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"VITAMIN A DELIVERY SYSTEM"

QUARTERLY REPORT

September 16 - December 15, 1983

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And Preventive Ophthalmology
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1.0 INTRODUCTION

This first quarter of Fiscal Year 1983-84 was marked by several major accomplishments; namely, the completion of round 1 and initiation of the round 2 follow-up survey in the Aceh Study in Indonesia, the initiation and completion of the Lower Shire Xerophthalmia and Blindness Survey field work in southern Malawi in close collaboration with the Government of Malawi, WHO, USAID, IEF, HKI, and the RCSB; initial collaboration with the Government of Zambia in developing a protocol to investigate xerophthalmia in the Luapula Valley; and completing the first three months of the Public Health Ophthalmology Course with emphasis on nutritional and other leading causes of blindness in developing countries. In addition, the ICEPO Data Processing and Analysis Unit received, processed, and conducted preliminary analyses on substantial amounts of data from Aceh, and began processing data from Malawi. The Reference Laboratory continued to analyze green vegetables for beta-carotene content using HPLC apparatus, as well as publish previous results.

2.0. COUNTRY PROJECTS

2.1. Indonesia

2.1.1. Aceh Study

During September, 1983 the impact study of vitamin A capsule distribution in Aceh proceeded into its second year of field

work, involving a 10 to 12 month follow-up survey of children in UNIVAC and TARVAC villages. It is this second year of longitudinal follow-up that will generate the data needed to answer the questions on capsule distribution impact on xerophthalmia, mortality, growth, as well as a large number of questions on program efficiency. Approximately 33,000 children in 471 villages are scheduled to receive a second eye examination, and nutritional assessment, when indicated.

ICEPO's staff were in Indonesia during the transition between the first and second surveys to assist in developing/modifying field procedures and the data management system, as well as participate in numerous meetings at the executive management level of the study. During its review of the status of the Aceh project, the Steering Committee ruled that the study was proceeding remarkably well and that the only major difficulty was the lower-than-expected rate of corneal xerophthalmia. While this change in observed corneal disease may restrict the study's ability to evaluate the program impact on potentially-blinding xerophthalmia (depending on the change in disease risk during the second year among TARVAC villages), other major questions concerning program coverage, efficiency, and perhaps most importantly, capsule distribution impact on childhood mortality can be answered. In this regard, a modified proposal to include the mortality question was drafted and approved in Indonesia by the Steering Committee.

A schedule for the remainder of the Aceh project was established whereby the second year's survey would be completed

by September, 1984, data entry by November 1984, and a "clean" data base compiled in Baltimore by April 1985. During the period October 1984 to April 1985 a on-week epidemiologic and data analysis workshop will be given by ICEPO in Jakarta to assist in developing analytic skills among Indonesian collaborators. In addition, Dr. Sommer began helping Indonesian study members in formulating individual research questions to ask of the data set which can be further developed during the workshop. Ms Hawkins continued to work in Jakarta with the staff of the data entry unit in upgrading and testing their data management skills using the micro-computers, and modified data entry programs to be compatible for usage during round 2.

In Aceh, Mr. West spent three weeks reviewing round 1 procedures with the field teams, revising the Manual of Operations, field testing Round 2 forms, and participating in team training and standardization exercises. Later, Ms Hawkins also visited Aceh to complete the accurate identification of all surveyed villages and their program status during the first study year. In Baltimore the Manual of Operations and sample lists were updated to accurately reflect actual field events.

As of the end of the quarter, ICEPO has received 436 Round 1 data diskettes from Jakarta, of which slightly more than half have been processed, cleaned, and entered into the data base maintained at the School of Public Health and Hygiene. All round 1 data is expected to be cleaned and entered by the end of January 1984.

2.1.2. MSG Fortification

Plans to conduct a field trial on the impact of vitamin A fortification of MSG on vitamin A status, xerophthalmia, and MSG acceptability within the population was a major focus of deliberation during Dr. Sommer's and Ms Hawkins' visit to Indonesia. A basic protocol has been written jointly by the Nutrition Research and Development Center (NRDC) in Bogor, the Directorate of Nutrition of the Ministry of Health, and Helen Keller International (HKI) with ICEPO serving in a technical consultant capacity. While Hoffman-LaRoche is actively developing improved coating processes for the vitamin A-enrichment of MSG, the field study is likely to be yet 12 months or more in the future due to the political and economic considerations which much be addressed for MSG fortification to be a viable intervention (e.g. questions surrounding the fair marketing of a fortified MSG product, the financial mechanisms required to cover the on-going costs, etc.). In addition to these meetings in Indonesia, fortification of MSG was discussed further with Drs. Gantira and Muhilal from the Cicendo Hospital and the NRDC during their visit to Baltimore earlier in September 1983.

2.1.3. Nutrition Education Programs

The idea of a "media-blitz" nutrition education campaign to promote vitamin A dietary intake, introduced by Dr. Sommer during September 1982, was further discussed in Indonesia this year.

During the interim the approach has gained a larger constituency in Indonesia, such that a pilot project to evaluate the changes in knowledge, attitudes, and practices (KAP) has been identified as a research priority in the NRDC's proposed five-year plan as the WHO Asian Regional Collaborating Center for the Control of Xerophthalmia and Vitamin A Deficiency (dated 28 September 1983). Further, an outline of such a nutrition education campaign study has been developed with joint design and implementation components shared by the NRDC and the Directorate of Nutrition, Ministry of Health.

2.1.4. Xerophthalmia Surveillance System

While in Indonesia, Dr. Sommer reviewed plans for improving national surveillance system with Pak Tarwotjo of the Directorate of Nutrition. Pak Tarwotjo requested ICEPO assistance in strengthening the supervisory, reporting, and feedback networks, particularly between local health center and provincial level personnel.

2.1.5. Joint ICEPO-NRDC (Bogor) Collaboration

(Please refer to paragraph 3.0 of this report for details)

2.2. Tanzania

2.2.1. Measles Blindness Studies

Recruitment and study of almost 200 measles patients in each of the two collaborating institutions (KCMC & Mvumi) is completed. Preliminary data analysis suggests an important role for vitamin A deficiency in the genesis of the problem. Drs. Sommer and Taylor had lengthy discussions on the project with the KCMC primary collaborator, Dr. Marilyn Scudder, in October at the AAO meeting in Chicago. Plans are underway for Dr. Foster to bring preliminary data to ICEPO in February for review and formulation of future plans. Dr. Sommer will review all clinical and epidemiologic data in Tanzania in February and will return with the hundreds of blood specimens requiring analysis by Mrs. Rider's laboratory.

2.2.2. Tanzanian Training in Malawi

In order to establish a precedent for intra-regional technical cooperation in xerophthalmia control, ICEPO arranged and financed a training visit for two Tanzanian ophthalmic medical assistants to Malawi to participate in the Lower Shire Xerophthalmia and Blindness Survey for a three week period. Dr. B.B.O. Mmbaga (from Dodoma) and Dr. Peter Mihale (from Iringa) observed and participated in team training including standardization exercises, survey planning discussions and actual survey procedures, accompanying field teams to the villages each

day. Both Drs. Mmbaga and Mihale are expected to be actively involved in planning and conducting the Tanzanian National Xerophthalmia Survey in late 1984.

2.2.3. Tanzanian National Prevention of Blindness Seminar

Preparations continued during the quarter for what is now planned to be a regional prevention of blindness seminar in February 1984 in terms of the standardized xerophthalmia survey package being prepared by Dr. Tielsch, and presentations to be made by Dr. Sommer. Approximately 100 participants from throughout the East African region are expected to attend the seminar.

2.3. Malawi

The Government of Malawi, Lower Shire xerophthalmia-blindness survey was conducted from September through November 1983. This survey of nearly 5400 children and 1600 adults comprised a major collaborative project between the government of Malawi and a network of international agencies, including the International Eye Foundation, ICEPO, Helen Keller International, Royal Commonwealth Society for the Blind, World Health Organization, and USAID. Following a year of planning and preparation, Drs. Tielsch, Taylor, and Mr. West arrived in Malawi in September to train and standardize the three field teams. Dr. Tielsch and Mr. West remained on-site during October to help launch the actual survey in compliance with the established

protocol, provide on-going technical support throughout the first month of field work, and to fully document survey procedures. Dr. Tielsch's work in Malawi was supported by the World Health Organization. The survey was completed on schedule during the third week of November 1983.

Given the short duration of the survey and the present lack of trained personnel and data management facilities in Malawi, it was previously decided that data entry and initial analyses would be conducted in Baltimore by ICEPO. In accord with this decision the survey data forms were brought to Baltimore by Mr. Swartwood (IEF) immediately following the survey. During December, a local data entry firm was contracted on a competitive basis by ICEPO for data entry, scheduled for completion by March 1984. Ms Joanne Katz and Ms Hawkins were responsible for selecting the data entry firm and have been actively involved in preparing the data management programs required for preliminary cleaning of the data and its subsequent analysis. The previously drafted Manual of Operations was critically reviewed and modified by Mr. West and Dr. Tielsch in Malawi to reflect actual survey procedures. The Manual was redrafted and finalized during November and December and will be distributed to participating agencies as well as other interested organizations in January 1984. Copies of the initial draft of the Manual are currently in Zambia and Tanzania to assist local agencies in planning their Luapula Valley and National Xerophthalmia Surveys, respectfully.

The Lower Shire survey is expected to yield concise

estimates of the prevalence and severity of xerophthalmia in the Lower Shire Valley and is viewed by the government of Malawi as the first phase of a formal program to prevent xerophthalmia in the region. To this end, reported findings will be discussed jointly with the Government of Malawi and other collaborating agencies during 1984 to formulate future preventive activities.

2.4 Zambia

At the request of the National Food and Nutrition Commission (NFNC), Government of Zambia, Dr. Taylor and Mr. West site visited the Luapula Valley for ten days to conduct a preliminary investigation of xerophthalmia and measles-blindness and to review the Government's draft proposal for the assessment and prevention of nutritional blindness in the Luapula Valley. While relatively large numbers of blind adults and older children were seen, corneal scarring appeared to be less common among the under six year old population during the team's travels through the Valley. It was noted that the WHO measles vaccination program is currently reaching approximately 75% of the under six year old population and that the consumption of vitamin A-rich small fish has increased in the region, both of which may be acting as important preventive factors.

The NFNC, in collaboration with the Zambia Flying Doctors Service (ZFDS) and the Tropical Diseases Research Center (TDRC), has proposed to investigate xerophthalmia and other major causes of blindness in the Luapula region to determine its prevalence,

severity, and associated risk factors in this historic "valley of the blind." During a series of several meetings, Dr. Taylor and Mr. West worked with local colleagues in refining the Government proposal to prevent vitamin A deficiency and xerophthalmia which involves an initial, population-based prevalence survey during its first phase. The proposal was subsequently reviewed in Baltimore during the visit of Dr. Chelemu, Director of the ZFDS, in late October. The Zambian Government plans to submit the proposal to various funding agencies for consideration early in 1984, with plans to conduct the actual survey later in the same year.

2.5. Zaire

Pursuant to a request by Dr. Kabamba, Director of the Zaire Government's National Nutrition Planning Center (CEPLANUT) in the spring of 1983, Dr. Tielsch visited Zaire for two weeks in November to conduct a preliminary assessment of xerophthalmia and measles blindness in several regions throughout the country.

Specifically, Dr. Tielsch visited Kinshasa, and a number of areas throughout Kivu province where serious malnutrition is known to be wide-spread, including Goma, Bukavu, and Katana. In each location, Dr. Tielsch met with senior medical, nutrition, and ophthalmic personnel concerning the presence of xerophthalmia in the community and examined malnourished children for eye signs in local hospitals and clinics. While ample evidence exists to indicate moderate to severe protein-energy malnutrition as a

serious problem throughout major regions of the country, xerophthalmia does not appear to be a significant public health problem. Clinicians throughout the regions visited have rarely seen xerophthalmia despite large numbers of children routinely seen with severe PEM. This apparently low prevalence of xerophthalmia may be largely attributable to the ubiquitous use of red palm oil which is available throughout the country. In addition, dark green leafy vegetables appear to be widely available and routinely incorporated into the weaning diet of young children.

While both discussions with leading ophthalmologists and impressions gained from visiting schools for the blind suggest that measles, at least historically, has been a major cause of childhood blindness, this may be an increasingly less serious problem in the future due to an extensive and vigorously pursued WHO expanded program of immunization throughout much of the country.

While all major areas where malnutrition exists were not visited during the visit, little evidence could be collected to suggest vitamin A deficiency and xerophthalmia to be an important problem in Zaire. As a result, Dr. Tielsch recommended ICEPO plan no further involvement in Zaire in the area of xerophthalmia control.

2.6. Mexico

Data concerning the prevalence of xerophthalmia as determined by history of night blindness from study villages in Mexico were analyzed by Dr. Taylor. Results showed age-specific prevalence rates to range from 12 to 32 percent in the absence of other clinical signs of xerophthalmia among children under 12 years of age. This poor specificity indicates that the usefulness of a history of night blindness as an indicator of xerophthalmia can vary widely in different cultures.

3.0. WHO REGIONAL COLLABORATING CENTERS

Work to promote a network of regional collaborating centers for the prevention of nutritional blindness was pursued on two different scales during the quarter: (1) continued investigative work with the Nutrition Research and Development Center (NRDC) in Bogor, Indonesia; and (2) intensified discussions and planning both in Geneva and Baltimore to develop an East African Regional Collaborating Center.

3.1. NRDC-ICEPO Activities

ICEPO and the NRDC, Bogor, collaborate officially under the terms of a five-year Memorandum of Understanding jointly signed by the directors of the two institutions November of 1982. During the quarter the NRDC, in close collaboration with ICEPO, developed and submitted to the WHO a proposed Five-year Plan, as

a regional center for the control of xerophthalmia and vitamin A deficiency. This plan focuses on strengthening institutional capabilities within the NRDC, particularly in the development of comprehensive library resources in the vitamin A area, and technical communications. To assist in these efforts, ICEPO has initiated a monthly mailing of computerized literature searches dealing with vitamin A deficiency and is scheduling Mrs. Agatha Rider to spend several months at the NRDC during mid-1984 to assist in conducting biochemical studies and writing reports suitable for scientific publication. The plan further outlines a regional training course in vitamin A deficiency and xerophthalmia for workers from neighboring countries in Asia which would be developed in concert with ICEPO.

The third major section of the five-year plan deals with strengthening intervention-oriented research which involves a number of research topics jointly developed by the NRDC and ICEPO, including testing alternatives to the soft gelatin capsule for packaging large doses of vitamin A; comparisons of beta-carotene content of fresh, sun-dried and shade-dried green leafy vegetables utilizing high-performance liquid chromatography techniques; a pilot trial on MSG fortification with vitamin A; a study of knowledge, attitudes, and practices regarding DGLV consumption to form a basis for a nutrition education campaign; and a study on optimizing the vitamin A response to a large prophylactic dose through a small dose loading technique. One completed study on the use of a history of night blindness by village kaders as a screening tool for xerophthalmia in the

community, jointly developed by NRDC and ICEPO, was presented by NRDC investigators at the Asian Congress of Nutrition in November, 1983.

3.2. East African Regional WHO Collaborating Center for Prevention of Nutritional Blindness

In response to (1) growing evidence of xerophthalmia as a prominent cause of blindness in East African children, (2) the need to appropriately address nutritional blindness in a coordinated fashion given extremely limited national resources within the region, and (3) a growing interest to promote greater technical cooperation between developing countries, the potential usefulness of a Regional Collaborating Center composed of institutions and members from different countries in East Africa has been an issue of intense discussion between Drs. Pradilla, DeMaeyer, Thylefors at WHO, and ICEPO. In November Dr. Tielsch visited Geneva (under the auspices of WHO) to further discuss the formation of this regional center. It was agreed that ICEPO prepare terms of reference for the regional collaborating center which should actually comprise a proposal for implementation, indicating the areas of expertise which need to be represented along with a list of potential member institutions. A formal "Terms of Reference" is currently being prepared by ICEPO for the WHO.

4.0. DOMESTIC SUPPORT PROJECTS

4.1. Data Processing and Analysis Unit (DPAU)

The Center's data processing and analysis unit has continued to gain momentum and efficiency as large volumes of data from the Aceh study arrive in Baltimore in diskette form. Ms Hawkins directs the activities of the unit and, with her experiences in Indonesia, both in the field with the teams and in Jakarta developing and training the data entry unit, provides continuity to the Aceh data management system. Ms Joanne Katz, Mr. Steven Singer (contracted computer systems specialist), and Mrs. Karen Jackson comprise the Center's core staff. In addition to the multiple data processing activities of the Unit, Ms Hawkins is concurrently preparing a special data processing manual which documents the entire system being utilized for the Aceh study. The immediate goal of the DPAU is to prepare a report describing the major study characteristics of the Aceh population generated from the first year's field work, by February 1984.

In addition to the Aceh data set, the DPAU was responsible for competitively selecting the data entry firm in Baltimore for the Malawi survey data, and has prepared the programs required for cleaning and analyzing the data set drawing on the experiences and utilizing already-developed software from the Aceh Study. Ms Katz has been primarily responsible for preparing the Malawi data set management system.

4.2. Biochemistry Reference Laboratory

The Biochemistry Reference Laboratory, directed by Mrs. Agatha Rider, has continued its investigation in differences in pro-vitamin A content in dried samples of dark green leafy vegetables from Indonesia, Malawi, and Tanzania. Altogether, 17 samples of dry, dark green leafy vegetables and 4 samples of fresh leafy vegetables were analyzed for beta-carotene content using the high performance liquid chromatography (HPLC) method described by Brauman and Grimme (Biochimica Biophysica Acta 637:8-17, 1981). Three vegetable types from Tanzania were received in both fresh and dried condition, providing a particularly useful basis for comparing dried and fresh contents while controlling for sample variation. The retention of beta-carotene after drying was 32% for the DGLV "kunde," 55% for "mchicha," and 62% for "maboga" on a dry weight basis. Other dried vegetables contained levels of beta-carotene varying from non-detectable in okra fruit to 695 micrograms per gram for dried papaya leaves from Indonesia. A more detailed report of this study is in preparation.

In addition, split samples of dried DGLV from Malawi were also sent to Tanzania with the intention of comparing analysis results between laboratories at the Tanzanian Food and Nutrition Commission and ICEPO.

4.3. Clinical Photo Bank

Loan requests to ICEPO for slides of clinical material have been abundant during this first quarter. Slides were lent for the following purposes during this period:

1. An additional series of slides to WHO for use on the xerophthalmia recognition card.
2. To the Food and Agriculture Organization (FAO) for illustration in an up-coming publication.
3. To Hoffman-LaRoch for use in non-commercial illustrative brochures (i.e., for generic educational material) as suggested by Dr. DeMaeyer.
4. To the new book, Vitamin A Deficiency and its Control, ed, for illustration, edited by Dr. Jack Bauernfeind.
5. To the American Ophthalmological Society to be used as illustrative material in the their publication on "Increased Mortality in Mild Vitamin A Deficiency."
6. Previously loaned slides appeared as illustrative materials in the new textbook titled, The Cornea: Scientific Foundation and Clinical Practice, edited by G. Smolin and R.A. Thoft, in Chapter 13: "Dietary Deficiencies" by R.A. Thoft, Little, Brown, and Co., Boston/Toronto, 1983.

4.4. State of the Art Paper

The paper prepared during the year by Mr. West and Dr. Sommer titled "Periodic Large Oral Doses of Vitamin A for the Prevention of Vitamin A Deficiency and Xerophthalmia" underwent a final update during November and is currently being considered for publication in the new journal, "International Food Research," edited by I. Hornstein. The article is also being considered for an independent IVACG monograph.

4.5. Standardized Xerophthalmia Survey Package

The generalized Manual of Operations, being prepared by Dr. Tielsch, underwent substantial development during the quarter based on experiences from the Malawi and Indonesia field surveys. This manual is viewed as part of an overall package of instructions and guidelines which can be adapted to specific country circumstances for planning and carrying out a xerophthalmia and blindness survey in the community.

4.6. Public Health Ophthalmology Course

In September, 1983 thirteen physicians from twelve different countries around the world arrived to participate in the nine-month Collaborative Training Program in Public Health Ophthalmology jointly conducted by the ICEPO and the Johns Hopkins School of Hygiene and Public Health. In addition to developing basic public health skills, emphasis is placed on the

application of these skills to recognition, treatment, and prevention of major causes of blindness throughout the underdeveloped regions of the world. During late November and the first half of December, students were provided intensive instruction in vitamin A deficiency and nutritional blindness as part of their core public health ophthalmology curriculum. Instructors included Dr. Sommer, Mrs. Rider, Mr. West, and Dr. Tielsch. Drs. Sommer and Tielsch are the course Director and Coordinator, respectively.

4.7. Other Projects

4.7.1. Conjunctival Imprint Technique

Development of methods for early detection of clinically significant vitamin A deficiency continues to be an important goal for ICEPO. Previous trials conducted by ICEPO (Dr. John Whittpen) in India showed variable results using a conjunctival imprint technique to detect loss of goblet cells in the conjunctiva of children with vitamin A deficiency. Recently the technique has been refined in the rabbit model based on the simultaneous appearance (and detection) of giant epithelial cells in vitamin A deficient rabbit conjunctiva. Plans are now being laid to retest this conjunctival cytologic method in Indonesian children in collaboration with the NRDC, Bogor.

4.7.2. Continuing Analysis of 1976-78 Indonesia Data

Previously unanalyzed data from the 18 month longitudinal study on Java between 1976-78 were organized into accessible data management files during December, 1983. The following research questions will be investigated using this data set:

1. A comparison of 12-month growth rates among children with any xerophthalmia, chronic xerophthalmia, and normal children by age.
2. A descriptive investigation of the seasonality of vitamin A intake among children with xerophthalmia, their controls, and a random sample from the larger study population by age throughout the 18 month study period.
3. A comparison of changes in vitamin A intake among children who proceed from normal to xerophthalmic status, xerophthalmic to normal status, normal to normal status, and abnormal to abnormal status. The ability to investigate this latter issue in the present data set is speculative at this time.

5.0. MEETINGS/PRESENTATIONS/PUBLICATIONS

5.1. Meetings

The following meetings were attended by ICEPO staff during the quarter:

1. Dr. Taylor participated in several meetings at WHO/Nutrition and WHO/PBL in Geneva (at no cost to project) concerning the xerophthalmia survey in the Lower Shire Valley and plans for a regional WHO Collaborating Center in East Africa on 1-4 October, 1983
2. Ms Hawkins attended a Symposium on Computer Applications in Medical Care in Baltimore, October 23-25, 1983.
3. Dr. Sommer and Dr. Taylor attended the annual meeting of the American Academy of Ophthalmology (AAO) in Chicago, October 13-November 4, 1983.
4. Dr. Sommer and Dr. Taylor attended a WHO meeting on revising the WHO Visual impairment Survey Form In Bethesda, Maryland, November 10, 1983 (at no cost to project).
5. Dr. Tielsch participated in discussions at WHO/Nutrition in Geneva concerning the progress of the Malawi survey and plans for the Regional WHO

Collaborating Center, 14-15 November, 1983 (at no cost to project).

5.2. Presentations

The following vitamin A-related presentations were made by ICEPO during this quarter: course on "War on Blindness" by Dr. Sommer at the AAO in Chicago, October 31-November 4, 1983.

5.3. Publications

1. Sommer A, Tarwotjo, I, Hussaini G., Susanto, D.:
Increased mortality in children with mild vitamin A deficiency. Lancet II:8350; 585-588, 1983.
2. Rider AA, Sommer A: Comparison of serum vitamin A values obtained by three different methods. Nutrition Reports International 28:891-897, 1983.
3. Tielsch JM, Sommer A: Epidemiology of vitamin A deficiency and xerophthalmia. Annual Review of Nutrition (in press).
4. Sommer A: Nutritional Blindness: Xerophthalmia and Keratomalacia. in: Duane's Clinical Ophthalmology.

6.0. FUTURE ACTIVITIES

6.1. Travel

Dr. Sommer to Tanzania to participate in the National/Regional Blindness Prevention Seminar; review the measles/nutritional blindness studies in Moshi and Mvumi; review results of the National xerophthalmia surveillance program; assist in planning the National Xerophthalmia Survey; collect dried DGLV specimens for beta-carotene analyses in Baltimore; collect and return serum to Baltimore for analysis; and meet with Dr. Chirambo (MOH, Government of Malawi) to review the Lower Shire Survey and data entry procedures, determine the GOM analysis requirements and plans for a future seminar to review the survey results, and plan appropriate intervention programs; February 10-24, 1984.

Ms Hawkins to Orlando, Florida to attend the annual meeting of the Biometrics Society, ENAR, March 11-14, 1984.

6.2. Data Management and Analysis Activities

A preliminary analysis of the first year's prevalence survey data from the Aceh study will be performed, and a preliminary data report will be compiled and distributed.

Round 2 data diskettes will continue to be received by the DPAU from Jakarta for processing, editing, cleaning, and compiling.

The Malawi survey data will be entered by the contracted data entry firm, and returned to ICEPO for editing, cleaning, and early data analyses.

6.3. Vitamin A Biochemistry Reference Laboratory

A report will be prepared on beta-carotene analyses of dark green leafy vegetables as more specimens become available.

A literature search will be conducted for recommendations for drying vegetables, beta-carotene content of fresh and dried vegetables, and other issues related to preparing a paper on the DGLV analysis experiments.

The laboratory will continue to collaborate with Dr. Sheffer Tseng on the role of vitamin A in corneal differentiation and in healing of lesions caused by uveitis using the rabbit model.

6.4. Visitors to ICEPO

January 16-24, 1984

Dr. Alan Foster from Tanzania to review the results of the measles/nutritional blindness study and to carry-out in-depth analyses of the National Xerophthalmia Surveillance data.

January 18-19, 1984

Mr. Robert Tilden from Indonesia to review current round 2 study procedures and early round 1 data and make further plans for the fortification and nutrition education programs.

January 24, 1984

Dr. Carl Kupfer from the National Eye Institute to meet the Public Health Ophthalmology students to discuss the control of xerophthalmia.

January 27, 1984

Dr. Susan Pettiss from New York to co-author an article with Mr. West on xerophthalmia prevention programs and to discuss issues of xerophthalmia prevention with Public Health Ophthalmology students.

February 2, 1984

Dr. Konyama from the WHO to visit the PHO students to discuss strategies for the control of xerophthalmia.