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PROJECT REPORT

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**Evaluation of a Program to
Prevent Xerophthalmia
In Haiti**

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FOREWORD

The evaluation of the first three years of a project to prevent xerophthalmia was carried out under the auspices of the Department of Public Health and Population of Haiti (DSPP), Helen Keller International (HKI, formerly the American Foundation for Overseas Blind-AFOB), with the support of the U.S. Agency for International Development (AID).

The ocular survey was designed by Louis D. Pizzarello M.D., M.P.H., an ophthalmologist in practice at the Edward S. Harkness Eye Institute in New York City at the time of the evaluation. The field activities were directed by Serge Toureau, M.D., M.P.H., project coordinator of the AFOB Vitamin A Program in Port-au-Prince, Haiti, assisted by two Haitian ophthalmologists, Drs. Clausel Midy, and Ludovic Lafontant. Susan Leone, M.A., M.P.H., projects officer in the Blindness Prevention Department, HKI, New York, was responsible for the non-ocular aspects of the survey.

The authors wish to thank in particular Drs. Gaston Deslouches and William Fougere of the DSPP for their

cooperation. The counsel of Susan Pettiss, Ph.D., director of Blindness Prevention, HKI, and Florence Marshall, M.D., pediatrician and HKI project consultant, was invaluable in completing the survey. The thoughtful review and comments by Dr. Kendall King, vice president - Grants, Research Corporation, on the preliminary analysis of the data is gratefully acknowledged. The editorial assistance of Margaret C. Bayldon, director of Public Relations, HKI, the help in graph design of Ms. Donna Nager, and secretarial skills of Ms. Mary Jackson, both of HKI are also greatly appreciated.

Finally, the diligent field work by the Haitian survey team--assisted by project administrator Jean-Claude Lucas and HKI field representative Perry Smith--is recognized and warmly acknowledged.

CONCLUSIONS

1. The ocular survey has demonstrated a tenfold decrease in the prevalence rate of vitamin A related corneal destruction in the area studied in Haiti since the 1974-75 survey.
2. The decrease in the prevalence of xerophthalmia may have been influenced by a number of factors, among which was certainly the active and extensive vitamin A supplementation program.
3. The prevalence of nearly one case per 1000 children indicates that xerophthalmia continues to be a problem of public health magnitude, according to WHO standards.
4. The survey found that children from 9.4 percent of the families interviewed had received a vitamin A capsule at some point, based on mother's recall.
5. It was suggested that the above percentage indicates that a significant number of the target group of children--the ill and malnourished benefitting from the health and nutrition services--are being reached.
6. There are marked variations in reported distribution between sample sites.

7. Less than 5 percent of the heads of households surveyed gave a positive response when queried on their understanding of vitamin A capsules.
8. Eighty-two percent of the health establishments were centers of distribution of vitamin A capsules by the end of 1978.
9. The number of capsules reported distributed each year has more than doubled annually (1976-78).
10. There is a discrepancy between numbers of vitamin A capsules reported as reaching the AFOB/Port-au-Prince vitamin A program and numbers of capsules reported distributed to the distribution centers. There is an even greater discrepancy between the numbers of capsules reported as distributed to the centers and the number of capsules reported distributed by the centers.
11. The Port-au-Prince health district distributed the largest share per district of vitamin A capsules. A higher percentage of its estimated target group was reached than reports indicate from other areas of the country.

12. AFOB/Port-au-Prince vitamin A program staff's ability to communicate within the system was positively demonstrated by data indicating that the majority of centers of distribution were using a revised reporting form within seven months after its inception; although persons in large numbers of centers did not seem to know how to fill out the form correctly.
13. Supervisory visits from AFOB/Port-au-Prince staff significantly influenced the rate of reporting by distribution centers, and the seminars had an even more dramatic positive effect.
14. Subsidizing salaries of the 22 district auxiliary nutritionists from February through September 1977 did not seem to influence the reporting of capsule delivery from centers in the districts.
15. Purchase of a project vehicle greatly accelerated and strengthened project operations from December 1977 onward. The delay in purchase is assumed to have frustrated project growth and development.
16. Project costs per capsule delivered decreased over the first three years of the project (1976-78).

17. The limited results of the nutrition education efforts illustrate the difficulty in reaching rural populations. The seances d'education (talks during the actual administration of the vitamin A) seem the most effective technique for getting the message across.
18. The vitamin A program staff in Haiti has been relatively stable with little turnover; technical assistance by the two HKI advisors has been continuous since the project began.

RECOMMENDATIONS

1. The vitamin A program in Haiti should continue its operations with the goal of prevention of xerophthalmia.
2. The program should take measures to improve its supervisory component. There should be an effort, for example, to determine why some centers of distribution do not report routinely, and what the obstacles are. A plan for more effective monitoring of the reporting system should be developed.
3. The seminars in the districts should be continued in some form--perhaps as refresher exercises in conjunction with other health personnel meetings.

4. It is realized that the costs of seminars and supervisory trips from Port-au-Prince headquarters are relatively high. A modified system should be explored, such as designating a responsible health/nutrition worker to visit periodically the various centers of distribution in his or her district for supervision and in-service support.
5. Seances d'education between health personnel and parents seem an effective way to reach the rural population. Their importance should be stressed at seminars, and at training institutes. The time of interaction between the patient and medical, health, or nutrition worker is an optimal time for transmitting nutrition messages.
6. The program should take advantage of any mass immunization campaigns carried out in the country. A schedule for immunization plans should be requested from each district. It would also help in monitoring the distribution if immunization activities could be indicated in the monthly reports of distribution.
7. More emphasis should be given to national nutrition education (vitamin A-specific), using more widespread channels of communication and aids.

8. The experience at Grande Riviere du Nord should be further assessed and followed up in other areas where feasible. It demonstrated an impressive distribution rate and awareness of vitamin A capsules among the population in the sample site of the ocular survey.
9. The program has good baseline data from both 1975 and 1979 surveys. Consideration might be given to selecting localities for different modes of intervention, and assessing variations in results at a later date.
10. Continued efforts should be made to integrate the vitamin capsule availability and distribution into the health system as it is reorganized and expanded. However, for the foreseeable future, a special vitamin A deficiency unit will be needed to coordinate, promote, and monitor the distribution activity.

EVALUATION: PROGRAM TO PREVENT XEROPHTHALMIA IN HAITI

I. INTRODUCTION

Haiti, a country of more than five million inhabitants, is one of the least developed countries in the Latin American region. Famine and drought in recent years have aggravated the situation of children already suffering from diets severely deficient in protein and calories.

The country is on the western third of the Caribbean island of Hispaniola. The Dominican Republic occupies the remainder of the island. The terrain is mountainous, with few easy means of communication. A major roadway linking Port-au-Prince, the capital, with the North has recently been completed and a similar road is under construction in the South.

The people are primarily descendants of Africans brought to work on the island. The official language is French, but Creole is the universal tongue. Approximately 24 percent of Haitians live in urban areas, the most populous of which are Port-au-Prince, Cap Haitien, and Gonaives. The remainder live in the countryside. Villages are termed "bourgs," and surrounding the "bourgs" are "rural sections." The population grows at approximately 1.6 percent per annum. Both

the birth rate (35.8/1000) and infant mortality rates (119-147/1000) are among the highest in the hemisphere, while the per capita income of \$75.00* is one of the lowest.

Widespread malnutrition has been documented in the past.^{1, 2} Childhood diseases such as measles, gastroenteritis, and respiratory infections are major killers of the malnourished youngsters. A recent study of the nutritional status of Haitians indicated that approximately 16 percent of the children are severely or moderately wasted (low weight for height) and 19 percent are stunted (short height for age). In addition, approximately 55 percent had been ill in the seven days previous to the study, 44 percent experienced recent diarrhea, and 32 percent recent fever.³

The main diet consists of corn, millet, ground roots such as cassava, mangos in season and sugar cane, and only occasionally such items as refined sugar and wheat flour.

The health system operates in both private and public sectors. Government health stations, which have been established in nearly every village, are frequently augmented by private facilities, many with religious affiliations. These health establishments are staffed by nurses or auxiliaries who have received training in basic medicine, pediatrics and nutrition. Each health district has a

*Using AID source, with 1955 income as constant.

hospital with a staff of physicians, supported by larger hospitals in the greater urban areas. The University Hospital in Port-au-Prince serves as the major referral hospital.

A. BACKGROUND

Xerophthalmia--the ocular disease caused by vitamin A deficiency and malnutrition--threatens an estimated five to ten million children in the developing world each year. In Asia alone, some 250,000 of these children may go blind. Children under seven years are at highest risk, especially during such critical periods as weaning and illness. In the past, health data from Haiti have given mixed reports on the extent to which xerophthalmia is a problem in the country.

A survey to determine the prevalence and geographical distribution of xerophthalmia in children under seven years old was carried out in 1974-75 by the American Foundation for Overseas Blind (AFOB), since renamed Helen Keller International (HKI). This survey was made in collaboration with the Department of Public Health and Population of the Government of the Republic of Haiti, partially supported by

the World Health Organization (WHO) and the Research Corporation (New York). It reached the conclusion that vitamin A deficiency was the major cause of binocular blindness among Haitian children. Prevalence rates of corneal scars with avitaminosis A history indicated a public health problem as defined by WHO standards.

The survey of the country-wide sample was during a two-month period (December 30, 1974 - February 28, 1975). More than 5,000 children were examined, with a subsample surveyed for nutrition and economic status. Twenty-five localities, urban and rural, in all areas of the Republic were visited. Two Haitian ophthalmology residents performed the examinations, using hand lamps. The results of that survey have been reported previously.^{4, 5} (See Tables I and II). Briefly, the rate of corneal destruction for the country as a whole was 2.5 cases per 1000 children under the age of seven. A significant regional discrepancy existed: the South had 1.2 cases/1000 and the North reported 8.1/1000. Bilateral involvement was seen in 65 percent of the patients with corneal lesions. The authors predicted 94 new surviving cases of bilateral blindness per year in the Haitian child population as a result of vitamin A deficiency.

TABLE I

Prevalence of Vitamin A Related
Corneal Destruction, 1975

Section of Country	Prevalence Rate	Corneal Lesions
North	8.1 cases/1000	(6.0-10.0)
South	1.2 cases/1000	(0.0-2.0)
Total	2.5 cases/1000	(0.8-4.2)

TABLE II

Severity of Corneal Lesions, 1975

	Corneal Lesions	
	Number	Percentage of Total
Monocular	9	35
Binocular	17	65
Total	26	100
	Blindness	
	Number	Percentage of Total
Monocular	10	38
Binocular	7	27
Neither Eye	9	35
Total	26	100

As a result of this survey, a program of intervention was initiated through the resources of AFOB and the Government of Haiti, with funding from AID for the period March 31, 1976 through June 30, 1978,^{*} later extended until June 30, 1980. The intervention consists primarily of a targeted distribution of massive dose (200,000 IU) vitamin A capsules to ill or malnourished preschool-age children and lactating mothers, supported by components of nutrition education and training of medical, health and nutrition personnel in the detection and treatment of the disease. The program was designed to be eventually fully integrated into the Government's health/nutrition infrastructure.

B. PROGRAM COMPONENTS

1. Distribution of Vitamin A Capsules - The primary program intervention consists of the nationwide distribution of 200,000 IU vitamin A capsules through the health delivery system and other distribution centers. This high dosage vitamin A capsule is the standard treatment, recommended by WHO in areas of endemic xerophthalmia for prevention and clinical therapy. Other countries with similar national programs include Bangladesh, India, Indonesia, and the Philippines.

* Support Grant No. AID/ta-G-1305.

In Haiti, the project was designed as a targeted delivery system, intended to reach preschool children at highest risk: the sick and malnourished. Hence, at four-month intervals when possible, and in clinical situations in all cases, a single dose was to be administered to any child between the ages of six months and seven years, and at two-month intervals to lactating mothers. Health, medical, and nutrition personnel were to be trained in the detection, treatment and prevention of xerophthalmia. The distribution itself was to be through the existing hospitals, health clinics, and nutrition centers. In addition, recipients of vaccination in immunization programs were to receive a single dose.

Capsule distribution began in March 1976 at Cap Haitien, through the health installations and nutrition centers. Since the 1974-75 prevalence survey had indicated that xerophthalmia was a greater problem in the northern part of the country than elsewhere in Haiti, distribution activities were concentrated in that area at the outset of the program.

In March 1977, an innovation was introduced whereby one or two nutrition auxiliaries in each of the eleven health districts received training in xerophthalmia, and were assigned some responsibility in the supervising of the vitamin

A activities of the health and nutrition facilities in the district.

2. Nutrition Education - In order to facilitate nutrition education, indigenous educational materials were to be developed from prototypes produced by AFOB/HKI under a separate AID grant. These were to assist the orientation and training of individuals involved in the program, including:

- . medical staff (especially pediatric and ophthalmological personnel);
- . auxiliaries in the dispensaries, para-medical workers and others responsible in the nutrition centers, health agents in the district, and so forth;
- . peripheral workers, such as social workers, community development workers, school teachers;
- . general population--through radio programs, posters, and interactions (seances d'education) between auxiliaries and village mothers.

Training sessions were scheduled in the various medical and nursing schools, the auxiliary training institutions, and district centers. Regular radio broadcasts were beamed throughout the country. Routinely, auxiliaries counseled mothers in the out-patient clinics.

3. Management - Management of the program was centered in the AFOB/Port-au-Prince headquarters. It was directed by a project coordinator (Haitian), with a staff consisting of an administrator, auxiliary nutritionist, secretary, driver, and guided by a Haitian Advisory Committee consisting of a multi-disciplinary group of professional people and lay citizens. In addition, technical assistance was furnished by a principal consultant--an American pediatrician--and by the director of Blindness Prevention, HKI headquarters/New York. A part-time field representative in Haiti served as liaison between Port-au-Prince and New York.

Supervision of the program was carried out through a number of mechanisms: on-site visits by the project coordinator to the districts, and visits to Port-au-Prince by the consultant and director of HKI Blindness Prevention Department; routine submission of distribution records from the districts to headquarters, reporting on individual center distributions; and AFOB Haiti reports sent monthly to New York.

An integral part of the plan for the program was the evaluation of its impact. All phases of the program were to be reviewed approximately two years after its inception. The budgeting, efficiency of distribution, and general

administrative effectiveness were to be assessed by a member of the Helen Keller International staff. In order to determine the impact of the distribution on the prevalence of xerophthalmia--its effectiveness in reducing the disease--a second ocular survey was planned, to be supervised by an HKI consulting ophthalmologist, in collaboration with the project coordinator in Haiti.

C. EVALUATION PLAN

The primary goal of the project is to reduce the incidence of xerophthalmia and nutritional blindness among Haitian children. A number of controllable and uncontrollable, direct and indirect variables influence the attainment of this goal. For example, resources are required, such as medication and equipment, funds and staff. An organization is necessary, for delivery and management, promotion and treatment. Feasibility is expected, in terms of cost and efficiency. These variables are in some ways controllable. Other variables, such as weather and terrain, logistics and communication, are not. Additionally, the program is not isolated from other events, such as the distribution of fortified foodstuffs through voluntary agencies, which also would presumably influence the nutritional status of the children. This evaluation attempts to take these variables

into account.

The major objectives of the evaluation were to assess the project's effectiveness in terms of the efficiency of the system itself and to ascertain whether or not there had been a reduction in clinical signs and symptoms of xerophthalmia-related blindness. The following report is divided into separate sections, one on the ocular survey and the other on the administrative distribution aspects of the project.

II. OCULAR SURVEY

A. SURVEY OBJECTIVES AND DESIGN

In order to evaluate the clinical impact of the vitamin A supplementation program, a second ocular survey was proposed. This survey was to encompass a group of children under seven years of age in a specific geographical area. The number of children would have to be large enough to ensure statistical significance when compared to the data of the previous survey. The children were to be chosen at random to provide a representative sample of the population.

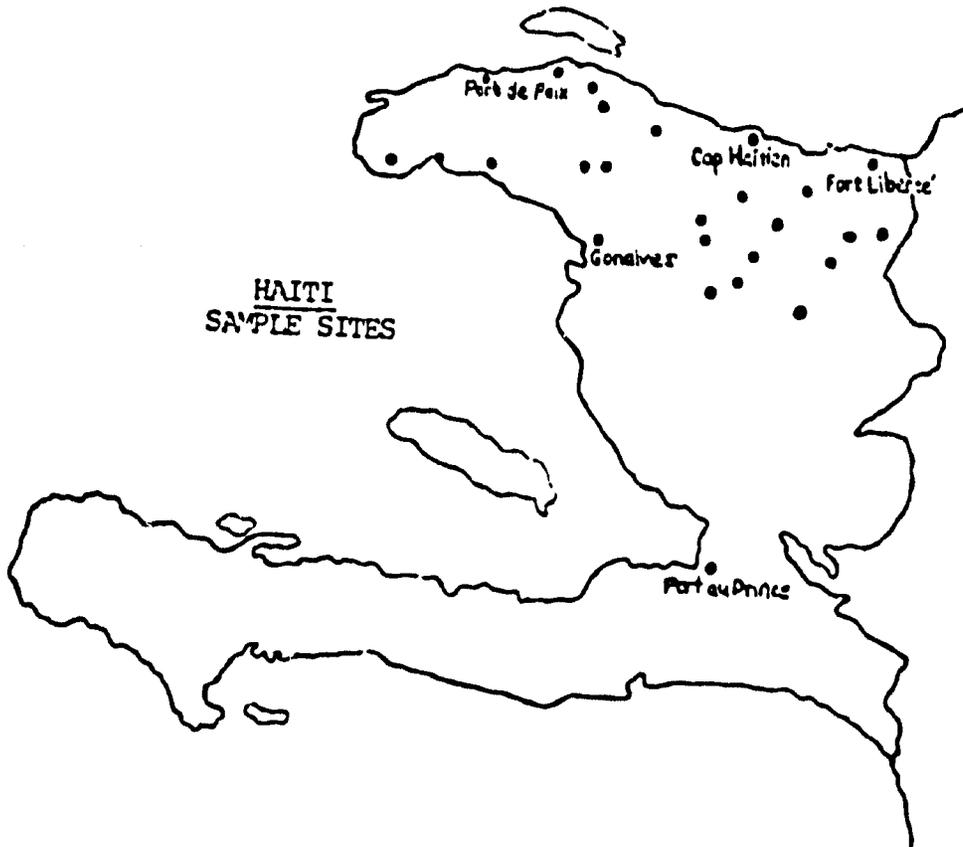
The assumption was made that a proportion of children in the area covered in the study had received vitamin A capsules over a prolonged period of time. The prevalence

of xerophthalmia in the area, determined by the earlier survey, would assumedly be at such a rate as to make statistical inferences possible. It was further considered desirable to revisit the same locations observed in 1975, in order to be able to make any place-specific, timely comparison.

To fulfill these criteria, the following survey design was chosen. The number of children to be examined was 5000 --a figure which would permit statistical comparison with the previous data. The children to be seen were in the areas of Artibonite, North, and Northwest of Haiti, areas which had received vitamin A capsules for a minimum of two years, with fairly continuous and extensive distribution. As previously indicated, the rate of xerophthalmia for this area was 8.1/1000 children in 1975, the highest of all the regions of Haiti.

In 1975, twelve localities had been visited in the North, Northwest, and Artibonite. They represented urban and rural sites scattered over the region. All of these places were revisited, and 13 additional localities were added, to make a total of 25. This number was chosen to permit a wide representation of the population and to facilitate an efficient examination of the children.

FIGURE I



The additional sites were generated from a table of random numbers. They included ten bourgs and three rural sections, in order to preserve the ratio of bourg/rural sections in the original twelve sites. (See Appendix I and II.)

A protocol to be followed in each survey site was established. The total number of houses to be visited was predetermined. Numbers were as follows:

Urban	200 houses/site
Bourg	150 houses/site
Rural section	100 houses/site

These numbers of houses were predicted to contribute the requisite 5000 children, while using time and manpower in the most efficient manner. Also, their choice took cognizance of the population size in the areas to be visited. The earlier survey had examined 1.7 children from each house that had contributed children. Table III indicates the summary of the houses to be visited and the total number of children expected in the 1979 survey.

TABLE III
Number of Houses and Children Predicted, 1979

Location	Number of Houses/ Location	Number of Locations	Number of Children
Urban	200	3	1020
Bourg	150	16	4080
Rural Section . . .	100	6	1020
Total . . .	450	25	6120

The plan was that at each house, a series of questions would be posed to the mother or other adult present, and that each child under seven would be enumerated, prior to examination by the ophthalmologist. The actual survey methodology will be discussed in the next section.

B. THE QUESTIONNAIRE

The survey form was composed of two parts. The first section identified the house visited by malaria program number and location, supplied some demographic information, and posed certain questions to the head of the household. The initial question concerned night blindness, a symptom of vitamin A deficiency. (In Indonesia, this question has been found to be helpful in assessing the degree of xerophthalmia in a community.)⁶

The second asked if the children in the family had received vitamin A capsules. A capsule was actually shown to the mother to aid in recollection.

The next question was an attempt to determine whether efforts at health education, i.e. to foster recognition of xerophthalmia and its treatment or prevention, had been successful. Specifically, it asked if the mother knew why vitamin A was given to the children. A response including the word "eye," "blindness," or "sight" was considered "good"; others were rated "bad."

Finally, an attempt was made to correlate distance from the health center and its accessibility, to the distribution of vitamin A.

The second section of the form was composed of one sheet for each child examined, listing a child-specific number, name, sex and age, and the results of the ocular examination. In addition, each positive examination, e.g. evidence of anterior segment eye disease, was recorded on a continuation sheet, listing the estimated visual acuity of the child, the results of the examination, the child's height and weight, eye photo number and an indication of the frequency of consumption of two foodstuffs--refined sugar and milled flour. This last information was elicited to determine the feasibility of vitamin A fortification to reach the target group.

The survey questionnaire was coded for key punch transcribing from the outset. (See Appendix III for copy of survey questionnaire.)

C. CONDUCT OF THE SURVEY

The ocular survey was carried out by a team consisting of the coordinator of the vitamin A program, the HKI consulting ophthalmologist, two Haitian ophthalmologists, five interviewers (enquetéurs), and a driver. The five interviewers had had previous experience in survey work and were conversant in both Creole and French.

Beginning on January 15, 1979, a two-week training period for the team members was held in Port-au-Prince. The survey form was reviewed with the interviewers and the questions were standardized in Creole. The HKI consultant held several training sessions with the ophthalmologists to review the clinical signs of xerophthalmia and the survey design.

The survey began on January 28, 1979, and followed the schedule listed in Appendix IV. The same protocol was used in each locality. The team arrived at a site sometime during the morning. The coordinator contacted the dispensary to select a central location which would be well-known to the population and appropriate for the children's eye examinations. Once the examination site was chosen, the community was divided into five districts, reflecting the various economic strata of the area. An interviewer was assigned to each district. She progressed in door-to-door fashion until she had visited the number of houses allotted for that day. Notation was made of any homes which were empty or lacked children under seven years, and of those with adults who refused to take part in the survey. The children, once enumerated, were dispatched to the ophthalmologists for examination and collection of the forms.

Completion and review of the questionnaires were conducted each day at the close of the survey activity.

Weekly summary sheets were supplied to the HKI office in New York and the consulting ophthalmologist was present in Haiti at the conclusion of the survey on March 15, 1979.

D. RESULTS

In order to comply with the protocol, visits were made to 4793 houses. The 1441 houses which failed to contribute children to the survey did so for a number of reasons which are tabulated in Table IV. Fifty-six households refused to take part in the survey. Thus, a total of 3352 households contributed children.

TABLE IV

Houses Not Contributing to Survey, with Reason

Reason	Number	Percentage
Family without adults	369	26
Family without children under 7	635	44
Empty houses	381	26
Refused to cooperate	56	4
Total . . .	1441	100

During the ocular survey, 5680 children under the age of seven were examined by ophthalmologists at 25 sites. Of these children, 2786 were males and 2894 females. Table V summarizes the data on age and sex. There is a decline in the numbers of children in each successive year of age, which is compatible with the normal demographics of a developing country. This finding is also compatible with the significant infant and childhood mortality rate reported in Haiti.

TABLE V
Age and Sex of Children Examined

Sex	Age in Years							Total	Per-centage
	Under 1	1	2	3	4	5	6		
Males	467	477	427	423	377	315	300	2786	49
Females	468	492	483	439	399	337	276	2894	51
Total	935	969	910	862	776	652	576	5680	100
% of total	16.5	17.0	16.0	15.2	13.7	11.5	10.1	100	

The responses to the query as to the number of people living in a household are given in Tables VI and VII, as well as the number of children under seven years of age in each of the 3352 households that contributed children to the study. There was an average of 1.75 children per household, a figure remarkably similar to the 1.70 of the 1975 survey.

TABLE VI

Number of Persons Per Household

Number of People/ Household	Number of Households	Percentage
2-4	815	24.3
5-7	1616	48.2
8-10	731	21.8
10 & over	190	5.7
Total	3352	100.0

TABLE VII

Children Under 7 Years Old Per Household

Number of Children Under 7 Years Old	Number of Households	Percentage of Households
1	1021	30.5
2	1300	38.7
3	777	23.2
4	204	6.1
5	47	1.4
6	3	0.1
Total.	3352	100.0

When queried as to the presence of a child with night blindness, mothers from 32 of the households reported affirmatively. This represented 1 percent of all households contributing children.

Responses to the question regarding the previous dosage with vitamin A indicated that 316 of the households reported children as having received at least one capsule. This represents 9.4 percent of the contributing households in the survey.*

The question concerning the respondent's knowledge of vitamin A was graded as a good or bad response. (See Section B.) Of the 3352 responses, 146 or 4.4 percent were considered good responses. Appendix V indicates the findings by location, and Table VIII compares the results of the question with the responses given regarding previous dosage of vitamin A.

The answers to the question regarding distance to the dispensary universally reflected the facilities available in the locality being surveyed. With few exceptions a dispensary was less than one-half day's journey from the home.

*If one were to assume that a positive response from the mother held for all of her children under seven (i.e., all children receiving vitamin A), 596 children (or 10.5 percent of the children in the survey) would be represented.

TABLE VIII

Comparison of Questionnaire Response About
Use of Vitamin A with Previous Dosage

Households	Number of Households Giving		Total
	Good Response	Poor Response	
Received Vitamin A.	128	188	316
Did Not Receive Vitamin A	18	3018	3036
Total.	146	3206	3352

E. CLINICAL FINDINGS

After examining the 5680 children, the ophthalmologists reported 31 cases which they considered to be positive for anterior segment pathology. Fourteen of these were male (45 percent) and 17 female (55 percent). The average age was 3.93 years: 3.85 years for males, 4.00 years for females.

The right eye was involved in 10 children, the left in 9, and in 12 instances both eyes showed evidence of disease.

The types of lesion were as follows:

Corneal opacity.	26
Phthisis bulbi	2
Conjunctival xerosis	<u>3</u>
Total	31

In each case, the ophthalmologists were asked to estimate the current visual function of each eye. For simplicity, this function was rated as either better or worse than 20/200 vision. Of the 31 cases, 20 (64 percent) were better than 20/200 and 11 (36 percent) were worse. In the group with vision in the affected eye(s) equal to or worse than 20/200, 5 cases were in the right eye, 5 were in the left eye, and one was bilateral. The last patient was the only blind child found in the course of the survey.

In consultation with the parents and the HKI consultant, etiologies were ascribed for each case. The results were:

Congenital microphthalmus	2
Congenital glaucoma	1
Measles	3
Other infection	10
Xerophthalmia-Keratomalacia	5
Trauma	1
Epithelial erosion	1
Conjunctival xerosis	3
Uncertain etiology	5

The eight cases of corneal or conjunctival involvement with xerophthalmia are summarized in Table IX. No active

TABLE IX

Summary of Corneal or Conjunctival Involvement with Xerophthalmia

Case	Age	Location	Eye *	Nutritional Status at Time of Survey **	Estimated Vision involved Eye(s)	Description of Pathology
1	3	Port de Paix	O.U.	III	Better than 20/200	Conjunctival Xerosis Corneal Opacity
2	4	Port de Paix	O.U.	I	Better than 20/200	Bilateral Corneal Opacities
3	5	Môle St. Nicolas	O.S.	Normal	Worse than 20/200	Corneal Opacity
4	6	Ouanaminthe	O.S.	I	Worse than 20/200	Descemetocoele
5	3	Platon	O.U.	Normal	Worse than 20/200	Severe Bilateral Corneal Scarring
6	4	Grande Rivière du Nord	O.U.	Normal	Better than 20/200	Conjunctival Xerosis
7	6	Anse à Foleur	O.U.	Normal	Better than 20/200	Conjunctival Xerosis
8	4	Anse à Foleur	O.U.	Normal	Better than 20/200	Conjunctival Xerosis

* O.D. Oculus dexter (right eye)
 O.S. Oculus sinister (left eye)
 O.U. Oculi Unitis (both eyes)

** Haitian Standard, Scale from Bureau of Nutrition, DSPP.

cases of keratomalacia were found. One case of bilateral involvement with legal blindness secondary to vitamin A deficiency was encountered. No Bitot's spots were seen during the survey, as was the case during the 1975 sample.

F. DISCUSSION

Vitamin A deficiency has been found to be a significant cause of blindness in Haitian children in the past. In a population already afflicted with chronic malnutrition, this dietary deficiency is responsible for new cases of blindness in children each year. Xerophthalmia was of such concern to the Government of Haiti that a nationwide vitamin A supplementation program was begun in 1976, encompassing health education as well as capsule distribution. In evaluating this program, the clinical survey described in this report was undertaken. The results open a number of areas for discussion, including the survey design itself, the impact of the distribution program on xerophthalmia prevalence, and the success of the health education effort.

The survey in large part followed the design protocol. Each of the 25 localities which had been selected was visited. The requisite number of houses was enrolled, with the only exception being in rural sections where the population was

too low to supply sufficient houses. The forms were easily handled by the interviewers and the error rate remained well below 1 percent. Scheduling, which had been arranged in advance, went smoothly, and the survey was completed one week in advance of the two months allotted. The goal of 5000 children was attained, and each child was examined by an ophthalmologist. It is worthwhile to note that the simple camera* used in this survey was helpful in documenting for later clarification all positive cases encountered during the survey. There is no question that none of this smooth process would have been possible without the efforts made by all individuals in the Haitian Government involved in this survey.

In the course of the survey, 5680 children under seven years of age in the Artibonite, North, and Northwest of Haiti were examined, five cases of corneal involvement with xerophthalmia were seen, and three with conjunctival xerosis discovered. No active keratomalacia or Bitot's spots were seen. This means a prevalence rate of .88 cases per 1000 children under seven for keratomalacia. One case was legally blind as a result of this disease. The rate of conjunctival xerosis was .52 per 1000 children. As has been mentioned,

*Kodak Instatech X Close-Up Camera

the rate of corneal scars secondary to xerophthalmia in 1975 was 8.1 cases per 1000 in the same area and that of conjunctival xerosis was .9 cases per 1000. This represents a nearly tenfold decrease in the prevalence of vitamin A related corneal disease. What has brought about this dramatic, and heartening change?

The area in question, the Artibonite, North, and Northwest, is one of the poorest sections of Haiti. Poor nutritional status has been found in several previous studies. Droughts are frequent, two major ones occurring in 1975 and 1977. At the same time, during the six months prior to January 1979, there was above average rainfall in many sections. An improved highway was constructed recently between Cap Haitien and Port-au-Prince, providing better access to the North. However, the Northwest remains as isolated as before. According to a CARE employee in Port-au-Prince, the average daily consumption of foodstuffs declined by 5-10 percent in the survey area between 1966 and 1976.

Vitamin A capsule distribution in the Artibonite, North, and Northwest began in earnest in 1976. The distribution records show that health installations in the location visited had distributed vitamin A capsules continuously since early 1977, with Perches being the only exception. The

survey found that 9.4 percent of the households reported having received a vitamin capsule at some point, based on mother's recall. In approximately 50 cases where the question about dosing was repeated by a second investigator, 47 mothers responded consistently. Since the distribution of capsules was not meant to be universal, but rather targeted to ill children, the 9.4 percent distribution rate may represent a significant size of the target population.

In an attempt to ascertain the extent of coverage of the vitamin A capsule distribution in each locality, 50 dispensary records of children under seven were reviewed at random to determine whether the patients had received vitamin A. In many dispensaries, no records were available. In a few centers, many children had received vitamin A, and in other centers, very few. Therefore, it proved impossible to make any substantive conclusion as to the full extent of distribution. While it is interesting to note the wide variations in distribution rate by locality, the low number of positive cases makes any correlation between distribution of capsules and incidence of disease difficult. It is true that only one positive case of anterior segment pathology had received vitamin A, and this was not a patient with xerophthalmia.

The Artibonite, North, and Northwest have also received powdered milk in a school distribution program sponsored by CARE. Every location visited in our survey had been listed as taking part in this program for at least a two- to three-year period. The various powdered milk and milk substitutes such as WSCM are fortified with vitamin A. The substance is distributed nationwide to 170,000 children of school age. A smaller preschool program is also in effect. Each student is to receive a total of 1.5 kilos of powdered milk products per month. The quantity of vitamin A per kilo was not known to those interviewed in Haiti, nor marked on the packaged goods. Specific utilization rates were also unavailable for our survey area. However, the CARE workers felt that some of the powder given to the older children found its way to the preschool child population. The exact effect that this distribution has had on our study population is difficult to assess with any certainty. We can only know that there was another source of supplementary vitamin A available in the community.

Equally difficult to ascertain is the effect of change in local diet in the period leading up to the survey. The same time of year was chosen in each survey to minimize the variation in climate-related dietary intake. As far as is known, the two surveys were similar in this respect.

The impact of the health education program seems to have been questionable, since less than 5 percent of the 3352 heads of households surveyed could give a positive response when queried on the value of vitamin A capsules. The mass education effort had been geared to radio broadcasts. It is of interest that a recent nationwide nutrition survey found that radio is a poor means of reaching the rural Haitian population. Additional efforts will have to be made in this area.

In analyzing location-specific data, marked discrepancies are found in dosage rates as well as in recognition of the capsule. In one village--Grande Rivière du Nord--66 percent of 253 children had received vitamin A. This represented 29 percent of all children who had received vitamin A capsules. The same locality had a 47.1 percent positive recognition rate, which constituted 44.9 percent of all positive responses in the survey. Nine locations had no positive responses. An additional ten sites had less than a 5 percent positive response rate. In six sites, no children had received vitamin A. Each of these sites likewise had a zero positive response rate to the question regarding recognition of the vitamin A capsule. Eleven sites had less than a 5 percent dosage rate.

It is of interest that Grand Rivière du Nord, which had such a startling high rate of dosage distribution and recognition, is a unique situation. A large hospital there, affiliated with the Mennonite Church, has maintained an active outreach service in the community. Yet there was one case of conjunctival xerosis in the area.

The questions regarding food consumption were to be asked of those mothers or guardians of children representing positive clinical cases of anterior segment pathology. Of the 27 responses, 13 indicated they consumed refined wheat weekly, plus 1 daily. The statistics of the rate of white refined sugar consumed--22 of 27 cases responding daily consumption--were so radically different from other background sources*, it was concluded that most likely the question was misunderstood, and included those consuming suk rouge, a partially refined sugar processed at the village level. Many more questions will have to be asked before any fortification activities can be carried out.

Attempts were made to locate the children who had been identified with xerophthalmia during the first survey. Three were traced. One had died; a second now showed no evidence of corneal disease in one eye and residual scars in the other; and the third showed persistent unchanged corneal scars. The *The aforementioned CDC survey reports 1.1 percent of families in rural areas, and 8.9 percent in Port-au-Prince, as consuming white refined sugar.

low rate of success in locating children previously surveyed reflects, in part, the mobility of the rural Haitian population.

In summary, then, a second ocular survey held in the Artibonite, North, and Northwest of Haiti in 1979 found a nearly tenfold decrease in the prevalence rate of vitamin A-related corneal destruction. The disease, however, still remains a significant health problem, with nearly one case per 1000 children, and is potentially blinding, as was seen in one case in the survey. The marked decrease in the prevalence of xerophthalmia may well be due to several factors, not the least of which is an active and extensive vitamin A supplementation program.

III. NON-OCULAR ASPECTS OF THE EVALUATION

This section of the report examines aspects of the project that are related to operational and administrative efficiency. It deals with the distribution of vitamin A capsules, nutrition education, management, costs, and other elements which seem to have influenced the project. A review of the process of the operations, as well as its effectiveness in reaching its target population follows.

A. DISTRIBUTION OF CAPSULES

Since the Artibonite, North and Northwest were the areas of highest prevalence, as indicated in the 1975 prevalence survey, the distribution of vitamin A was started there; but the distribution network eventually grew to cover the entire country. As previously stated, the targeted distribution of high dosage vitamin A capsules (200,000 IU) was actually begun in March 1976, in Cap Haitien.

By 1978, 82 percent of the health establishments in Haiti were distributing vitamin A capsules. This figure was determined by dividing the number of centers of distribution on the Master List (275) by the total number of health establishments on the list of the Department of Public Health and Population (334).

To be included on the Master List of vitamin A distribution, a center had to have distributed vitamin A, as indicated by reports sent to Port-au-Prince. The number of distribution centers has doubled each year, as well as the number of capsules reportedly distributed. (Table X)

While examining distribution data, it is important to note a discrepancy between the number of capsules reported as distributed to the districts from headquarters, and the number of capsules reported as distributed by the centers in the districts.

TABLE X

Distribution of Vitamin A Capsules

	Total DSPP Health Establishments	Centers Distributing Vitamin A	Capsules Reported Distributed
1976. (10 months)	334	65	34,326
1977.	334	131	97,945
1978.	334	275	207,752

From the outset of the program until December 1978 (the evaluation period), 1200 bottles of vitamin A capsules were recorded as received by AFOB/headquarters in Port-au-Prince. Of that number, 1031 bottles were recorded on the "cartes de stock" as distributed from headquarters to the districts. Each bottle contains approximately 500 capsules.* Of the 1031 bottles, capsules equivalent to 680 bottles have been reported as distributed. Hence, using the denominator of 1200 bottles, 57 percent of the capsules are accounted for as distributed; using the denominator of 1031 bottles, 66 percent are accounted for.

* In noting the difference in capsules distributed and bottles going out, it was brought to our attention that, in some cases, the number of capsules per bottle varies significantly--not necessarily containing 500, but sometimes as few as 350. In three bottles checked at random, capsules counted were: 506, 497, 507.

These data have implications for the analysis of the effectiveness and efficiency of the delivery system (discussed later). However, it is recognized that, due to the incompleteness of the records and data received, the numbers recorded in the rest of the report are only indications of trends, and the analysis is subject to the same limitation.

At the end of each month, the centers of distribution in the eleven districts are supposed to send to the Port-au-Prince program headquarters reports of the number of capsules distributed in their centers that month. These data are then compiled at headquarters in the form of monthly reports, with district-specific information for the country.

The total number of capsules reported distributed per year has more than doubled annually. It is useful to separate the activities of Port-au-Prince from "Other" sections of Haiti. Port-au-Prince is unique in that it is the capital, it has the largest urban population, and it is the location of AFOB headquarters in Haiti. The Center for Disease Control (CDC)/AID nutrition survey lists the 1978 population of Port-au-Prince at 800,000, or 15 percent of the total estimated population of Haiti.*

*Due to the recent reorganization of the health system, we do not have population figures for the district target groups. The population figures available are along the lines of the earlier district divisions.

TABLE XI

Number of Capsules Reported Distributed in Haiti, 1976-1978

Year	Total	Port-au-Prince	Per-centage	"Other" Sections	Per-centage
1976. .	34,326	2,438	7	31,888	93
1977. .	97,945	27,951	29	69,994	71
1978. .	207,752	55,555	27	152,197	73

Further delineation of the data from the "Other" sections of Haiti is as follows:

TABLE XII

Total Capsules Distributed by District and Year

District	1976	1977	1978
Port-au-Prince	2,438	27,951	55,555
Cap Haitien	25,313	15,150	44,578
Port de Paix	927	11,089	10,752
Gonaives	716	9,736	9,368
Hinche	0	1,262	4,105
Belladère	206	396	1,658
Petit Goave	535	12,177	12,208
Cayes	1,343	10,315	21,519
St. Marc	2,725	3,606	23,352
Jacmel	0	2,604	2,358
Jérémie	123	3,659	22,299
Total	34,326	97,945	207,752

TABLE XIII

Number of Vitamin A Capsules Distributed, 1976-78

District	Children			Mothers		
	1976	1977	1978	1976	1977	1978
Belladère . .	176	291	1,233	30	105	425
Cap Haitien .	20,538	10,503	27,503	4,775	4,647	17,075
Cayes	979	7,446	15,606	364	2,869	5,913
Gonaives . . .	580	8,932	7,211	136	804	2,157
Hinche	0	943	3,029	0	319	1,076
Jacmel	0	2,182	1,651	0	422	707
Jérémie . . .	109	2,672	17,122	14	987	5,177
Petit Goave .	451	10,894	10,009	84	1,283	2,199
Port-au-Prince	2,127	23,600	44,607	311	4,351	10,948
Port de Paix .	776	9,167	8,788	151	1,922	1,964
St. Marc . . .	2,586	3,364	19,319	139	260	4,033
Total . .	28,322	79,976	156,078	6,004	17,969	51,674

The count of "capsules distributed" does not give child-specific information. Therefore, in an attempt to determine how many individual children were receiving capsules, a category of "first-dosers" was introduced in early 1978. The reporting forms were revised, adding a column requiring the auxiliary health worker to differentiate between the number of children receiving a first dose from those receiving repeated doses.

In order to estimate the number of first-dosers after the form was revised, data for the last six months of 1978 were analyzed. However, a review of the monthly records and forms from the various districts indicated that not everyone seemed to know what the extra column was for. Hence, district reports for two selected months were examined in more detail, and a subjective judgment was made as to those who "seemed to know what to do." Determination was then made on the basis of that select group as to how many of the capsules distributed were to first-dosers.

From the data, it was concluded that 64 percent of capsules were distributed to first-timers, or specific children (not repeaters).^{*} This figure will aid in determining the number of children reached, vis-a-vis the target population of children from birth through age 6, using the health services.

Specifically, the 1978 nutrition survey (GOH/AID/CDC) estimates the population of Haiti at 5,300,000. The government estimates that 20 percent of its population (1,060,000) is between birth and seven years old. It has also been estimated that 30 percent (318,000) of the latter age group

* 64 percent is the mean percent, or average. The median percent equals 69 percent.

use the health services. Given the state of the art of health statistics in Haiti, these assumptions and figures are used in this report.

For instance, as stated earlier, the CDC nutrition survey estimates Port-au-Prince's 1978 population at 800,000. If 20 percent of this number are under seven years old, there are 160,000 in this group. If 30 percent of the latter use health services, then 48,000 children are the target population for Port-au-Prince; the "Other" target population in Haiti (318,000 minus 48,000) equals 270,000 children.

TABLE XIV

Estimated Percentage of Target Child Population Receiving Capsules

	Total Target Child Population	Estimated Number of Children Receiving Capsules*	Percentage of Target Group
Port-au-Prince . . .	48,000	28,548	59
"Other" sections . .	270,000	71,341	26
Total	318,000	99,889	31

* As calculated per methodology p. 44.

Discussion

In many ways, the system for delivering vitamin A capsules through the health infrastructure has worked well. Eighty-two percent of the health establishments are known to distribute vitamin A capsules. The number of capsules distributed, the number of centers distributing them, and the number of reports sent into headquarters from the districts have more than doubled each year since 1976.

A critical problem is the inability to account for the total supply of capsules. Two explanations have been offered: the centers sometimes distribute the capsules, but do not actually or accurately report; or the capsules are delivered to the district and are left on a shelf somewhere instead of being distributed. It seems more likely that the former is the case, i.e., the capsules are being distributed and not reported. There are two reasons for this assumption:

--A review of the monthly reports from specific centers reveals a minority which do not ever report, rather a number that report sporadically or unevenly. The fact that they do report periodically seems to indicate an activity which is on-going:

-- There is no routine distribution of capsules to the centers. Instead, the procedure for obtaining capsules is

for the centers to request them from headquarters when refills are needed. (Exceptions are during district seminars when the coordinator carries a supply with him to leave with the participants after the session.) In general, then, a center would presumably be out of capsules or in need of capsules before receiving replenishment. Therefore, capsules would not just be sitting on a shelf somewhere.

It has been noted that centers in Port-au-Prince distribute the largest share of capsules (27% of all capsule distribution reported in 1978 was in Port-au-Prince, which has 15% of the population). Centers in Port-au-Prince are reaching a majority of the estimated target population for that area (59% of ill/malnourished children using the health system), with the rest of the country reaching only 26% of its estimated target group. This is not an unexpected situation, however, since the urban setting has more services, better communications, and easier accessibility.

B. SEMINARS AND CONFERENCES

One of the supporting components of the distribution system is the training of medical, health and nutrition personnel in the detection and treatment of xerophthalmia. This also has the spinoff of gaining the support of the related professions. Seminars and conferences (réunions)

have been held throughout the country, supported by AFOB or the Bureau of Nutrition. The seminars sponsored by AFOB concentrated on prevention and treatment of xerophthalmia, addressing malnutrition peripherally; the seminars sponsored by the Bureau of Nutrition focused on nutrition, with a section on the detection, treatment, and prevention of xerophthalmia. In addition, there have been numerous seminars in Port-au-Prince at the school of nursing and the medical school, at the auxiliary training institutions, as well as sessions directed to schoolteachers and other rural community workers.

The district seminars were generally held over a three-day period, with per diem allowances offered to 30 participants. These participants included physicians, nurses, or auxiliaries who were primarily responsible for the logistics and reporting of capsule distribution, and other aspects of the program.

It should be noted that there was a significantly greater number of sessions in Port-au-Prince (25) than in the entire rest of the country (28). However, with the exception of one seminar which was directed to the personnel of that health district (in November 1978), the rest of the sessions in Port-au-Prince were held either at the professional

TABLE XV

Seminars/Conferences in Haiti, 1976-78

District	1976	1977	1978	Total
Port-au-Prince. . .	6	12	7	25
Cap Haitien	1	1	6	8
Port de Paix. . . .	1	0	1	2
Gonaives.	2	0	2	4
Hinche.	0	1	0	1
Belladère	0	1	0	1
Petit-Goave	0	0	1	1
Cayes	1	1	2	4
St. Marc.	0	0	2	2
Jacmel.	0	0	1	1
Jérémie	0	1	3	4
Total.	11	17	25	53

schools or were staged for peripheral categories of personnel (i.e. schoolteachers, rural agents, and so forth).

Two meetings in Port-au-Prince were held for representatives of all the districts:

March 1977--administrators from the 11 health districts;

February 1978--auxiliary nutritionists from the 11 health districts.

In addition to the clinical investigation during the ocular survey, an administrative questionnaire was filled out in each sample site at the centers of distribution (see p. 34). Aside from determining whether or not distribution centers existed at the site, questions were asked to determine the number of staff members at the center, and those who participated in one of the seminars concerning vitamin A.

In the 25 sample sites, 6 had no health establishments, and hence no distribution of vitamin A. In the remaining 19 sample sites, there were 23 centers of distribution: 2 hospitals, 5 health centers, 1 nutrition center, and 15 dispensaries. During the survey, one of the dispensaries was closed, resulting in 22 available for investigation.

Of these 22 centers, 18 had at least one staff person who had participated in a training seminar; in fact, 10 had more than half of their staff trained. The numbers of staff members for most of these centers are small. The data is delineated in Table XVII.

To determine, in general, whether or not the seminars seemed to influence the capsule delivery, the number of seminars in 1978 was correlated with the average percentage of centers reporting to AFOB/Port-au-Prince from the particular district where the seminars were held.*

*The methodology for determining the average percentage of centers for the respective districts is defined in a later section on supervision.

TABLE XVI

Effect of Seminars on Percentage of Centers of Distribution Reporting to AFOB/Port-au-Prince, 1978*

District	Number of Seminars	Average Percentage of Centers Reporting to AFOB/Port-au-Prince
Belladère.	0	23
Cap Haitien.	6	45
Cayes.	2	50
Gonaives	2	39
Hinche	0	23
Jacmel	1	16
Jérémie.	3	66
Petit-Goave.	1	15
Port de Paix	1	23
St. Marc	2	43

*Port-au-Prince is not included.

It was determined that in districts with less than two seminars in 1978, an average of 20 percent of the centers of distribution sent in reports, whereas in districts with two or more seminars, an average of 48.6 percent of the centers reported. When examining the median number, to take into account the substantial variations between districts, the percentages are 23 and 45 respectively, still demonstrating a positive correlation between numbers of seminars and degree of reporting per district.

TABLE XVII

Number of Health Facility Staff Members
Who Participated in Vitamin A Seminar

Sample Site by District	Type of Health Facility	Number of Staff Members	Staff Members Who Participate in Vitamin A Seminar
Gonaives:			
Gros Morne	Health Center	20	0
Savane Gros-Morne	No facility	-	-
Gonaives	Hospital	32	5
Marmelade	Dispensary	4	0
Platon	No facility	-	-
Port-de-Paix:			
Bassin Bleu	Dispensary	3	0
Port-de-Paix	Dispensary	4	1
	Hospital	42	6
Bombardopolis	Dispensary	1	1
	Dispensary	4	0
Baie de Henne	Dispensary	1	1
Anse à Foleur	Health Center	3	1
Môle St. Nicolas	Nutrition Center	1	1
	Dispensary	1	0
St. Louis du Nord	Dispensary	4	1
Cap Haitien:			
Port-Margot	Dispensary	2	2
Fort-Liberté	Dispensary	2	1
Cap-Haitien	Health Center	12	10
Acul du Nord	Dispensary*	-	-
Ouanaminthe	Health Center	4	2
	Dispensary	8	3
Perches	No facility	-	-
Pignon	Dispensary	2	2
Limonade	Dispensary	3	1
Dondon	Dispensary	2	1
	Dispensary	9	3
Grande Rivière de Nord	Health Center	14	12
Bas de Sault	No facility	-	-
L'Oiseau	No facility	-	-
Beaudin	No facility	-	-

*Closed on day of inquiry.

Discussion

The number of seminars has increased each year. One major reason for the increase in 1978, which will be examined in a later section, was the acquisition of a project vehicle in December 1977.

In terms of outreach, the program is successfully expanding its coverage to districts outside Port-au-Prince. The mandate of the program was to sponsor an intensive seminar session at the outset of the distribution activities in each district. Although not necessarily on schedule, each district has sponsored at least one of these seminars.

In addition, due to the association of the program with the Bureau of Nutrition, the project has been able to integrate xerophthalmia and blindness prevention material in the Bureau's seminars. The data reported here lead to the observation that there is a significant difference in rates of reporting from districts which have two or more seminars per year than from those with less than two seminars.

Finally, Port-au-Prince hosts numerous seminars, but in fact only one of the seminars (in November 1978) was directed specifically to the health district personnel of Port-au-Prince; the other seminars and conferences were at the hospitals, university, Government agencies, and the like.

C. NUTRITION EDUCATION

Nutrition education is another support activity which has been a part of the program. An auxiliary nutritionist is a permanent member of the vitamin A program staff. She participates in the seminars already described, in addition to making presentations on radio programs, at mobile clinics, and so forth. The district auxiliary nutritionists also participate in radio programs in their respective districts (where possible*), and "instruct" during seances d'éducation at the distribution centers.

A total of 105 radio programs were presented between 1976 and 1978: 4 in 1976, 49 in 1977, and 52 in 1978. These programs stress the need for vitamin A, the importance of foods rich in vitamin A, the use and availability of vitamin A capsules through the centers for mothers and children, in addition to general education in nutrition.

It is difficult to assess the effectiveness of the radio programs in increasing popular awareness of the need for vitamin A or for the distribution of vitamin A capsules. The recent CDC nutrition survey notes that, in the rural areas, in contrast to Port-au-Prince (where the majority own radios), radio listeners are a minority, and there is little "group listening" to educational programs.

* Port-au-Prince, Cap Haitien, Cayes, Gonaives, Jérémie, Port-de-Paix, St. Marc.

One can therefore assume that, in the rural areas, the séances d'éducation by the auxiliary nutritionists are more effective in "spreading the word." These seances are part of the protocol in the training sessions of the auxiliary nutritionists. The nutritionists are instructed to have these séances with the mothers when administering vitamin A capsules. Included are discussions of the importance of vitamin A, the capsules, vitamin A-rich foods, and the relationship of all these to the eyes.

Table VIII from the ocular survey correlates the receipt of vitamin A with awareness of what vitamin A is for ("good response"). Although the percentage who received capsules was low, of those mothers whose children received capsules, 41 percent knew that vitamin A had something to do with the "eyes," "sight," or "blindness."

Nutritional aids, guidelines, and reports have been developed and published by the vitamin A program staff. A flip chart with pictures drawn by a Haitian artist, for use in speaking with mothers was field-tested in Haiti. (Because of favorable results, this flip chart - Vitamin A For Beautiful Eyes - has been distributed worldwide by HKI as a prototype aid in preventing xerophthalmia.)

Other publications by the vitamin A program staff include:

- Assessment of Xerophthalmia in Haiti; Toureau, Serge; Sommer, Alfred; Doty, Margaret M.; and Pettiss, Susan T.; AFOB, New York, 1976.
- Guide D'Education Nutritionnelle; DSPP; Port-au-Prince, Second Edition; March 1978.
- Country Program Report-Haiti; Toureau, Serge; IVACG Conference, Rio de Janeiro, Brazil, August 1978.
- "Prevention of Xerophthalmia Program"; Toureau, Serge; IVACG Conference, Geneva, May 1977.
- "Review of Vitamin A Programs in Haiti"; Fougere, William; IVACG Conference, Haiti, March 1976.
- "Xerophthalmia and Anterior Segment Blindness"; Sommer, Alfred, et al.; American Journal of Ophthalmology; Vol. 82, No. 3, September 1976.
- Reports Trimestriel des Activites du Bureau de Nutrition, DSPP.

Discussion

The data illustrate two common problems in developing countries: the difficulties of making services accessible to the rural populations, and of developing information channels which reach them. For example, the project created a series of vitamin A and nutrition programs for radio stations throughout the country. However, the rural population owning working radios is as low as 10.8 percent in one district (contrasted to 60.3 percent in Port-au-Prince⁷).

At seminars for those responsible for the vitamin A capsule distribution in a district, there is a specific section on nutrition education. This includes the telling of a story with the use of a flip chart, by the program auxiliary nutritionist, who thus demonstrates a technique of relaying the information at the village level.

The data suggest that such discussions between the person administering the vitamin A and the mothers in the séances d'éducation provide a successful mechanism for relaying information to a high-risk group. In looking again at Table VIII from the ocular survey, we see a high correlation between receipt of vitamin A and "good" response. A qualification in interpreting the data is that 45 percent of the awareness figure came from one sample site with a strong outreach program. Nevertheless, there is a suggestion that the séances have a possible, and positive, influence.

D. MANAGEMENT

The vitamin A program is primarily managed by a four-member Haitian staff, headquartered in Port-au-Prince. The group consists of a project coordinator (who is also an M.D.); an administrator; an auxiliary nutritionist; and a typist. An HKI field representative based in Port-au-Prince has a part-time assignment to serve in a liaison and support capacity.

Technical assistance is provided by an HKI consultant and by the director of the HKI Blindness Prevention Department. The consultant is a pediatrician who has been associated with the Albert Schweitzer Hospital in Haiti for more than twenty years. She spends every third year in Haiti. During the other two years, she participates in group practice in New York, returning to Haiti periodically for HKI. HKI's director of Blindness Prevention is responsible for the overall operation and management of the project.

As described earlier, the targeted system of delivery of vitamin A capsules is carried out through the existing health infrastructure. This infrastructure consists of hospitals, health centers, dispensaries, and nutrition centers in all eleven health districts. Throughout 1975, a group of medical auxiliaries were given special training by the Bureau of Nutrition in order to become auxiliary nutritionists; one or two were then assigned to each district with responsibility for nutritional activities. In March 1977, specific instruction in vitamin A was given to these auxiliary nutritionists, and responsibility was allocated to them for the distribution of vitamin A and its reporting. The Director General of the DSPP sent a directive to all the districts in August 1977 authorizing this function, and

confirming the importance of the vitamin A program and the reporting of its activities.

The project coordinator has been with the program since overseeing the prevalence survey in 1974-75. An administrative secretary initially employed was replaced by an administrator in February 1977. The auxiliary nutritionist and typist have been with the program from its outset. Turnover in two of the three field supervisory positions was due to the incumbents leaving for better positions. In other words, the staff has been relatively stable, with few exceptions.

As previously mentioned, the number of capsules delivered has more than doubled each year, as have the number of centers distributing vitamin A and the number of centers reporting vitamin A distribution. More than 80 percent of the health establishments of Haiti are actively participating in the vitamin A distribution program. However, there is considerable variation in the reporting from the districts. This may be correlated with the number of supervision trips made by the AFOB staff. These two indicators of management activities are discussed in detail in the following sections.

1. Reporting - Capsule distribution began in Cap Haitien in March 1976. The distribution network gradually expanded throughout the entire health system. In examining the evolution

over time, we find that in some of the districts it was months before the centers of distribution established any regularity of reporting.

TABLE XVIII
Report of Capsule Delivery, by District

District	Date of Initial Report to AFOB/Port-au-Prince	Date when Reporting for More Than Two Consecutive Months Started
Belladerè	10/76	8/77
Cap Haitien	3/76	3/76
Cayes	10/76	10/76
Gonaives.	11/76	11/76
Hinche.	1/77	8/77
Jacmel.	5/77	1/78
Jérémie	10/76	10/77
Petit Goave	10/76	1/77
Port-au-Prince.	8/76	8/76
Port de Paix.	11/76	11/76
St. Marc	6/76	6/76

As already noted, in evaluating the performance of centers reporting over the three-year period, the problem is not a question of some not reporting ever; but the reporting is sporadic from most of the districts. In reviewing the head-

quarter's records, we find that, in any one month, an average of only 36 percent of the centers reported the number of capsules delivered. This estimate was derived by averaging the number of reports received in Port-au-Prince program headquarters during the last quarter of 1978. It was assumed that this four-month test period reflected the most recent state of reporting (as compared to start-up, e.g.).

TABLE XIX

Reporting of Vitamin A Distribution, August - November, 1978

District	Number of Centers of Distribution	Number of Reports Received				Average Percentage Received
		8/78	9/78	10/78	11/78	
Port-au-Prince.	62	21	19	23	20	33
Cap Haitien . .	41	15	20	13	25	45
Port de Paix. .	28	7	5	6	8	23
Gonaives. . . .	25	13	9	9	8	39
Hinche and Belladere . .	21	5	5	7	2	23
Petit-Goave . .	18	6	2	3	0	15
Cayes	31	9	9	24	20	50
St. Marc. . . .	20	11	7	8	8	43
Jacmel.	16	3	2	2	3	16
Jérémie	19	13	16	12	9	66
Total . . .	281	103	94	107	103	36

2. Supervision - The project coordinator is responsible for making periodic supervisory trips to the districts. His responsibility is shared by the project administrator and the auxiliary nutritionist. In addition, some of the supervisory functions for the AFOB vitamin A program are accomplished while the project coordinator--who is also assistant director of the Bureau of Nutrition--is on field assignments for the Bureau.

TABLE XX

Number of Supervision Trips by
AFOB/Port-au-Prince, * 1976-1978

District	1976	1977	1978	Total
Port-au-Prince. . .	0	1	0	1
Cap Haitien	2	1	2	5
Port de Paix. . . .	1	0	1	2
Gonaives.	1	1	1	3
Hinche.	0	1	0	1
Belladere	0	0	0	0
Petit-Goave	1	0	1	2
Cayes	2	3	6	11
St. Marc.	2	0	0	2
Jacmel.	0	1	2	3
Jérémie	0	2	1	3
Total.	9	10	14	33

* Some of these supervisory trips were sponsored by the Bureau of Nutrition, but the majority were sponsored by AFOB.

The measure for determining the extent of influence which the supervision trips have had on the program was derived by determining the average percentage of centers of distribution reporting from the district to AFOB/Port-au-Prince* correlated with the supervisory visits in 1978.

Table XXI

Implications of Supervision Trips on Percentage of Distribution Centers Reporting to AFOB/Port-au-Prince, 1978**

District	Number of Supervisory Trips	Average Percentage of Centers Reporting to AFOB/Port-au-Prince
Belladère.	0	23
Cap Haitien.	2	45
Cayes.	6	50
Gonaives	1	39
Hinche	0	23
Jacmel	2	16
Jérémie.	1	66
Petit-Goave.	1	15
Port de Paix	1	23
St. Marc	0	43

**Port-au-Prince is not included.

*The methodology for determining such an average percentage was described earlier in this section, p. 61.

Thus, it was determined that in districts with less than two supervision trips in 1978, an average of 33 percent of the centers of distribution reported; whereas in districts with two or more supervision trips, the average number of centers reporting was 37 percent. In looking at the median number, in taking into account the variations between districts, the percentages are 23 and 45 respectively, again supporting the data that supervisory trips are positively correlated with increased percentage of centers sending in reports. In Port-au-Prince, where there were no official supervisory trips in 1978, 33 percent of the centers reported to AFOB headquarters in Haiti.

Three of the districts--Cap Haitien, St. Marc, and Gonaives--have staff members who assist in the collection of records and the sending of reports to AFOB/Port-au-Prince. These people are paid a salary supplement by the AFOB program.

It is difficult to determine the extent of influence of these individuals, since they have been with the program for most of its duration. A change in personnel at Cap Haitien, however, resulted in a dramatic decrease in reports to Port-au-Prince. The reason may be a matter of personality, rather than the presence of a paid supervisor. In the other two districts, the effect does not seem significant, when looking

at distribution rates over time. However, when looking at the average percentage of centers reporting in these three districts, it is a higher percentage than the average of the other districts (42 percent compared to 31 percent).

In March 1977, as previously mentioned, auxiliary nutritionists were specially trained and assumed some responsibility for the vitamin A program in their districts. For a transitional period (from February through September 1977), AFOB supplemented the salaries of these auxiliary nutritionists. At the end of this period, it was agreed that the DSPP would pay their salary increments. The data on district activity do not show a significant change in capsule distribution reported when AFOB began the subsidy, nor a significant change when it stopped payments.

3. Communication within the System - One indication of the quality of AFOB vitamin A program communications is the ability of the Port-au-Prince headquarters to "get the message out". In March 1978, a new form was developed for use by the individual centers of distribution for reporting to headquarters. The revised form included a separate column for the number of children receiving capsules for the first time ("first dosers"). (This form was described in detail on p. 44.)

All reports from the individual centers to AFOB/Port-au-Prince in October and November 1978 were examined to determine: (1) the percentage of reporting centers which had used the new form; and (2) the percentage of those using the new form who seemed to understand how to fill it out. The first percentage was a straight count; the second was a judgment made by the evaluator when studying the way the form was actually filled out.

TABLE XXII

Evaluation of New Reporting Forms, October - November, 1978

Month	Percentage of Centers Using Revised Form	Percentage of Centers Using Form, Who Seem to Know How to Use It
October	80	43
November	86	47

4. Integration of Project Activities into Government

System - From the outset, an objective of the program was to integrate its activities into the Government system. This institutionalization was viewed as an insurance of future program viability.

Since the distribution of capsules was designed to make use of the existing health infrastructure, there was, by definition, cooperation and built-in association with the

Government. This was further enhanced by the fact that the project coordinator is also assistant director of the Bureau of Nutrition in the DSPP.

The President of the Republic of Haiti gave legitimacy to the program in an April 7, 1976 address, on the occasion of World Health Day, referring to the program as an example of the Government's interest in preventing blindness and malnutrition. Further, as mentioned earlier, the Director General of the DSPP sent out a directive to the health districts in August 1977, sanctioning the program, and indicating the necessity of distributing capsules and submitting reporting forms.

5. Technical Assistance - As described in the introduction, an HKI consultant and the director of HKI's Blindness Prevention Department give technical assistance to the program.

TABLE XXIII

International Trips/Technical
Assistance Missions, 1976-78

Date	Director/New York	Consultant*
May 1976. . . .	1	1
July 1976 . . .	1	
January 1977. .	1	
September 1977.	1	
November 1977 .		1
March 1978. . .	1	
May 1978. . . .		1
November 1978 .		1
Total	5	4

* From Fall 1976 to Fall 1977, the consultant was based at the Albert Schweitzer Hospital in Deschappelle, which is about a two hours drive from Port-au-Prince.

In addition, the HKI field representative in Port-au-Prince provides part-time service to facilitate operations and serve as liaison with New York.

At the outset of the program, an Advisory Committee was formed in Haiti for professional support and technical assistance to the project. The Committee included representatives from the DSPP, Pan American Health Organization, and

private practice. The following meetings were held:

Advisory Committee Meetings,
Port-au-Prince

March	1976
April	1976
May	1976
June	1976
October	1976
November	1976
February	1977
June	1977
October	1977
June	1978

Discussion

The data indicate that: some districts take longer than others to begin to send in reports of their activities routinely to AFOB/Port-au-Prince; the percentage of centers per district sending in reports varies considerably (ranging from 15 to 66 percent in the 11 health districts); and districts which had less than two supervisory visits in 1978 had, on average, a lower percentage of centers reporting capsule distribution than districts which had two or more supervisory visits.

While there are other management factors which must influence the performance of the districts and headquarters, the relationship between them--particularly politics and personalities--is difficult to analyze accurately.

As was the case with the seminars, the availability of a project vehicle influenced the number of supervisory trips made each year (discussed in a later section).

The AFOB/Port-au-Prince headquarters effectively implemented a new recording system, since more than 80 percent of those reporting were using the revised forms. However, less than half of the personnel seemed to be clear as to how to use the changed format (i.e. to distinguish between children first receiving a capsule and repeaters).

It has been noted that, throughout the project history, the AFOB/Port-au-Prince staff has been relatively stable. This continuity is assumed to have had a positive influence on the strengthening of the management system and the program activities. The technical assistance support has been consistent. Both the HKI consultant and the director of the Blindness Prevention Department have maintained close contact with the program from the outset--which again demonstrates continuity and commitment. The number of Advisory Committee meetings in Port-au-Prince has been reduced to one annually, possibly indicating a lessened need for input as the project became better established.

E. OTHER EVENTS

Several other events may have influenced program operations:

1. Depletion of Stock of Vitamin A - The procedure for procuring capsules is that the Government formally requests a specific supply from UNICEF. UNICEF is responsible for then processing the requests, i.e. authorizing, ordering, and delivering the capsules. During two separate periods, the stock of vitamin A capsules stored in AFOB/Port-au-Prince headquarters was completely depleted--from July through August 1977, and November through December 1978. The stock cards during the preceding months also indicated a decreasing supply available (i.e. seven bottles were on hand for distribution to the districts at the end of May 1977, three at the end of June).

There are no data on the stock levels of the individual districts or distribution centers. In analyzing the graph illustrating total distribution of capsules throughout the country, there does not seem to be a correlation between the absence of stock at headquarters and capsules reported delivered in the districts during that period. (The decline of capsule delivery in December has been associated with holidays--with staff either not distributing, or not sending in

reports.) It could be argued that not having stock available prevented an acceleration of program activities, but this is hypothetical.

The reasons for the complete depletion of the stock are interrelated: not enough lead time given by management for the processing of the request, in addition to bureaucratic delays on both sides (Government and UNICEF) in clearing and acting on the request.

2. Transportation - From the beginning of the program, there was an agreement between AFOB (HKI) and the Department of Public Health and Population (DSPP) that transportation for the program staff would be provided by the Bureau of Nutrition. Due to the heavy demand on the Bureau for use of its vehicles, however, the program staff lacked assured transport. This caused constant frustration and limited the activities of the vitamin A program. In January 1977, USAID agreed to use funds designated for the Bureau of Nutrition to purchase a vehicle for the Bureau, to be assigned solely for the use of the vitamin A program. Due to administrative and procurement delays with USAID, the purchase of the jeep did not take place until December, almost a year later.

Although it is difficult to cite the availability of transport as a singular obstacle to program growth, it is interesting to note the number of seminars and supervision

trips outside of Port-au-Prince after the purchase of the project vehicle. The number more than doubled from 1977 to 1978.

TABLE XXIV

Effect of Project Vehicle Purchased December 1977 on Number of Supervision Trips and Number of Seminar Sessions

	Number of Supervision Trips		Number of Seminar Sessions	
	1977 (excluding 12/77)	1978	1977 excluding 12/77)	1978
Port-au-Prince. .	1	0	12	7
Outside Port-au-Prince. .	9	14	3	20

3. Campaigns - One of the most efficient mechanisms for distributing capsules is mass campaigns, such as immunization campaigns. Although there was no list of such campaigns for the individual health districts, an examination of the number of capsules distributed by center, by month, revealed significant variations in some instances. For example, a single center would report distributing 4,000 capsules. It was assumed that special events such as immunization campaigns were indicated.

TABLE XXV

Number of Capsules Delivered During
Special Campaigns (i.e. Immunization)

District	Date	Single Center's Delivery	
		Children	Mothers
Cap Haitien.	February 1977	1005	-
Port-au-Prince	May 1977	2660	1025
Petit Goave.	August 1977	4500	-
Port-au-Prince	October 1977	1500	-
		500	-
		2000	-
		1500	-
Cap Haitien.	January 1978	1951	133
Cap Haitien.	April 1978	1702	82
St. Marc	May 1978	4093	73
Port-au-Prince	May 1978	228	1596
St. Marc	June 1978	4529	51
Cap Haitien.	August 1978	1374	104

In the analysis of the graph of total capsule delivery for the country, these events were the single most influential force in the variation on the graph profile. (See Appendix VI.)

F. COSTS

Project costs are divided into four categories: Haitian office and staff expenditures; Government of Haiti in-kind estimates; technical assistance; and costs for capsules. The

costs are also differentiated in terms of years, in an attempt to distinguish between start-up and ongoing costs for a project of this type.

1. Haitian office and staff expenditures - These expenditures include the following line items: salary, transport, per diem^{*}, and other (post office, xerox, office supplies, and miscellaneous). The costs were calculated from the accounts in AFOB headquarters, Port-au-Prince.

<u>1976</u>	Salaries:	\$ 8760.00	(68 percent)
	Transport:	1532.81	(12 percent)
	Per Diem:	1236.85	(9 percent)
	Other:	<u>1436.14</u>	<u>(11 percent)</u>
	Total:	\$12965.80	(100 percent)
<hr/>			
<u>1977</u>	Salaries:**	\$13517.30	(67 percent)
	Transport:	3011.37	(15 percent)
	Per Diem:	2958.00	(15 percent)
	Other:	<u>706.52</u>	<u>(3 percent)</u>
	Total:	\$20193.19	(100 percent)
<hr/>			
<u>1978</u>	Salaries:	\$11185.00	(59 percent)
	Transport:	972.00	(5 percent)
	Per Diem:	5495.00	(29 percent)
	Other:	<u>1234.48</u>	<u>(7 percent)</u>
	Total:	\$18886.48	(100 percent)

* Per diem includes food and lodging on the field trips for seminars and supervision, for headquarter staff and for an average of 30 participants.

** Includes severance pay for administrative secretary.

The major expenditures were the salaries of the vitamin A staff; the next two categories were transport and per diem. The transport included travel to and from seminars, in addition to maintenance, repair, and gasoline (the first two years) of the project vehicle. The DSPP picked up gasoline costs after the purchase of the vehicle for the project in December 1977.

2. Government in-kind estimates - DSPP has provided office space, utilities, and gasoline (1978) for the vitamin A program. The office rent and utilities were estimated at \$150 per month per room, with two rooms used by the program. The 1978 gasoline cost estimate was derived from the gasoline expenditures in 1977, i.e., \$2000.

A more difficult "contribution" to estimate is the use of the health system itself--including the district health administrators and auxiliary nutritionists who were specifically trained to assist in the vitamin A activities. Special training for selected auxiliaries to oversee vitamin A nutrition activities in the districts occurred in March 1977; a special seminar for the administrators was also held in March 1977. However, since assistance was required at the district level before specific training took place, costs were estimated for the 1976-78 period, beginning with the

month when reports first were received in Port-au-Prince from the centers in the respective districts. Program assistance was estimated at 5 percent of the district health administrator's time, and 10 percent of two district auxiliary nutritionists' time. Vitamin A activities were operating in nine of the eleven health districts in 1976, in all of them by May 1977.

Cost estimates were not calculated for the village level workers, since cost appropriations had not changed at that level with the outset of the program. That is, there was no extra out-of-pocket costs; the task was considered an ongoing function of their job description.

Through AID assistance, the Bureau of Nutrition purchased a vehicle in 1977 for sole use of the vitamin A program. This is considered an in-kind item of \$9500 in 1977.

Therefore, the total estimates for the Government of Haiti in-kind contribution are: 1976: \$4923; 1977: \$17,720; and 1978: \$10,220.

3. Technical assistance - This cost category refers to the activities of the project consultant, HKI/New York staff, and the local field representative. In particular, it includes the services and travel of the consultant, the services of the field representative, and the international travel of the HKI/New York staff.

In 1976, the costs were \$4,173.46; in 1977, \$7,414.28; and in 1978, \$6,807.76. When examining the relationship of costs of technical assistance to overall project costs, the following percentages result:

<u>1976</u>	<u>\$ 4,173.46</u>	=	18%
	\$23,143.26		
<u>1977</u>	<u>\$ 7,414.28</u>	=	16%
	46,790.22		
<u>1978</u>	<u>\$ 6,807.76</u>	=	17%
	39,398.64		

4. Capsules - The capsules cost approximately 1¢ each.* The initial stock (200 bottles, or 100,000 capsules) was purchased by AFOB. The rest have been a UNICEF input to the Government.

Some 1200 bottles (600,000 capsules) have been delivered to Port-au-Prince by UNICEF. Since the bulk of those arrived in one shipment (September 1977), annual cost estimates are calculated by number of capsules/bottles recorded as distributed by AFOB/Port-au-Prince to the centers of distribution. As discussed earlier in this report, 1031 of the 1200 bottles are accounted for; 169 bottles (84,500 capsules) are not.

* UNICEF figures are: 1976, \$5.10 per bottle of 500 capsules; in 1977, \$5.46 per bottle; and in 1978, \$5.86.

TABLE XXVI

Program Costs

<u>1976</u>	<u>Costs</u>	<u>Comment</u>
Haitian Office & Staff	\$12,965.80	From account books, AFOB/Port-au-Prince, to include salaries, transport, per diem, and other
Government in-kind estimates	4,923.00	Rent, utilities, plus percentage of salary of health district administrator & two district auxiliary nutritionists
Technical assistance .	4,173.46	Services and international travel for consultant, services of part-time field representative, and travel of HKI/New York staff
Capsules @1¢	940.00	188 bottles (94,000 capsules) distributed
Shipping 15%	<u>141.00</u>	Shipping of bottles distributed
Total	\$23,143.26	
<u>1977</u>		
Haitian Office & Staff	\$20,293.19	Same as above
Government in-kind estimates	17,720.00	Includes jeep purchase
Technical assistance .	7,414.28	Same as above
Capsules @1¢	1,185.00	237 bottles (118,500 capsules) distributed
Shipping 15%	<u>177.75</u>	Same as above
Total	\$46,790.22	
<u>1978</u>		
Haitian Office & Staff	\$18,886.48	Same as above
Government in-kind estimates	10,220.00	Includes gasoline
Technical assistance .	6,807.76	Same as above
Capsules @1¢	3,030.00	606 bottles (303,000 capsules) distributed
Shipping 15%	<u>454.40</u>	Same as above
Total	\$39,398.64	

The costs are:

<u>1976</u>	188 bottles (94,000 capsules)	\$ 940
<u>1977</u>	237 bottles (118,500 capsules)	\$1,185
<u>1978</u>	606 bottles (303,000 capsules)	\$3,030

In addition, shipping costs by UNICEF is 15 percent: hence, 1976 - \$141, 1977 - \$178, and 1978 - \$454.

5. Total costs - The total costs for each year of the project, as just defined, are shown in Table XXVI. They equal: 1976 - \$23,143.26; 1977 - \$46,790.22; and 1978 - \$39,398.64. The cost figures are comprehensive, including: Haitian expenditures, Government in-kind contributions, technical assistance experts, and capsule costs.

An effort has been made to calculate costs per capsule delivered in the project. This is accomplished by dividing the total project costs by the number of capsules distributed each year. However, "capsules distributed" can be defined both in terms of capsules sent out from Port-au-Prince to the district centers of distribution, or as the capsules reported distributed by the centers. As discussed earlier, there is a significant discrepancy in these two figures. Both figures are presented as denominators in the following calculations; so that the cost per capsule distributed, and the cost per capsule reported distributed are shown.

1976

\$ 23,143.26 (project costs) = 24¢
94,000 (capsules distributed)

\$ 23,143.26 (project costs) = 67¢
34,326 (capsules reported distributed)

1977

\$ 46,790.22 (project costs, with purchase of jeep)* = 39¢
118,500 (capsules distributed)

\$ 46,790.22 (project costs) = 48¢
97,945 (capsules reported distributed)

1978

\$ 39,398.64 (project costs) = 13¢
303,000 (capsules distributed)

\$ 39,398.64 (project costs) = 19¢
207,752 (capsules reported distributed)

*In not including purchase of jeep, the costs are 31¢ and 38¢ respectively.

As concluded earlier, it is felt that the number of capsules distributed from Port-au-Prince headquarters to the districts (as reported on stock cards) is more accurate the number distributed, than those numbers reported on the monthly forms. This is concluded for a number of reasons, not the least of which is that the majority of centers do not send in reports each month.

Discussion

Project costs doubled between 1976 and 1977. However, in looking at the costs between 1977 and 1978--excluding the purchase of the jeep--the expenditures seem to have stabilized.*

It is usual to think of project costs as high at the outset, and decreasing over time. This is always the case when there is need for capital investment (such as with new buildings or roads). The AFOB project is essentially a program integrated into an ongoing health system. The only major capital investment for the project was the purchase of the project vehicle.

The cost per capsule distributed has decreased considerably since project outset, to an estimate of 13¢ per capsule in 1978.

This discussion would be incomplete in not mentioning the human cost in suffering incurred by the blinded child. Hence, in preventing blindness, these "costs" are lessened, and the child's well being increased.

*

This section has not taken into account rates of inflation for Haiti during the 1976-78 period. These range between 6 and 9 percent for 1976; 6 and 7 percent for 1977; and 0 and 15 percent for 1978, depending on the source.

FOOTNOTES

1. Jelliffe, D.B., and Jelliffe, E.P.; "Prevalence of Protein-Calorie Malnutrition in Haitian Pre-School Children," American Journal of Public Health; 60: 1355-1366, 1960.
2. The New York Times, "Northwest Haiti Facing a Famine after Drought," Sunday June 8, 1975.
3. Bureau of Nutrition; Department of Public Health and Population, Republic of Haiti; in cooperation with the U.S. Agency for International Development and the Center for Disease Control; Haiti Nutrition Status Survey: 1978; Agency for International Development, Washington, D.C. April 1979.
4. American Foundation for Overseas Blind (now Helen Keller International); Assessment of the Prevalence of Xerophthalmia in Haiti; New York, New York 1976.
5. Sommer, A. et al. "Xerophthalmia and Anterior Segment Blindness" American Journal of Ophthalmology; 82: 439-446; 1976.
6. Personal communication with Dr. Alfred Sommer.
7. World Health Organization, Vitamin A Deficiency and Xerophthalmia, Technical Report Series 590, Geneva 1976.
8. Bureau of Nutrition, Department of Public Health and Population, Republic of Haiti, et. al.; Haiti Nutrition Status Survey: 1978, op cit.

APPENDIX I

Sample Sites for Prevalence Survey, 1975

1. Port-au-Prince (Brooklyn)
2. Fond-Parisien (Bourg)
3. Varreux (S.R. Cx. des Bouquets)
4. Saut-d'Eau (Bourg)
5. La Selle (S.R. Saut-d'Eau)
6. Baint (Bourg)
7. Trou Chouchou (S.R. Petit-Goave)
8. Cayes (Nan Zile)
9. Roche-a-Bateau (Bourg)
10. Beauclos (S.R. Roche-a-Bateau)
11. Fond-Rouge Torbeck (S.R. Jérémie)
12. Jeremie (Ste-Helene)
13. Moron (Bourg)
14. Gros-Morne (Bourg)
15. Gros-Morne (S.R. Gros-Morne)
16. Bassin-Bleu (Bourg)
17. Port-de-Paix
18. Bombardopolis (Bourg)
19. Baie de Henne (Bourg)
20. Gonaives (Rabote - Ka-Soleil)
21. Marmelade (Bourg)
22. Platon (S.R. Marmelade)
23. Bas-Quartier (S.R. Port-Margot)
24. Fort-Liberte (Bourg)
25. Cap-Haitien (La Faussette)

APPENDIX II

Sample Sites for Ocular Survey, 1979

1. Gros Morne
2. Savane Gros-Morne (S.R. Gros-Morne)
3. Bassin Bleu
4. Port-de-Paix
5. Bombardopolis
6. Baie de Henne
7. Gonaives
8. Marmelade
9. Platon (S.R. Marmelade)
10. Bas Quartier (S.R. Port-Margot)
11. Fort-Liberté
12. Cap-Haitien
13. Acul du Nord
14. Anse à Foleur
15. Ouanaminthe
16. Perches
17. Môle St. Nicolas
18. St. Louis du Nord
19. Pignon
20. Limonade
21. Dondon
22. Grande Rivière du Nord
23. Bas de Sault (S.R. Acul Samedi)
24. L'Oiseau (S.R. Acul Samedi)
25. Baudin (S.R. Pilate)

APPENDIX III

FORMULAIRE: 1

Fiche n° _____ (1-2-3-4)

PROGRAMME D'EVALUATION DE LA
VITAMINE "A" EN HAÏTI

No de l'échantillonnage _____ (5-6)

No de l'enquêteur _____

Date de l'examen _____

Revisé par _____

Département _____

Nom du bourg _____

Nom de la section rurale _____

Nom du chef de famille _____

No de la maison _____

Jour _____ (7-8-)

Mois _____ (9)

Géographie

Quartier Urbain 1

Bourg 2

Section Rurale 3

Nombre de personnes vivant dans la maison _____ (11-12)

Nombre d'enfants de moins de 7 ans _____ (13)

Avez-vous des enfants qui ne voient pas la nuit? Oui 1 Non 2 (14)

Votre ou vos enfants ont-ils déjà reçu une capsule de Vitamine A? Oui 1 Non 2 (15)

Pourquoi donne-t-on la vitamine A aux enfants

Bonne réponse 1

Mauvaise réponse 2 (16)

Combien de temps prenez-vous pour aller au dispensaire?

Moins d'une journée 1

Une journée entière 2 (17)

Plus d'une journée 3

APPENDIX III

FORMULAIRE: 2

de l'enfant

INFORMATION SUR L'ENFANT

(1) (2) (3) (4) (5)

Nom de l'enfant _____

Sexe

Masculin 1 (6)

Féminin 2

Date de naissance de l'enfant _____ 197 _____ (7-8-9)

Mois Année

Age en années (enfant de plus d'une année) _____ (10)

Années

Age en mois (enfant de moins d'une année) _____ (11-12)

Mois

L'enfant a-t-il été examiné par l'ophtalmologue?

Oui 1

Non 2 (13)

Nom de l'Ophtalmologue _____

Résultat de l'examen

Positif 1 (14)

Négatif 2

APPENDIX III

FORMULAIRE: 3-1

de l'enfant

(1) (2) (3) (4) (5)

ACUITE VISUELLE

OD

OG

- (6) 1 - Mieux que 20/200
 2 - Egal ou moins de 20/200
 9 - Incertain
 Si égal ou moins de 20/200
 L'anomalie structurale est

- (10) 1 - Mieux que 20/200
 2 - Egal ou moins de 20/200
 9 - Incertain
 Si égal ou moins de 20/200
 L'anomalie structurale est

 Cause de cette anomalie

 Cause de cette anomalie

CONJONCTIVE

Infection

OD

OG

- (7) 1 - Conjunctive
 2 - Purulente
 9 - Incertain
 0 - Normale

- (11) 1 - Conjunctive
 2 - Purulente
 9 - Incertain
 0 - Normale

Consistance

OD

OG

- (8) 1 - Xérosis (sécheresse)
 2 - Plissement-épaississement
 4 - Erythème
 9 - Incertain
 0 - Normale

- (12) 1 - Xérosis (sécheresse)
 2 - Plissement-épaississement
 4 - Erythème
 9 - Incertain
 0 - Normale

Accroissement

OD

OG

- (9) 1 - Tache de Bitot
 2 - Ecume dans la cornée
 ou conjonctive
 9 - Incertain
 0 - Normale

- (13) 1 - Tache de Bitot
 2 - Ecume dans la cornée
 ou conjonctive
 9 - Incertain
 0 - Normale

APPENDIX III

FORMULAIRE: 3-2

de l'enfant

— — — — —

Cornée

OD

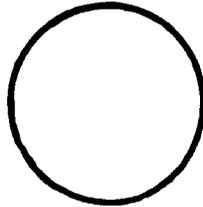
- (14) 1.- Sécheresse (Xérosis)
2.- Erosion épithéliale
4.- Ulcération
9.- Incertain
0.- Normale

OG

- (19) 1.- Sécheresse (Xérosis)
2.- Erosion épithéliale
4.- Ulcération
9.- Incertain
0.- Normale

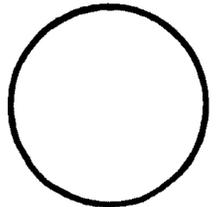
OD

- (15) 1.- Kératomalacie
2.- Descemetocele
4.- Perforation
9.- Incertain
0.- Normale



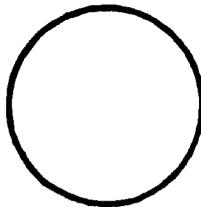
OG

- (20) 1.- Kératomalacie
2.- Descemetocele
4.- Perforation
9.- Incertain
0.- Normale



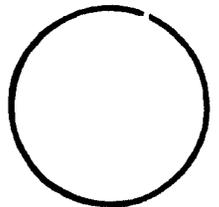
OD

- (16) 1.- Leucome
2.- Leucome adhérent
9.- Incertain
0.- Normale



OG

- (21) 1.- Leucome
2.- Leucome adhérent
9.- Incertain
0.- Normale



OD

- (17) 1.- Staphylome
2.- Phtiste Bulbaire
9.- Incertain
0.- Normale

OG

- (22) 1.- Staphylome
2.- Phtiste Bulbaire
9.- Incertain
0.- Normale

Si un numéro de est positif quelqu'un de la famille a-t-il donné une raison explicative ?

OD

- (18) 1.- Oui
2.- Non
9.- Douteux

OG

- (23) 1.- Oui
2.- Non
9.- Douteux

APPENDIX III

FORMULAIRE 3-3

de l'enfant

Le diagnostic basé sur les données de l'histoire clinique et les lésions rencontrées est :

- OD
- (24) 1.- Traumatisme
 2.- Rougeole
 3.- Autres infections
 4.- Congénital
 5.- Déficience en Vitamin A
 6.- Autres
 9.- Incertain

- OG
- (25) 1.- Traumatisme
 2.- Rougeole
 3.- Autres infections
 4.- Congénital
 5.- Déficience en Vitamin A
 6.- Autres
 9.- Incertain

_____ Poids

_____ Taille

_____ Photo #

L'enfant, a-t-il déjà reçu une capsule de vitamine A?

- (26) 1. Oui
 2. Non

Fréquence de consommation d'aliments pouvant servir de véhicules à la Vitamin A

	Chaque Jour	Chaque Semaine	Chaque Mois	Pas du tout
(27) Sucre	1	2	3	4
(28) Farine france	1	2	3	4

APPENDIX III

Formulaire 4

No de l'échantillonnage _____

Type d'établissements _____

1 - Hôpital

2 - Centre de Santé

3 - Dispensaire

(Tire. 50 Fiches au hasard)

Combien de fiches infantiles mentionnent que l'enfant

a reçu la Vitamine " A "

Effectif de l'établissement _____

Combien de membres de l'effectif ont suivi des cours

sur la Xérophtalmie _____

Formulaire 5

LOCALITES VISITEES

_____ Nom
_____ Population Totale

Type: Ville

Bourg

S.R.

Existe t-il un établissement de Santé?

_____ Oui

_____ Non

_____ Combien

_____ Hôpital

_____ Centre de Santé

_____ Dispensaire

_____ Centre de Nutrition

L'Etablissement de santé distribue -t-il de la vitamine " A "?

_____ Oui

_____ Non

Nombre de point de distribution relevant de l'établissement de santé

Pourcentage d'enfants de moins de 7 ans fréquentant l'établissement de santé
chaque mois

PROGRAMME VITAMINE A HAÏTI

RESUME QUOTIDIEN OU

HEBDOMADAIRE

Formulaire 6
Enquête - Haïti

No. de l'échantillon _____

Lieu _____

Date _____

Nom de l'enquêteur _____

AGE	0	1	2	3	4	5	6	Total
# D'enfants examinés								
# d'enfants inscrits et non examinés								
# de maisons non disponibles et la raison	Total	Familles sans adultes		Famille sans enfants moins de 7 ans		Maisons vides		Ont refusé l'enquête
Nombre de maisons visitées contribuant à l'enquête		Commentaires						
Nombre de maisons visitées								
Nombre d'enquêtes revisées								

APPENDIX III

APPENDIX III

Formulaire 7

LISTE DES FAMILLES CONTRIBUANT A L'ENQUETE

NOM DE LA FAMILLE	NOMBRE D'ENFANTS
1.- _____	_____
2.- _____	_____
3.- _____	_____
4.- _____	_____
5.- _____	_____
6.- _____	_____
7.- _____	_____
8.- _____	_____
9.- _____	_____
10.- _____	_____
11.- _____	_____
12.- _____	_____
13.- _____	_____
14.- _____	_____
15.- _____	_____
16.- _____	_____
17.- _____	_____
18.- _____	_____
19.- _____	_____
20.- _____	_____
21.- _____	_____
22.- _____	_____
23.- _____	_____
24.- _____	_____
25.- _____	_____
26.- _____	_____
27.- _____	_____
28.- _____	_____
29.- _____	_____
30.- _____	_____

APPENDIX IV
Schedule of Survey

October 1978	Visit to Haiti by consultant for preliminary investigations
November - December 1978	Preparation of questionnaires - New York and Port-au-Prince selection of survey team
January 15-19, 1979	Training of interviewers - Port-au-Prince
January 22-25, 1979	Training of ophthalmologists - Port-au-Prince
January 26, 1979	Field test
January 28 - March 15, 1979	Ocular survey
April 1979	Data processing
May - June 1979	Preparation of report

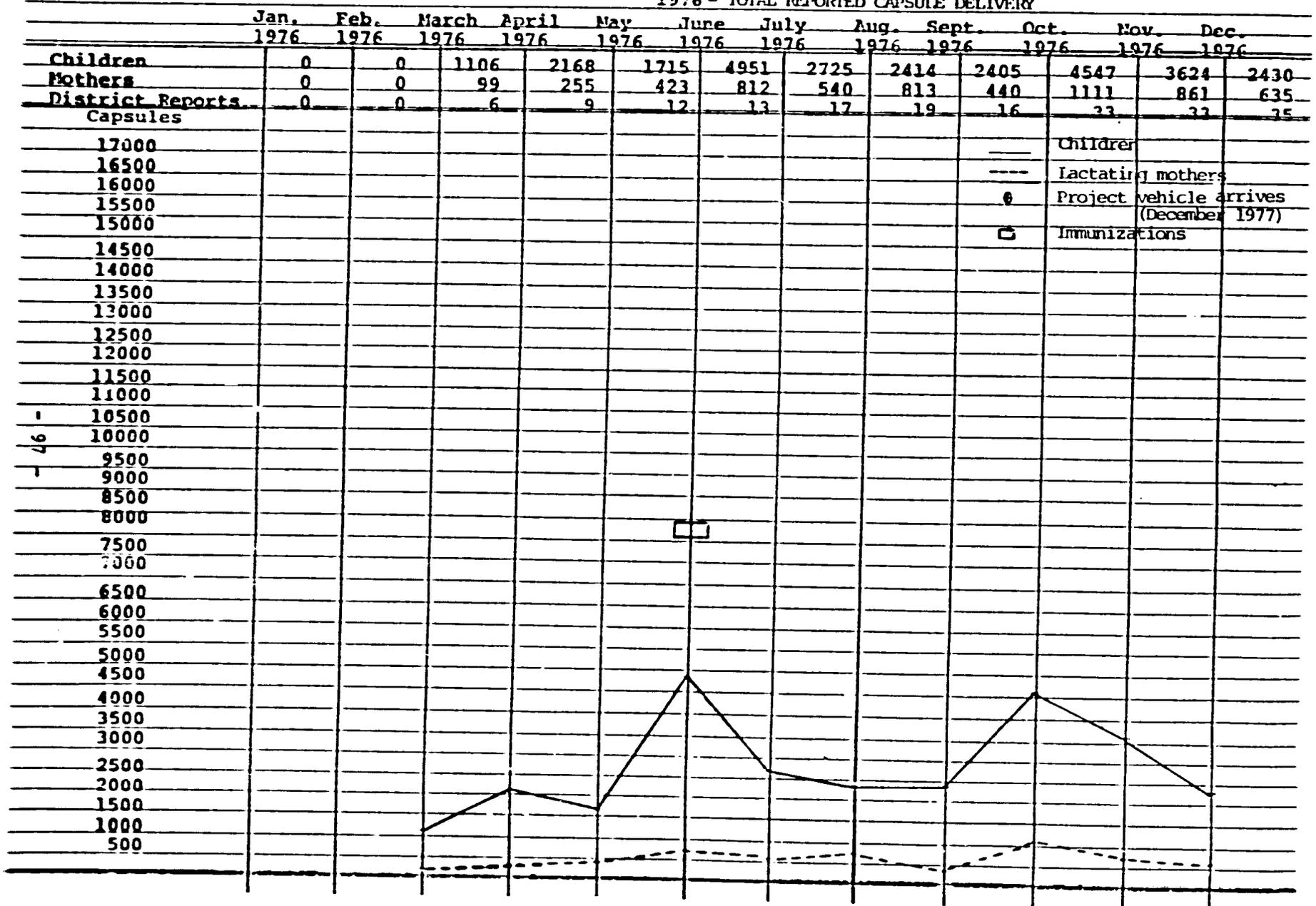
APPENDIX V

Location-Specific Response on Knowledge
of Vitamin A*

<u>Sample Site Number</u>	<u>Good Response</u>	<u>Bad Response</u>
1	3	238
2	0	160
3	1	188
4	15	292
5	28	232
6	6	156
7	4	327
8	0	241
9	0	149
10	3	161
11	4	249
12	16	245
13	22	236
14	0	254
15	18	242
16	0	248
17	0	259
18	6	262
19	8	250
20	10	224
21	8	240
22	124	139
23	0	112
24	0	142
25	0	156

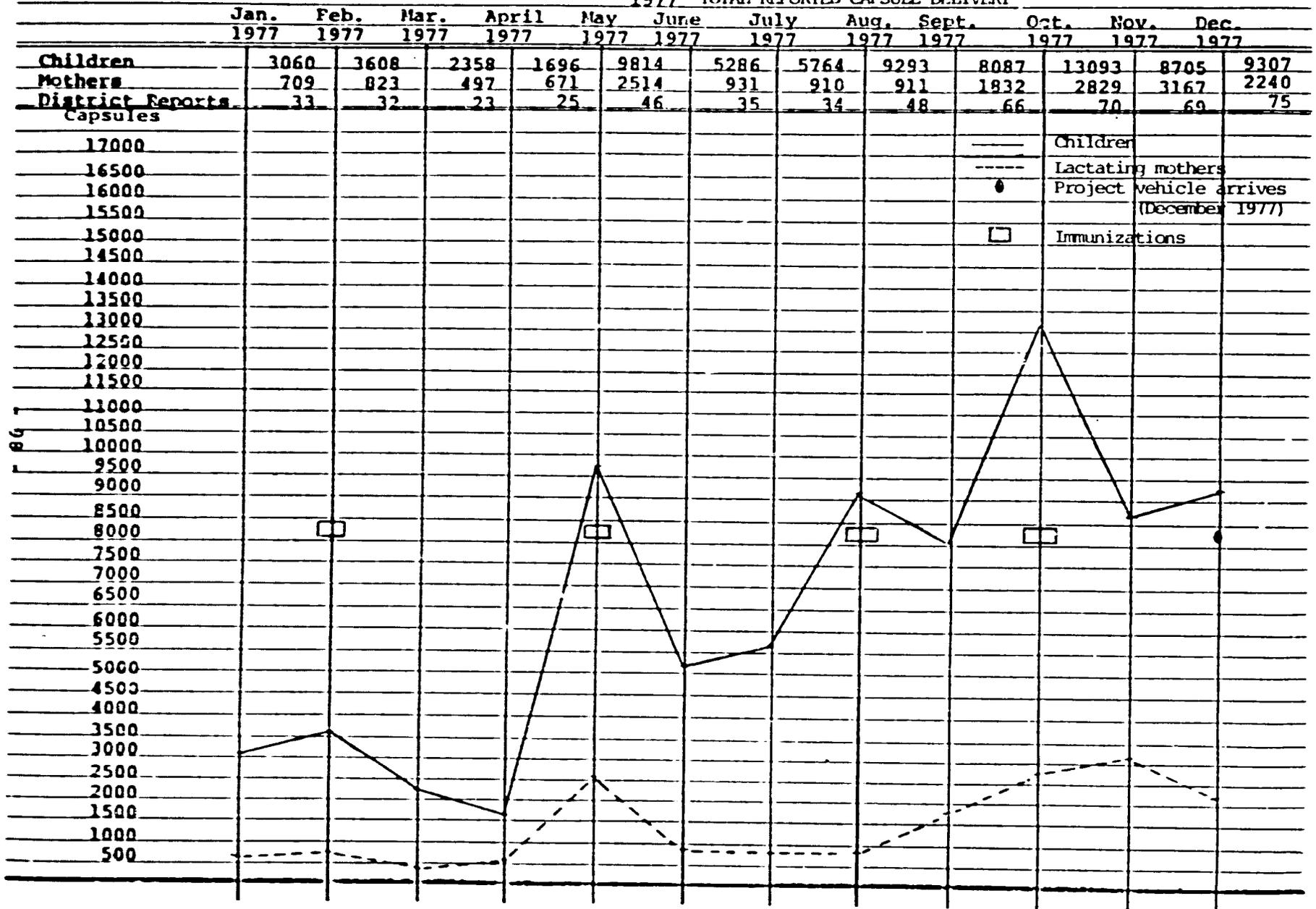
* Responses are in terms of children in household,
assuming mother's response held for all.

1976 - TOTAL REPORTED CAPSULE DELIVERY

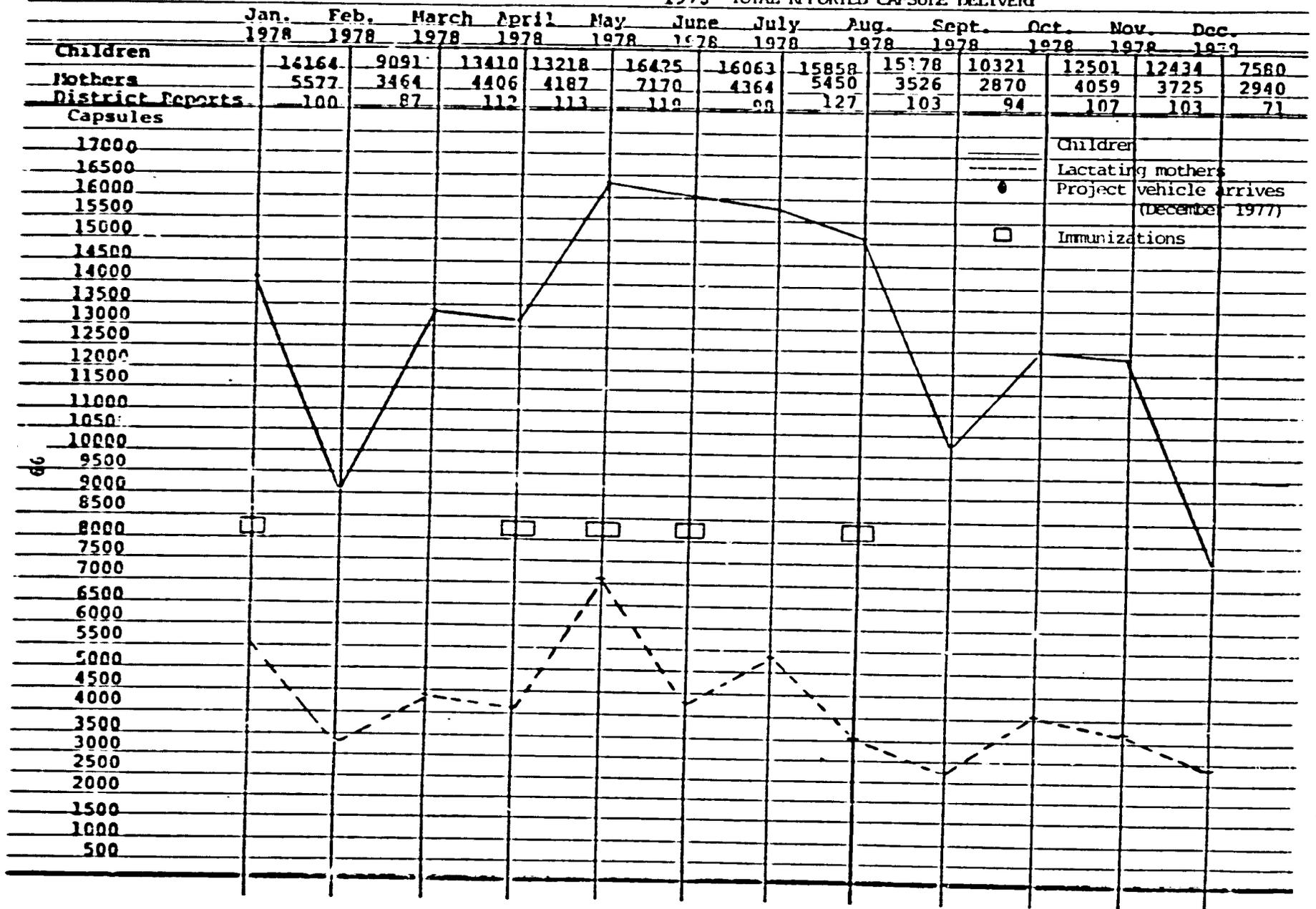


APPENDIX VI

1977- TOTAL REPORTED CAPSULE DELIVERY



1978- TOTAL REPORTED CAPSULE DELIVERY



Children
 Lactating mothers
 Project vehicle arrives
 (December 1977)
 Immunizations