsing~~ mothers were reinterviewed. Their responses were also checked in the HA's archives. Subsequently, a measure of quality was made consisting of

the number of responses that coincided between the original and second interview as a numerator and the total number of questions as a denominator.

In order to perform these quality control calculations, the questions were organized into five categories: empirical, subjective, those which classified HAs as either acceptable or deficient, all interview questions, and those which were used to verify the quality of the health information system.[7] Using a very simple formula (number of responses verified divided by number of questions), the quality of each of the interviews was determined. Results of 90% were considered acceptable.[8]

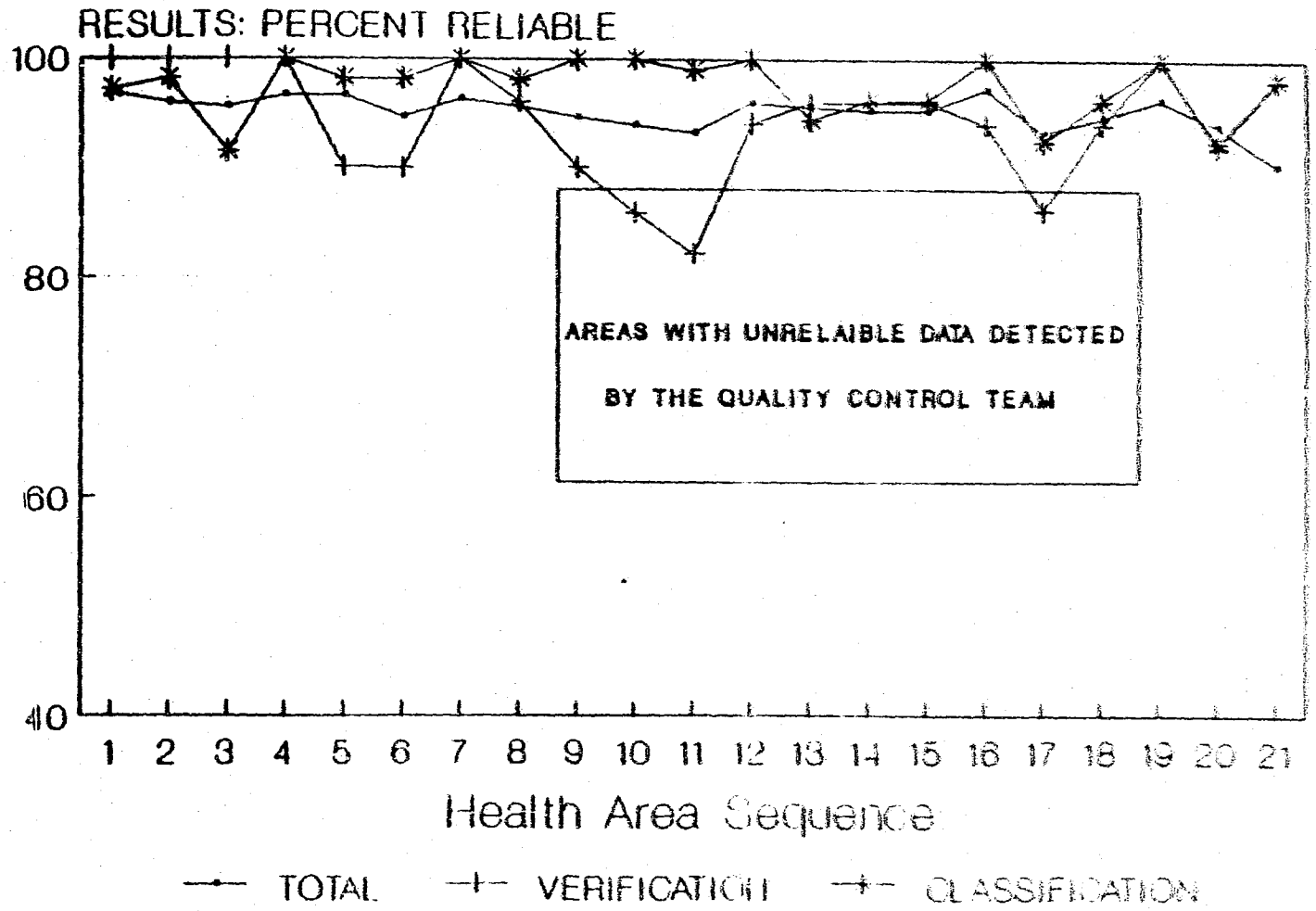
When the quality was less than 90%, the supervisor of the appropriate interview team was notified and shown the problem questions. They were instructed to contact the appropriate interviewer and explain the error. The goal was to prevent the same error from being committed in subsequent interviews. Some 11 HAs exhibited data quality scores less than 90%, thus, requiring the quality control group to return to these 11 Areas to collect a second time the appropriate category of data. In all cases the faulty data consisted of those

---

[7] Empirical questions depended on observable facts; subjective questions relied on either the opinions or memories of mothers.

[8] The data obtained for the weight and height of the children was of such a low quality that it was excluded from the study. Mothers tended not to remember when their children were weighed and measured, and CHWs tended not to record the dates they performed these activities.

FIGURE 1A
Group 1



portions of the questionnaire in which health records were contrasted with interview data (Figure 1abc). [9]

RESULTS

In response to the needs of the Ministry of Health, the project evaluated the following activities of the Primary Health Care Program:

1) Home Visits by CHWs
2) Vaccinations (Polio 1,2,3; DPT 1,2,3; Measles)
3) Referral of Pregnancies to a Doctor
4) Referral of New Borns to a Doctor
5) Oral Rehydration Therapy (knowledge, use, preparation)

Each of these five activities are discussed separately in the following sections.

HOME VISITS

Two criteria were used to evaluate this activity. The first

---

[9] In addition to the already mentioned function of the quality control team, it had the additional responsibility of randomly selecting from the health archives of each HA 26 families with children under three years of age. The family health archives were used as the sources of information to fill out LQAS questionnaires, (the same questionnaires used for the HAs).

These data were collected in order to develop LQAS methodology and to study its economics when archives rather than household data are used for assessing coverage. This study will be presented to the authorities of the Ministry in the coming months. If the results of this comparison prove to be reliable when compared to the household study, this approach will be used in order to avoid the costs of the household study.

criterion was liberal. Any home in which the Household Register[10] indicated no visit at all during the 4 months preceeding the interview were considered as homes not adequately covered by the health worker. The 4 month interval was chosen for the project since the Ministry requires a minimum of three visits annually to each household. Households which did not have a Household Register were not judged as deficient under this criterion. In other words, the CHW was given the benefit of the doubt. National coverage by this activity was 78% (CI:+2%). However, 13 of the 60 Areas evaluated were operating below the MOH standards (See Annex 3 for list of the number of defective households in the sample of 28 children of each HA).

The second criterion was conservative. For this set of HA classifications, any household that either had not been visited during a 4 month interval or that did not have a Household Register was considered deficient. The results using this criterion were worse. National Coverage was 34% (CI:±5%). Only 7 Areas were classified as acceptable.

An important observation arises from having performed the analysis using two criteria. The difference in the results is primarily due to the fact that 44% of the houses interviewed had no Household Register. Only 22% of the homes visited had a Household Register that indicated a visit more than four months prior to the interview. Given these results, the following questions arose: Are 44% of the families not covered? If they are, why didn't they have a Household Register?

---

[10] The Household Register is a Ministry of Health form found in the home in which the health worker writes the date of his last visit and signs his name.

These and other related questions will be examined in the diagnosis stage of the project, 1988-1989.

VACCINATIONS

Two types of assessments were performed: one was based on MOH standards and another based upon the international standards established by WHO.

I. Screening Health Facilities According to Ministry of Health Standards

According to MOH standards, all children should receive 3 doses of DPT vaccination, 3 doses of polio vaccination and one dose of measles vaccination within the 11 months of life according to the following schedule:

1) DPT: The first dose should be received at two months of age. The second and third doses should be received at two month intervals (see Figure 2).

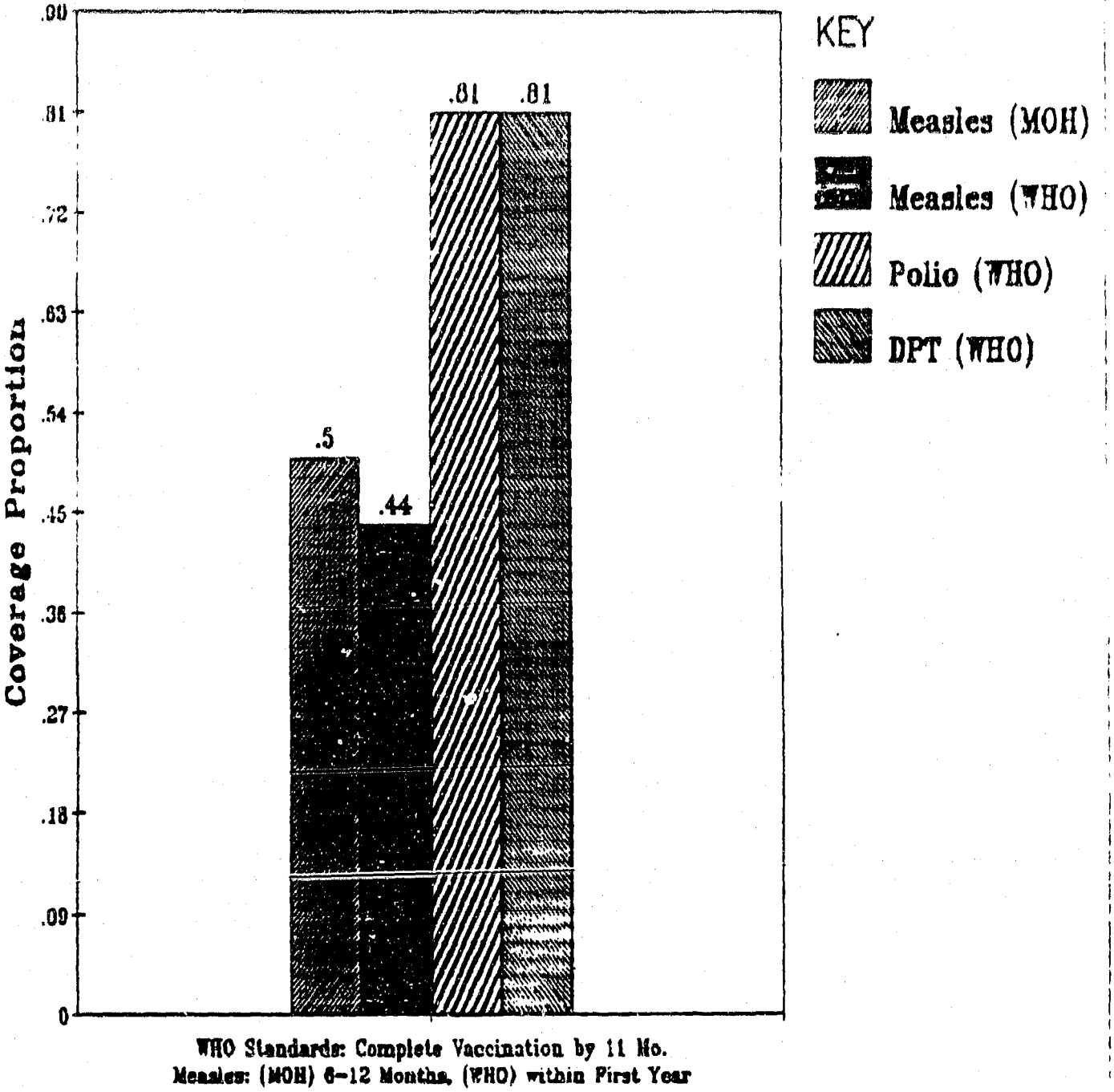
2) Polio: The same standards hold for Polio as for DPT (see Figure 3).

3) Measles: One dose should be received between 6 and 11 months of age (see Figure 4).

Vaccination cards of all children were examined to determine

FIGURE 4

MEASLES VACCINATION COVERAGE USING MINISTRY OF HEALTH CRITERIA AND ALL VACCINACTION COVERAGE BY W.H.O. INTERNATIONAL STANDARDS



WHO Standards: Complete Vaccination by 11 Mo.
Measles: (MOH) 6–12 Months, (WHO) within First Year

whether or not they had been vaccinated in accordance with the MOH standard. Boosters were not considered.

Regional and national coverages for each vaccination are listed in Table 1 with their corresponding confidence intervals. The number of defective children in each HA's sample of 28 appears in Annex 4. The performance of each HA for each vaccination is listed according to their Health Center and Region in Annex 5.

First Polio and DPT Doses

The formal MOH norms were modified for analytic purposes since one cannot expect a dose of, say, polio 1 to be administered exactly at two months of age. Three standards were applied to evaluate the first dose of DPT and Polio vaccination. All of the coverage proportions reported have been weighted by the number of children in a given HA.

Standard 1: Children vaccinated between the ages of 1.5 and 2.5 months inclusive, were considered acceptable. This rule extends the MOH standard by ±15 days. National coverage with Polio 1 was 57% (CI:±2%), and 59% (CI:±2%) for DPT. Some 47 HAs were substandard in polio coverage and 44 HAs were substandard for DPT coverage.

Standard 2: The lower age limit remained at 15 months, as in Standard 1; the upper bounds was increased by an additional 2 weeks. Therefore, the acceptable age interval to have received the vaccinations was 1.5 to 3 months of age.

Accordingly, national coverage was 68% (CI:±2%) for both the first dose of polio and the first dose of DPT. Some 33 HAs were deficient in polio coverage and 27 HAs were deficient in DPT coverage.

Standard 1: This standard was established by assuming that a child should at the very least be vaccinated during the CHW's visit to the family. The minimum number of visits of a CHW to a household according to MOH standards is four visits annually (1 visit every 4 months). Therefore, if we assume that the last visit of the CHW was one day prior to the minimum age at which a child should receive the first vaccination, (i.e., 1.5 months of age), the child would be eligible for the vaccination during the next visit (i.e., at 5.5 months of age) four months later. Thus, the acceptable age interval at which a child can be vaccinated is 1.5 - 5.5 months.

Standard 3 raises a potential problem for the health system. Children who are first seen by the CHW when they are younger than 1.5 months of age need to wait until the next visit before being vaccinated. If these children wait for the CHW's following visits to receive their second and third polio and DPT doses at intervals of 5.5 months, they will not be able to complete the vaccination series before their birthday. Indeed they would be 16.5 months of age before receiving the third dose. Nevertheless, Standard 3 established a practical norm for evaluating vaccinations. National coverage by Polio 1 was 84% (CI:±2%); two HAs were defective. DPT coverage was 85%

(CI:±2%); one HA was defective. See Annex 3 for a summary of coverage statistics, and Annex 5 for a list of deficient HAs.

Second and Third Polio and DPT Doses:

The previous three standards were also used for evaluating the second and third doses of Polio and DPT vaccinations. For example, according to standard 1 (1.5 - 5.5 months) if a child received the first dose of DPT at the age of 2 months, the second dose would have to be received when the child is between 3.5 and 4.5 months in order for the coverage to be considered as acceptable. Using standard 2 (1.5 - 7 months), the vaccinations would be acceptable if the child is between 3.5 and 5 months. For standard 3 (1.5 - 4 months), the child should be between 3.5 months and 6 months. National coverage according to each standard was calculated as follows: (standard 1) 64% (CI:±2%), (standard 2) 75% (CI:±2%), and (standard 3) 91% (CI:±2%) for the second dose of DPT (See Annex 3).

According to standard 1, 33 HAs were deficient in polio 2 coverage; by standard 2, 12 deficient HAs were substandard; by standard 3 all HAs were acceptable. The same distribution of substandard HAs was found for the second dose of DPT with the exception of standard 1 in which 31 HAs were deficient.

The analysis of coverage for the third dose of both polio and DPT used the same three standards. The calculations of national polio 3 coverage using standards 1, 2 and 3, respectively, were 65% (CI:±2%), 73% (CI:±2%) and 85% (CI:±2%); DPT coverage proportions were 65% (CI:±2%), 73% (CI:±2%) and 91% (CI:±2%), respectively (See Annex 3).

The number of HAs determined deficient for the third polio and DPT doses were also similar. For polio 3 Standard 1, 33 HAs were deficient; by Standard 2, 17 HAs were substandard, and one HA was not acceptable by Standard 3.

See Annex 5 for a listing of HAs deficient in their coverage with the second and third doses of polio and DPT (see Figure 2-3 for a summary of the results).

Measles

According to MOH standards, only children vaccinated within the period between 6 and 11 months were considered acceptable.

By this standard, national coverage was 50% (CI:±2%). This low level of coverage was homogenous throughout the country. Regional coverage proportions are as follows: 54% (CI:±5%) for South Central, 52% (CI:±7%) for North Central, 46% (CI:±7%) for the Huetar North, 49% (CI:±5%) for Chorotega, 45% (CI:±8%) for the Huetar Atlantica, and 50% (CI:±6%) for Brunca.

A detailed summary of these statistics at the national and regional levels is given in Figure 4, Annexes 3 and 4. See Annex 6 for a list of Coverage proportions by Health Center. In this regard, the Health Centers of Liberia and Sarapiqui exhibited the greatest deficiency, 25% and 38%, respectively. Annex 5 lists the names of all deficient HAs.

II. Evaluation of Vaccination According to WHO Standards

WHO's vaccination standards recommend that a child should receive 3 doses of polio and DPT vaccination within the first 11 months of life.

with at least a one month interval between doses, and 1 dose of measles vaccination between 9 and 12 months of age. To evaluate coverage according to this standard, only children between the ages of 12 and 35 months were included (see Figure 4 for a summary of the results).

National coverage for the complete polio series was 81% (CI:±2%). Coverage for the DPT series was also 81% (CI:±2%). Coverage by measles vaccination was 44% (CI:±3%).

REFERRAL OF PREGNANCIES:

If a mother had visited a physician at least once during the 9 months of pregnancy, (according to WHO standards), coverage was considered to be acceptable. If a mother never visited a doctor during the entire pregnancy, coverage was judged to be deficient.

For this service coverage was high. Some 93% (IC:±1%) of all pregnancies had been referred to a doctor. In addition, not one of the 60 HAs analyzed were deficient in this service. The percentage of coverage at the regional and Health Center level can be found in Figure 5, Annexes 3 and 6.

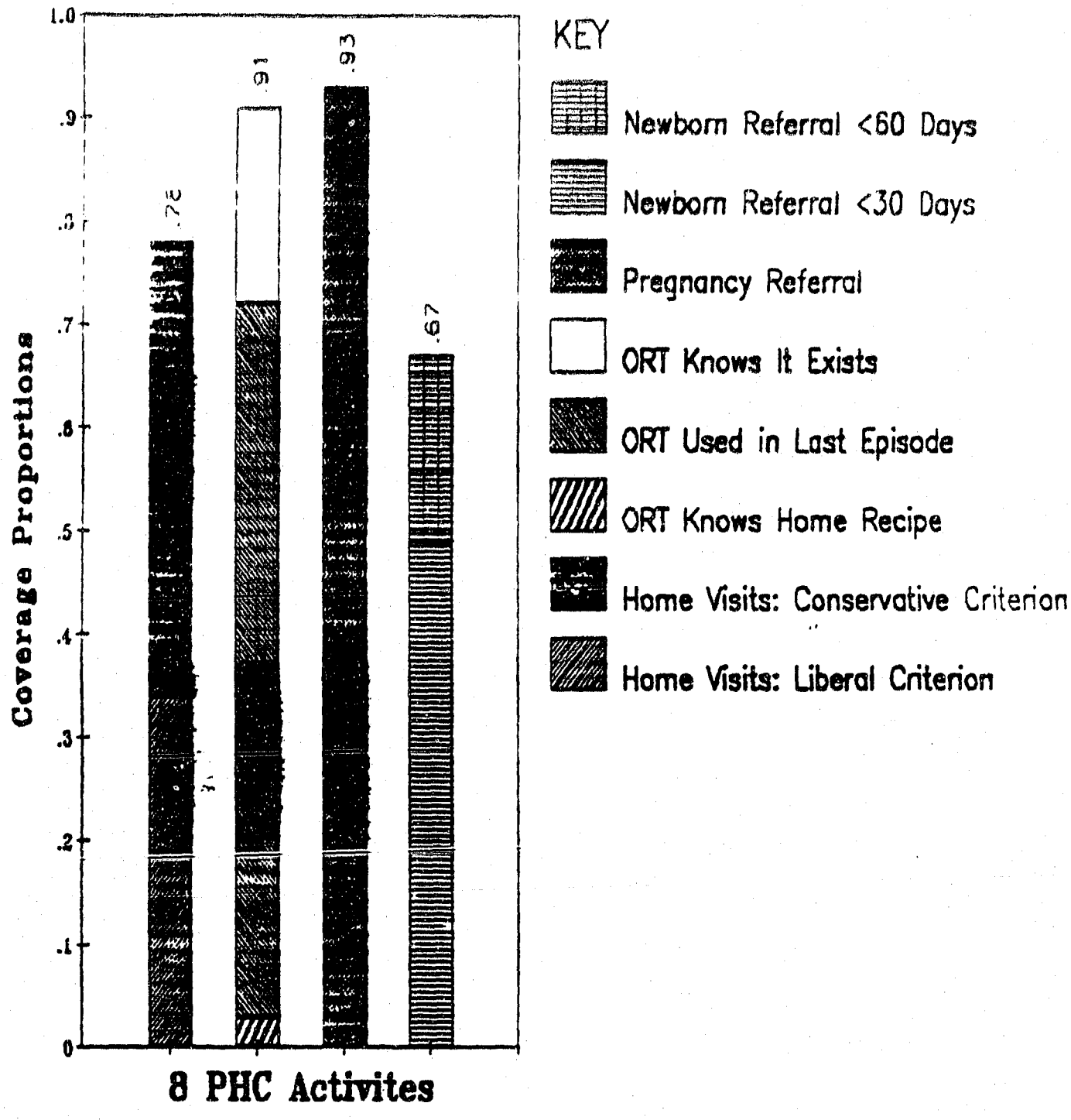
REFERRAL OF NEWBORNS:

Two standards were used to assess this activity. Standard 1: According to WHO standards all children should visit a physician within 30 days of birth. Children that had actually visited a physician within the first month of birth were considered as acceptable coverage.

Some 52 HAs were deficient. By standard 1, the national coverage was 49% (IC:±2%). Using standard 2, coverage increased to 67%

FIGURE 5

COVERAGE WITH 3 PHC ACTIVITIES: HOME VISITS, ORT, AND PREGNANT WOMEN AND NEWBORN REFERRAL IN COSTA RICA



(IC:±2%). Of the 60 HAs studied, 25 were deficient (See Figure 4, Annexes 3 and 5).

ORAL REHYDRATION THERAPY:

This service was evaluated using MOH standards. See Figure 5 for a summary of the results. According to the Primary Health Care Program, CHWs should:

1) Distribute packages of oral rehydration products in all of the households in their HA with children under 6 years of age.
2) Educate these families about the importance of oral rehydration therapy in the prevention of diarrhea.

The following indicators were used to evaluate this activity.

1) The proportion of mothers that were knowledgeable about the existence of oral rehydration salt envelopes.
2) The proportion of mothers that had used ORT envelopes during the child's last episode of diarrhea.
3) The proportion of mothers that knew how to prepare the household ORT mixture.

At the national level, 91% (IC:±1%) of the mothers knew that ORT envelopes existed. Some 72% (IC:±2%) of the mothers had actually used these packets during their child's last case of diarrhea. Only 3% (IC:±1%) knew how to prepare the household solution (See Annex 3).

None of the 60 HAs were defective with respect to the first indicator. All mothers knew ORT packets existed. Some 17 HAs were

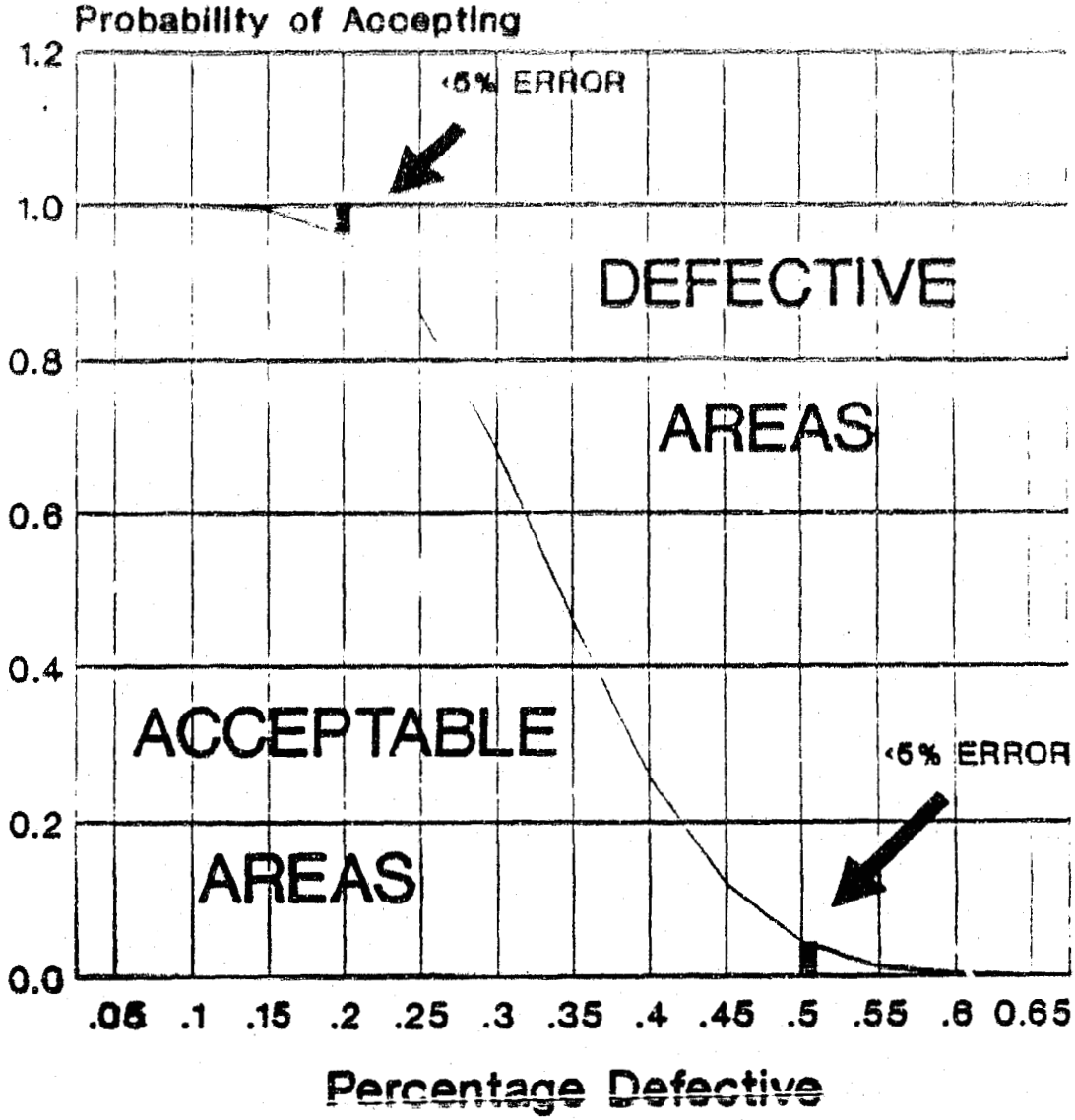
substandard in the use of oral rehydration therapy. All 60 wer defective in regards to the mother's knowledge of how to prepare th household mixture. The names of defective HAs are listed in Annex 5 The results for regional and Health Center levels are given in Annexes 3 and 6, respectively.

ANNEXES

ANNEX 1

OPERATING CHARACTERISTIC CURVE

Sample = 28, 9 Defects Permitted



Both alpha and beta errors are 5%

N = 28

d	Cumulative Probabilities for Values of p with d Defects																	
	.5	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95
0	.000	.100	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.011	.052	.238
1	.000	.100	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.003	.015	.063	.215	.588
2	.000	.100	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.004	.017	.061	.187	.459	.837
3	.000	.100	.000	.000	.000	.000	.000	.000	.000	.000	.000	.001	.004	.016	.055	.160	.377	.695	.951
4	.000	.100	.000	.000	.000	.000	.000	.000	.000	.000	.001	.003	.014	.047	.135	.315	.587	.858	.988
5	.000	.100	.000	.000	.000	.000	.000	.000	.000	.000	.003	.011	.039	.113	.264	.501	.765	.945	.998
6	.000	.100	.000	.000	.000	.000	.000	.000	.000	.002	.009	.031	.092	.229	.428	.678	.885	.982	1.000
7	.000	.100	.000	.000	.000	.000	.000	.000	.001	.006	.024	.074	.182	.365	.600	.818	.951	.995	1.000
8	.000	.100	.000	.000	.000	.000	.000	.001	.004	.018	.058	.148	.309	.528	.750	.918	.982	.999	1.000
9	.000	.100	.000	.000	.000	.000	.000	.003	.012	.044	.119	.259	.461	.682	.862	.961	.994	1.000	1.000
10	.000	.100	.000	.000	.000	.000	.002	.008	.031	.092	.213	.399	.618	.809	.932	.985	.998	1.000	1.000
11	.000	.100	.000	.000	.000	.001	.005	.022	.070	.172	.340	.551	.753	.897	.971	.995	1.000	1.000	1.000
12	.000	.100	.000	.000	.000	.003	.014	.050	.135	.286	.487	.695	.857	.951	.989	.999	1.000	1.000	1.000
13	.000	.100	.000	.000	.001	.008	.034	.101	.235	.425	.636	.813	.926	.979	.996	1.000	1.000	1.000	1.000
14	.000	.100	.000	.000	.004	.021	.074	.187	.364	.575	.765	.898	.966	.992	.999	1.000	1.000	1.000	1.000
15	.000	.100	.000	.001	.011	.049	.143	.305	.513	.714	.865	.956	.986	.997	1.000	1.000	1.000	1.000	1.000
16	.000	.100	.000	.005	.029	.103	.247	.449	.660	.828	.938	.978	.995	.999	1.000	1.000	1.000	1.000	1.000
17	.000	.100	.002	.015	.068	.191	.384	.601	.787	.908	.969	.992	.998	1.000	1.000	1.000	1.000	1.000	1.000
18	.000	.100	.006	.039	.133	.313	.539	.741	.881	.956	.988	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000
19	.000	.101	.018	.090	.250	.472	.691	.852	.942	.982	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000
20	.000	.105	.049	.182	.400	.635	.818	.936	.976	.994	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
21	.000	.118	.115	.322	.572	.780	.908	.969	.991	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
22	.002	.155	.235	.499	.736	.887	.961	.989	.997	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
23	.012	.142	.413	.685	.865	.953	.986	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
24	.049	.305	.623	.840	.945	.984	.996	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
25	.163	.541	.813	.939	.983	.995	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
26	.412	.785	.937	.985	.997	.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27	.762	.948	.989	.998	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

ANNEX 3

TABLE 1: COVERAGE AT THE REGIONAL AND NATIONAL LEVEL

KEY:
Ac. = Number of acceptable areas
Def. = Number of defective Areas
s1-s3 = See note below which defines standards 1-3
NB = New Born
Child. = Children

LEVEL OF COVERAGE FOR THE ENTIRE COUNTRY

Vaccinations	Rural		Urban		National		Total	Coverage Weighted	Confidence Interval
	Ac.	Def.	Ac.	Def	Ac.	Def			
Polio 1:s1	6	33	7	14	13	47	60	57%	2%
Polio 1:s2	15	24	12	9	27	33	60	68%	2%
Polio 1:s3	37	2	21	0	58	2	60	84%	2%
Polio 2:s1	14	25	13	8	27	33	60	64%	2%
Polio 2:s2	28	11	20	1	48	12	60	74%	2%
Polio 2:s3	39	0	21	0	60	0	60	90%	2%
Polio 3:s1	15	24	12	9	27	33	60	65%	2%
Polio 3:s2	23	16	20	1	43	17	60	73%	2%
Polio 3:s3	38	1	21	0	59	1	60	85%	2%
DPT 1:s1	9	30	7	14	16	44	60	59%	2%
DPT 1:s2	20	19	13	8	33	27	60	68%	2%
DPT 1:s3	38	1	21	0	59	1	85	85%	2%
DPT 2:s1	18	21	11	10	29	31	60	66%	2%
DPT 2:s2	29	10	19	2	48	12	60	76%	2%
DPT 2:s3	39	0	21	0	60	0	60	91%	1%
DPT 3:s1	14	25	11	10	25	35	60	65%	2%
DPT 3:s2	27	12	19	2	46	14	60	73%	2%
DPT 3:s3	38	1	21	0	59	1	60	86%	2%
Measles	2	37	0	21	2	58	60	50%	2%
Polio:WHO	34	5	18	3	52	8	60	81%	2%
DPT:WHO	34	5	19	2	53		60	81%	2%
Measles:WHO	0	39	0	21	0	60	60	44%	2%

Visits									
Standard 1	28	11	19	2	47	13	60	78%	
Standard 2	7	32	0	21	7	53	60	34%	
Used ORT	30	9	13	8	43	17	60	72%	
Familiar with ORT	39	0	21	0	60	0	60	91%	
Can Prepare ORT Home Recipe	0	39	0	21	0	60	60	3%	
Referals:									
Pregnancies	39	0	21		60	0	60	93%	
Child.<30 days	3	36	5	16	8	52	60	49%	
Child.<60 days	18	21	17	4	35	25	60	67%	

- Polio & DPT (based on the standards of the Ministry of Health):

  Standard 1: DPT and Polio doses should be given within an interval of 1.5 & 2.5 months of each other

  Standard 2: DPT and Polio doses should be given within and interval of 1.5 & 3 months of each other

  Standard 3: DPT and Polio doses should be given within an interval of 1.5 & 5.5 months of eachother

- Polio & DPT (based on the WHO Standard): Considers children who received the three Polio and DPT doses before completion of the first 11 months of life, with a one month interval between doses, as acceptable.

- Measles (Ministry's Standard): Considers children who received the three doses of Polio and DPT after 6 months and before 12 months of age as acceptable.

- Measles (WHO Standard): Considers children who received the doses after 9 months of age and before 12 months of age.

- Visits:

  Standard 1: Each household in which the household register showed that there had not been at least one visit in the four months prior to the date of the interview was considered not covered.

  Standard 2: We used the same standard as above but we also counted as defective all households which did not possess a household register at the time of the interview.

- Use of ORT: Proportion of mothers who had used ORT during their child's last case of diarrea.

- Knowledge of ORT:

  Proportion of mothers who knew of the existence of ORT.

- Knowledge of Preparation of ORT:

  Proportion of mothers who knew how to prepare the home recipe of ORT.

ANNEX 4

LIST OF HEALTH FACILITIES BY TOTAL NUMBER OF SERVICES FOUND TO BE DEFECTIVE: 1987

HEALTH CENTER	HEALTH FACILITY	HEALTH POST CODE	TOTAL NUMBER OF SERVICES FOUND TO BE DEFECTIVE
REGION ===> BRUNCA			
C.S. SAN ISIDRO DE PEREZ ZELEDON	P.S. RIVAS DE PEREZ ZELEDON	01	2
C.S. SAN VITO DE COTO BRUS	P.S. AGUA BUENA DE COTO BRUS	02	2
C.S. PALMAR NORTE	P.S. PALMAR NORTE DE OSA	03	3
C.S. CIUDAD CORTES	P.S. SIERPE DE OSA	05	3
C.S. CIUDAD CORTES	P.S. TINOCO DE OSA	06	3
C.S. SAN VITO DE COTO BRUS	P.S. SAN RAFAEL DE COTO BRUS	09	3
C.S. SAN ISIDRO DE PEREZ ZELEDON	P.S. LA UVITA DE OSA	05	4
C.S. SAN ISIDRO DE PEREZ ZELEDON	P.S. PLATANILLO DE PEREZ ZELEDON	07	4
C.S. SAN VITO DE COTO BRUS	P.S. LOS REYES DE COTO BRUS	06	4
C.S. GOLFITO	AREA AT.PRIMARIA URB. C.S. GOLFITO	01	4
REGION ===> CENTRAL NORTE			
C.S. VALVERDE VEGA	AREA AT.PRIMARIA URB. C.S. VALVERDE	01	2
C.S. HEREDIA	AREA AT.PRIMARIA URB. C.S. HEREDIA	01	2
C.S. HEREDIA	AREA AT.PRIMARIA URB. C.S. HEREDIA	03	2
C.S. BARVA	AREA AT.PRIMARIA URB. C.S. BARVA	01	2
C.S. ALAJUELA	P.S. TURRUCARES DE ALAJUELA	12	3
C.S. HEREDIA	AREA AT.PRIMARIA URB. C.S. HEREDIA	02	3
C.S. ALAJUELA	P.S. CARRIZAL DE ALAJUELA	04	3
C.S. ALAJUELA	P.S. SABANILLA DE ALAJUELA	09	4
REGION ===> CENTRAL SUR			
C.S. ACOSTA	P.S. GUAYABO DE MORA	02	1
C.S. SANTA ANA	AREA AT.PRIMARIA URB. C.S. SANTA AN	01	2
C.S. CRISTO REY	AREA AT.PRIMARIA URB. C.S. CRISTO REY	03	2
C.S. PARAISO	AREA AT.PRIMARIA URB. C.S. PARAISO	01	2
C.S. TURRIALBA	AREA AT.PRIMARIA URB. C.S. TURRIALBA	02	2
C.S. TURRIALBA	AREA AT.PRIMARIA URB. C.S. TURRIALBA	03	2
C.S. CURRIDABAT	AREA AT.PRIMARIA URB. C.S. CURRIDABAT	01	2
C.S. ACOSTA	P.S. PALMICHAL DE ACOSTA	06	3
C.S. ACOSTA	P.S. VUELTA DE JORCO	09	3
C.S. ASERRI	AREA AT.PRIMARIA URB. C.S. ASERRI	01	3
C.S. CRISTO REY	AREA AT.PRIMARIA URB. C.S. CRISTO REY	02	3
C.S. PARAISO	P.S. PACAYAS DE ALVARADO	10	3

HEALTH CENTER	HEALTH FACILITY	HEALTH POST CODE	TOTAL NUMBER OF SERVICES FOUND TO BE OPERATIVE
C.S. CRISTO REY	AREA AT.PRIMARIA URB. C.S. CRISTO REY	01	4
C.S. PARAISO	P.S. CORRALILLO	03	4
C.S. PARAISO	P.S. CACHI DE PARAISO	06	4
C.S. TURRIALBA	AREA AT.PRIMARIA URB. C.S. TURRIALBA	01	4
REGION ===> CHOROTEGA			
C.S. SANTA CRUZ	AREA AT.PRIMARIA URB. C.S. SANTA CRUZ	01	2
C.S. PUNTARENAS	AREA AT.PRIMARIA URB. C.S. PUNTARENAS	01	3
C.S. PUNTARENAS	AREA AT.PRIMARIA URB. C.S. PUNTARENAS	02	3
C.S. PUNTARENAS	AREA AT.PRIMARIA URB. C.S. PUNTARENAS	03	3
C.S. LIBERIA	P.S. BELEN DE CARRILLO	02	3
C.S. LIBERIA	P.S. FORTUNA DE BAGACES	05	3
C.S. LIBERIA	P.S. SAN ISIDRO DE AGUAS CLARAS	09	3
C.S. NICOYA	P.S. MANSION DE NICOYA	04	3
C.S. NICOYA	P.S. QUEBRADA HONDA DE NICOYA	07	3
C.S. LAS JUNTAS DE ABANGARES	P.S. COLORADO DE ABANGARES	01	3
C.S. LAS JUNTAS DE ABANGARES	P.S. LAS JUNTAS DE ABANGARES	04	3
C.S. LAS JUNTAS DE ABANGARES	P.S. SAN BUENAVENTURA DE ABANGARES	07	3
C.S. ESPARZA	AREA AT.PRIMARIA URB. C.S. ESPARZA	01	4
C.S. NICOYA	P.S. BOCAS DE NOSARA	01	6
REGION ===> HUETAR ATLANTIC			
C.S. GUAPILES	P.S. COLONIA SAN RAFAEL DE POCOCI	03	2
C.S. GUAPILES	P.S. LOS ANGELES DE POCOCI	06	3
C.S. LIMON	P.S. LA BOMBA DE LIMON	06	3
C.S. GUAPILES	P.S. PALMITAS DE POCOCI	01	-
C.S. LIMON	P.S. PENNURST DE LIMON	02	-
C.S. LIMON	P.S. BARRA DEL PARISMINA	04	-
REGION ===> HUETAR NORTE			
C.S. SARAPIQUI	P.S. UNION DE RIO FRIO	04	2
C.S. SARAPIQUI	P.S. BUENOS AIRES DE SARAPIQUI	02	3
C.S. SARAPIQUI	P.S. SAN MIGUEL DE SARAPIQUI	08	3
C.S. SAN CARLOS	P.S. COOPEVEGA	01	3
C.S. SAN CARLOS	P.S. SANTA ROSA DE SAN CARLOS	03	3
C.S. SAN CARLOS	P.S. SAN JOAQUIN DE SAN CARLOS	06	3

FIGURE 1B
Group 2

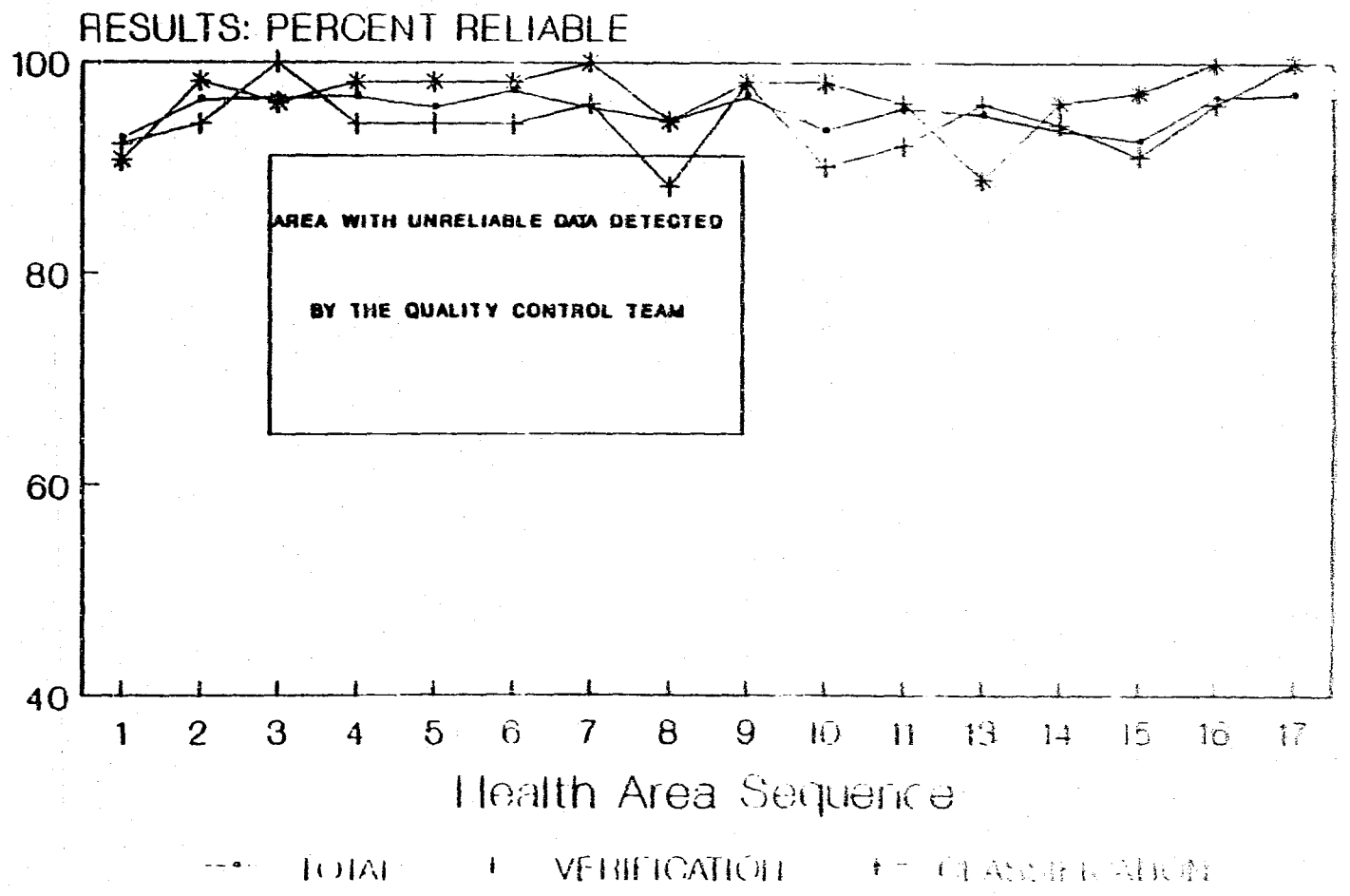


FIGURE 1C
Group 3

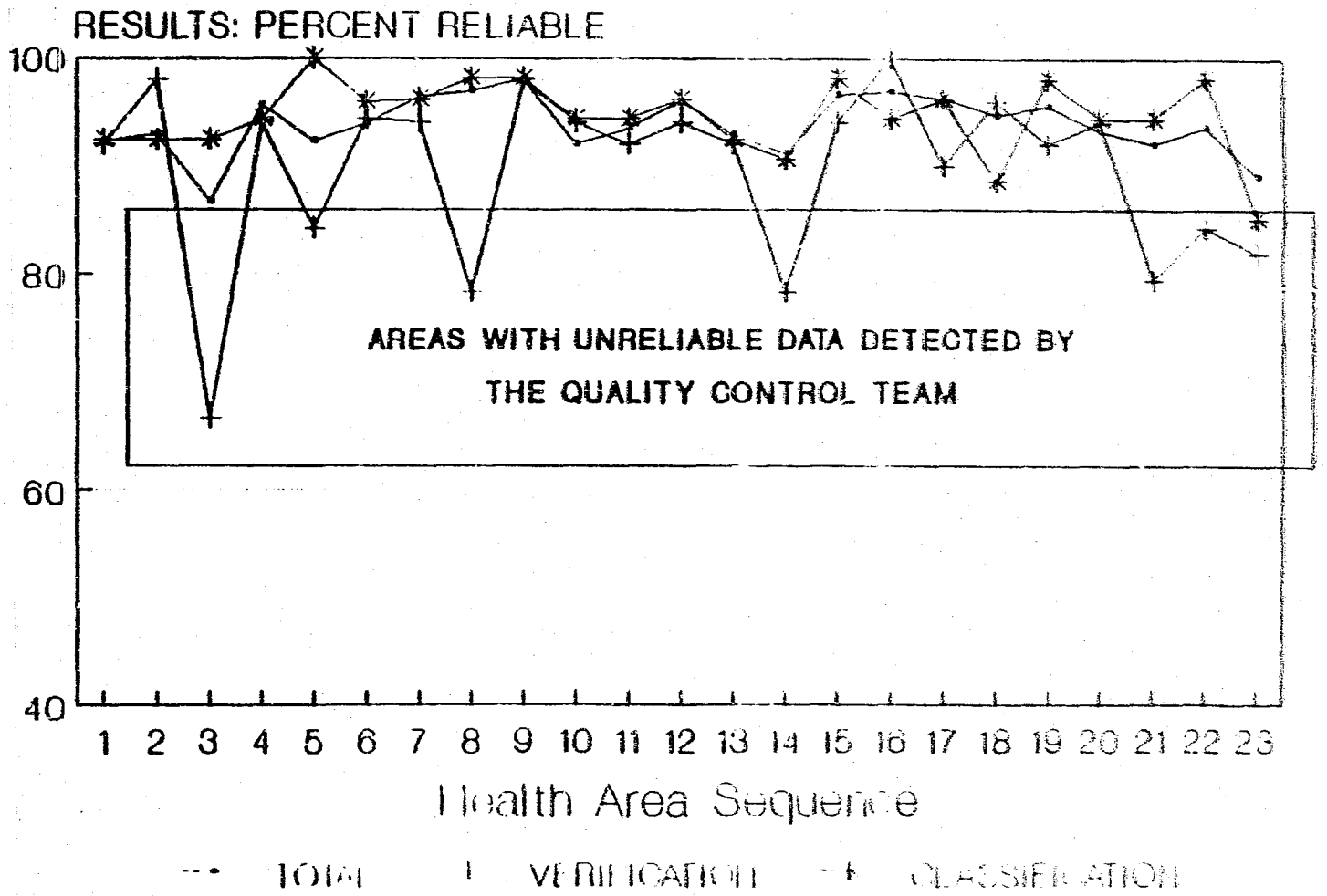
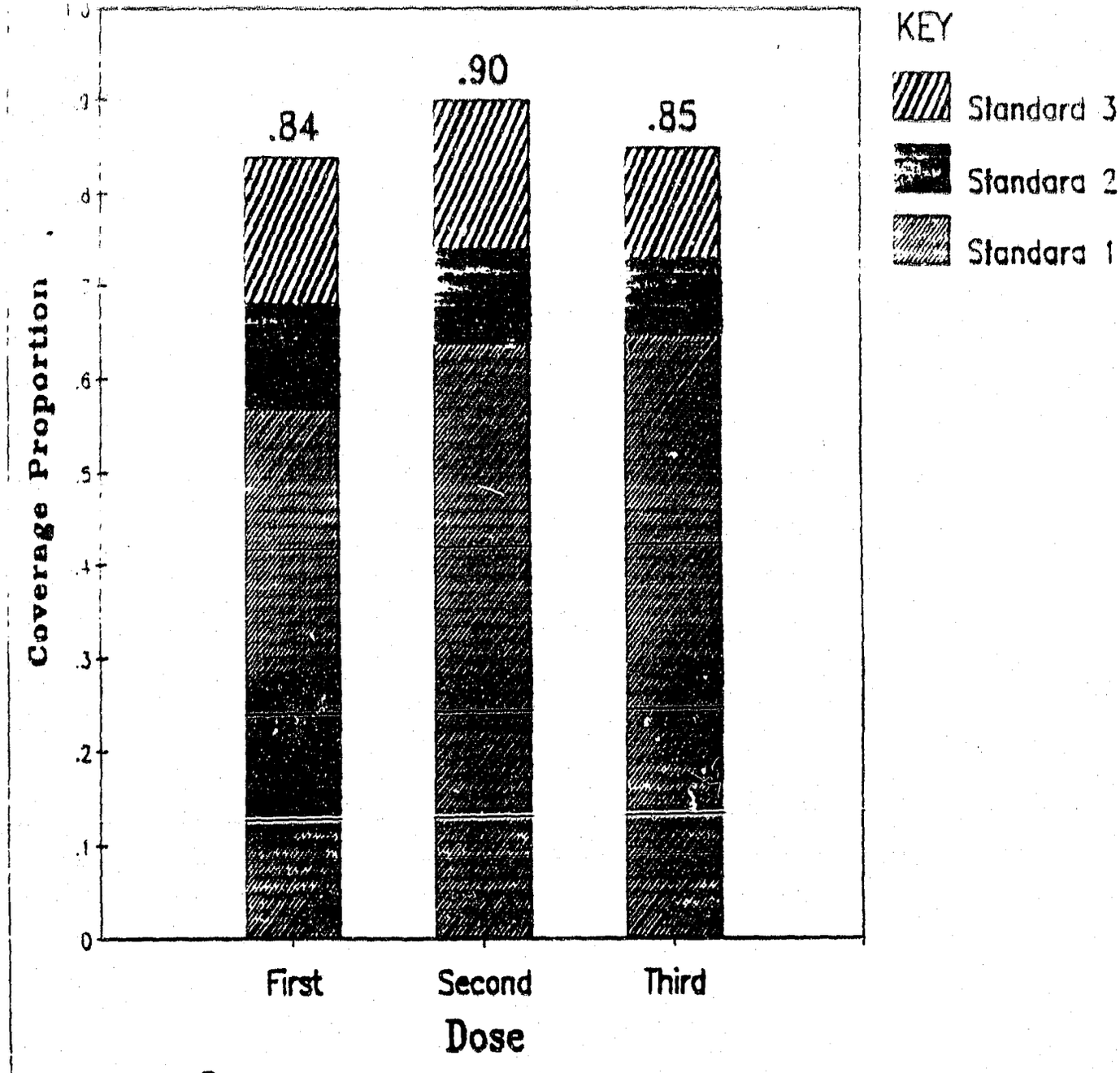


FIGURE 2

POLIO VACCINATION COVERAGE IN COSTA RICA USING 3 STANDARDS:

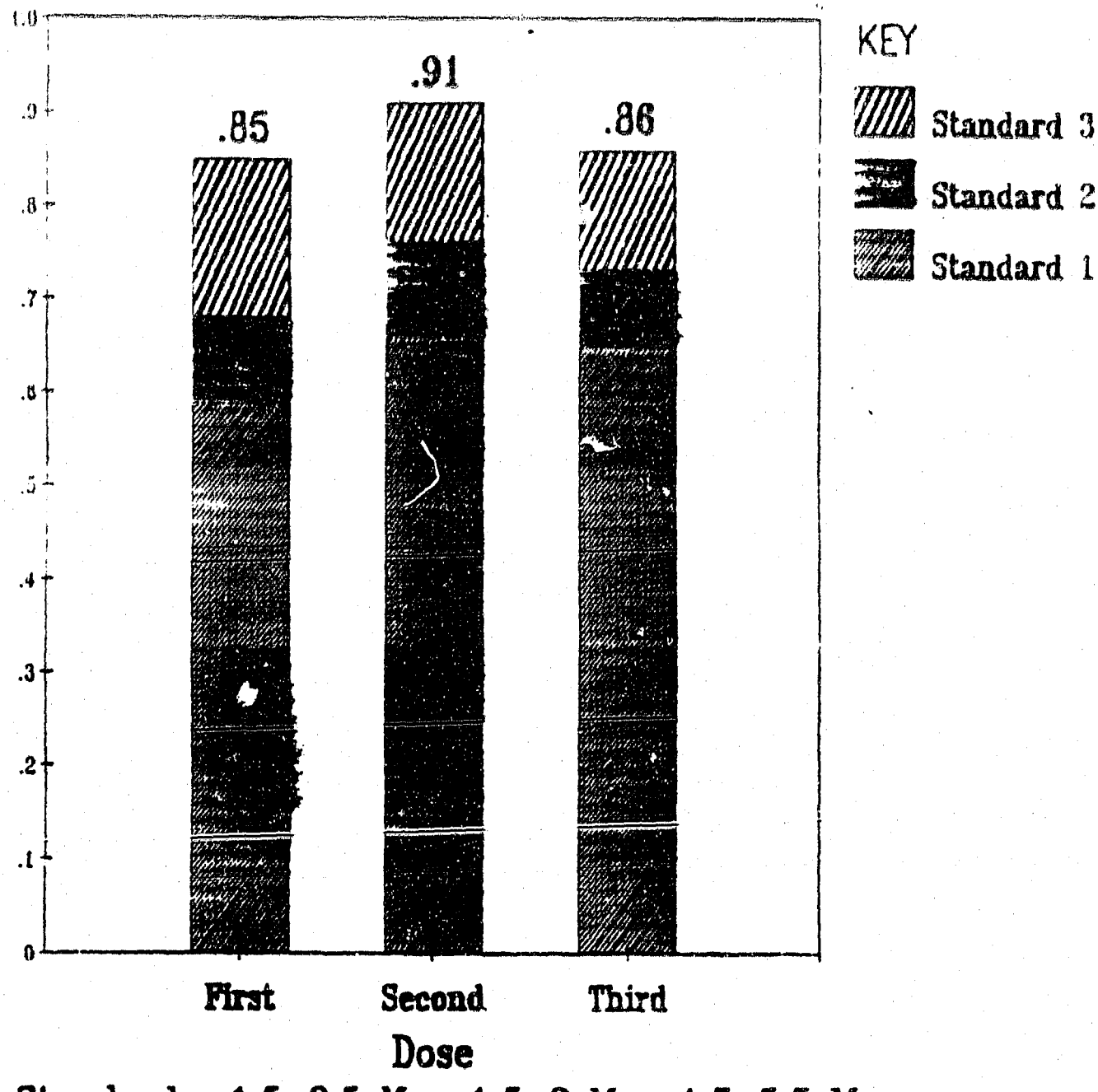
LQAS Data Analysis



3 Standards: 1.5-2.5 Mo., 1.5-3 Mo., 1.5-5.5 Mo.

FIGURE 3

DPT VACCINATION COVERAGE IN COSTA RICA USING 3 STANDARDS: LQAS Data Analysis



3 Standards: 1.5–2.5 Mo., 1.5–3 Mo., 1.5–5.5 Mo.

ANNEX 9

INSTRUMENTS USED

- Maps and hand drawn maps from the Department of Statistics, the Census and hand drawn maps from the Ministry of Health.
- Questionnaires for households with children, created by the project team.
- Instruction manual for the filling out of the questionnaires created by the project team.
- Formulas for the calculation of the Quality Control of the interviews created by Dr. Joseph J. Valadez
- Random Number Tables
- LQAS Tables created by Dr. Joseph J. Valadez
- Kilometric mileage diaries of the vehicles used by the interviewers

INFORMATION SOURCES MOST USED

- Family Charts
- Individual Control Cards
- Forms: Moniteration of Pregnancies and New Borns
- Weight/Age and Height/Age Curves
- Vaccination Notebooks
- Summary of basic health statistics for each Area
- Household Registers
- Lists of Health Posts and Community Health Areas
- Lists of the CHW's according to work Areas

ANNEX 10

Calculating Coverage Proportions and Confidence Intervals with LQAS Data

This section demonstrates the procedures for calculating coverage proportions using LQAS data. Because the number of children varies from one HP to another, the formula requires that the results from any one HA be weighted by the number of children in the target population of that particular HA. In this example 5 HAs are assumed rather than the 60 that were included in this work. Also the sample size is smaller than the 28 used, and the number of children in the target population are fewer than were found in the 60 selected HAs.

Table 2.2: A Example of Calculating Weighted Coverage Proportions

HA	n	d	(n-d)/n	N	Wt.	Wt.([n-d]/n)
1	12	2	.83	23	23/105	.18
2	12	3	.75	15	15/105	.11
3	12	0	1.00	29	29/105	.28
4	12	6	.50	17	17/105	.08
5	12	5	.58	21	21/105	.12
	60	16		105		.77

Key: HA = Health Area Code

n = LQAS Sample Size

d = Number of Unvaccinated Children Permitted in the Sample

N = Number of Individuals in the Target Population

An estimate of coverage in the area of these 5 HAs is therefore, 77%. The 95% confidence interval for this result would be calculated as follows:

$$\pm 1.96 \times \sqrt{\Sigma ([wt._i^2 (p_i\ q_i)] / n_i)}.$$

ANNEX 11

A Hypothetical Application of LQAS

As already mentioned, LQAS sampling uses the binomial formula.

$$P_a = (n! / [a! (n-a)!]) p^a q^{(n-a)}$$

The above formula was used for calculating all of the probabilities in Table 2.1. In each case the expected value (i.e., 80% or 50%) is the value of "p". Three rows are marked with an asterisk to denote LQAS sample size options that may be propitious. Each has its own advantages and disadvantages. The first option consists of a sample size of 12: 3 or fewer uncovered people are permitted. With such a design the evaluator would identify 79.5% of the HAs that have achieved 80% coverage of their communities.

Similarly, this design (i.e., n = 12, d = 3) would misclassify 7% of those HAs that actually had substandard coverage as acceptable. Therefore, 93% of the substandard HAs would be accurately identified.

These calculations were performed as follows:

The probability of correctly identifying an HA in which zero unimmunized individuals were permitted in a sample of 12 individuals assuming the true level of coverage was 80% of the population is:

$$P_a = p^n = .80^{12} \approx .0687$$

The probability of properly identifying an HA in which 1 unimmunized person was permitted in the sample is:

$$P_a = (n! / [a! (n-a)!]) p^a q^{(n-a)}$$

$$= (12) .80^{11} \times .20^1 = .2062$$

The probability of properly identifying an HA in which 2 unimmunized persons were permitted in the sample is:

$$P_a = (66)\ p^{10}q^{12-10} = (66)\ .80^{10} \times .20^2 = .2835$$

And, the probability of properly identifying an HA in which 3 unimmunized persons were permitted in the sample is:

$$P_a = (220)\ p^9\ q^{12-9} = (220)\ .80^9 \times .20^3 = .2362$$

Therefore, the probability of properly identifying an HA in which 3 or fewer unimmunized person were permitted in the sample is:

$$(.0687 + .2062 + .2835 + .2362) = .7946 = 80\%$$

Similarly, the probability of properly identifying an HA in which 2 or fewer unimmunized persons were permitted in the sample is:

$$(.0687 + .2062 + .2835) = .5584 = 56\%$$

These results, .80 and .56 are found in Table 2.1 at the first asterisk.

The same formula was applied to calculate the probability of correctly identifying an HA whose true coverage was 50% by permitting 3 or fewer unimmunized individuals in the sample. This calculation is:

$$(.0002 + .0029 + .0161 + .0537) = .0729 = 7\%$$

Hence, there is a 93% (or 1.00 - .07) probability that an HA in which coverage was 50% could be classified as a substandard HA.

Thus, with the design of n = 12, d = 3, and in which the expected coverage is 80%, some 79.5% of all the acceptable HAs would be correctly identified as would some 93% of those HAs whose coverage was 50% or lower. There remains the grey area of those HA whose coverage

s between 80% and 50%. Other OC curves could be calculated to determine the probabilities of their classification.