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MID-TERM REVIEW

OF

HELEN KELLER INTERNATIONAL, INC.

CHILD SURVIVAL GRANT

INDONESIA

by

David F.Pyle, Ph.D

Senior Assistant

John Snow, Inc.

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ACKNOWLEDGEMENT

Reviewing a multi-faceted program such as HKI has in Indonesia within a relatively short time places strain on the organization and those associated with project-related activities. I would like to thank all the HKI office and project staff for making it possible to get a good grasp of the various Child Survival components during the two weeks I was in Indonesia; they answered all my questions honestly and completely which greatly facilitated my job. Dr. Tarwotjo and all those in the Nutrition Directorate who have worked so closely with HKI over the last almost two years gave me insights on how the Child Survival activities of HKI have affected their operation. I want to thank Dr. Hanif for the cooperation he and his staff gave us when we visited Aceh Barat. The same goes for John Quinley and Afrizal, the project team in Aceh, and Dr. Steve Salter, the CHIPPS Consultant in Aceh Province who has supported the double intervention trial in Aceh Barat. I also want to thank the other professionals who took time out of their busy schedules to discuss project activities, especially Dr. Berlian (computerization and risk index), Dr. Muhilal (fortification of MSG), and Dr. Satoto (liquid vitamin A trial). USAID's support for the HKI Child Survival activities in Indonesia has been strong since their inception and the briefings provided by the Health and Population Office and the Child Survival Consultant were helpful in understanding the HKI effort.

The HKI support staff did a masterful job in typing a rough draft of the report before departure. For that I am extremely grateful. But without Pete Paterson's computer gymnastics back at JSI, the disk would have been worthless and the paper completely retyped. Thank God for people who can make these marvelous time-saving machine work for us rather than against us!! Thus with the combined effort of this large group of individuals, the review was completed, but the author remains solely responsible for the views expressed in the report.

EXECUTIVE SUMMARY

To satisfy the AID requirement that every Child Survival grant have a mid-project review, the author spent two weeks in Indonesia reviewing project documents, interviewing project staff and observing project activities. HKI's Child Survival program in Indonesia consists of six separate but interrelated components:

- Vitamin A/immunization field trial
- Vitamin A social marketing effort
- Vitamin A fortification of MSG
- Computerization of the Nutrition Directorate
- Feasibility study of liquid vitamin A distribution
- Risk index of vitamin A deficiency

In general HKI's Child Survival program was found to on course, well on its way to completing the Detailed Implementation Plan as submitted in January 1986. Of particular interest is HKI's approach since it differs from the typical PVO Child Survival project. Rather than delivering selected child survival interventions to the target group (eg., ORT and immunization), HKI in Indonesia has concentrated its energies on developing a capacity within the Government to serve the under five population with life saving interventions, particularly in the nutrition field, focusing on vitamin A specifically.

HKI has developed an effective financial monitoring system which gives the status of the budget for each of the components. Several of the activities have come to an end and some will spend less than anticipated. Surplus funds from one component are shifted to another activity requiring additional resources, especially the social marketing effort which is underfunded because a proposed collaboration with a local AID-funded project never materialized. HKI must be commended for how it has leveraged the Child Survival funds and greatly increased its resources.

Institution building is the focal point of all the components. In the double intervention trial in Aceh Province, for example, HKI is working with local authorities to develop local capacity to record and report births and deaths in the villages so that the target under-five population is known and receive their basic immunizations and a semi-annual mega-dose of vitamin A. While great strides have been made in increasing coverage (eg., 4-fold increase in DPT and 6-fold in measles), the sustainability of the effort is a concern. Moreover, a controversy has arisen over the evaluation research which has been designed to determine the effectiveness of the intervention. The research orientation has resulted in the effort neglecting the infant mortality issue and targeting a much larger cohort than would be done in the government program (3-60 months vs. 3-14 months).

The other five components are less complex. The social marketing effort was somewhat delayed but is now moving ahead. The formative research activities (interviews and focus groups) have been completed, and the first drafts of the messages are ready for field testing. The small amount of Child Survival support for vitamin A fortification has helped the effort move toward Phase II which is expanded field/market testing. The results from the preliminary trial are exceedingly encouraging and if realized could have a significant impact on child survival rates in Indonesia. The computerization of the Nutrition Directorate has been more successful than anticipated. In addition to processing vitamin A and nutrition data, the operation is serving the General Directorate of Community Health, developing an MIS for them. The computers and the training of the staff to use them has raised the productivity of the Directorate. The liquid vitamin A study is progressing although the findings are unlikely to support this alternative distribution approach. Finally, the risk index was able to fulfill only part of its objective since it was more difficult than anticipated to acquire data. However, the exercise was valuable as a means to train the Directorate staff on how to use computers.

I. INTRODUCTION

In fulfillment of the contractual obligations of their Child Survival grant (FY 86 - April 1985), Helen Keller International, Inc. (HKI) requested that a consultant conduct a mid-term evaluation of their project activities in Indonesia. Field work was carried out in Jakarta, Bogor and Aceh between 26 June and 9 July 1987. The terms of reference for the exercise drawn up by HKI are appended as Attachment I. Project related documents were reviewed. Persons directly involved in the HKI Child Survival I activities were interviewed (Attachment II), and where possible and time permitted, field activities were visited and observed.

Chronologically this review comes slightly more than half way through the programming phase of the Child Survival Grant. HKI's proposal was submitted in March 1985. Being the first round of Child Survival grants programmed by the office of Private and Voluntary Cooperation (PVC) of the Agency for International Development (AID), it took several months to complete the proposal review and grant solution process. Field activities did not begin until late 1985 or early 1986. In the case of HKI/Indonesia (HKI/I) they submitted their Detailed Implementation Plan in January 1986. The latter document developed the ideas presented in the original HKI proposal and gave details (objectives, plans of action, line-item budgets) for each of the six components to be carried out under The Child Survival grant in Indonesia by HKI. The grant will continue through September 1988.

The HKI Child Survival Program in Indonesia consists of six components:

- Vitamin A/immunization field trial in Aceh;
- Vitamin A social marketing effort in West Sumatra;
- Vitamin A fortification of MSG;
- Computerization of the Nutrition Directorate;
- Feasibility study of liquid vitamin A;
- Risk index of vitamin A deficiency;

In an attempt to give an accurate reflection of the current status of HKI/I's Child Survival activities, this report is divided into five sections. Section II briefly reviews the history of vitamin A and HKI programming in Indonesia. The next section examines the development of the HKI Child Survival approach for Indonesia and the rationale underlying the program. This is followed by a short section on the budgeting and financial aspects of the HKI/I grant. Section V reviews each of the six component of the Child Survival program HKI/I is carrying out in Indonesia. While all six activities are related, each has its unique objectives and special issues, strengths and weaknesses, and accomplishments which deserve attention. The future course and recommendations, when appropriate, are included in this section by component.

II. BACKGROUND

As will be discussed at greater length in Section V of this report, HKI/I's Child Survival activities differ considerably for the typical Private Voluntary Organizations (PVO) Child Survival program. The rationale for HKI's program revolves around vitamin A. All six of HKI/I's sub-projects are related to some aspect of vitamin A programming - distribution, integration, fortification, education, field research, data collection/analysis.

Until 1983, vitamin A was viewed primarily as a means to reduce nutritional blindness. When HKI submitted its Child Survival proposal in early 1985, they justified the intervention on the basis of recent findings that increased vitamin A intake by children under the age of five increased their capacity to resist infection and gastro-intestinal). In research conducted in Indonesia in the late 1970s with the heavy involvement of HKI, Sommer (Lancet, 1983) reported that the mortality rate among children with mild xerophthalmia was at least four times higher (up to 12 times higher in some age groups) than children without this clinical sign of vitamin A deficiency. This finding was corroborated by a study carried out in the early 1980s in Aceh Province of Indonesia in which children consuming mega-doses of vitamin A had over 30 percent lower mortality rates than those not receiving the supplement.

HKI has been involved in Indonesia for more than a decade and a half. It participated in the national xerophthalmia prevalence survey conducted in the 1970s. This effort identified the extent of severe vitamin A deficiency, estimating that 50,000 children were blinded each year as a result.

The high rates of xerophthalmia and under-five mortality in Indonesia make vitamin A interventions a high priority. The extent of the problem is made clear by the following numbers:

- prevalence of Bitot spots - twice WHO's minimum designating a public health problem;
- prevalence of cornea xeroxis and ulceration - six times designated rate;
- half of under-fives were found to have vitamin A deficiency in the mid - 1970s;
- approximately 10% of the under-ones and 20% of the under-fives die.

The Government of Indonesia took the findings to the xerophthalmia study seriously and developed a strategy to reduce vitamin A deficiency. They included vitamin A programs in their Third (Repelita III, 1979 - 81) and Fourth (Repelita IV, 1985 - 89) National Five Year Development Plans. The main components of the effort have included:

- distribution of mega-doses vitamin A (200.000 I.U) capsules semiannually to all children between 1 and 5 years old;

- nutrition education to increase the knowledge, attitude and practice (KAP) pertaining to vitamin A consumption;

- investigation of the potential for vitamin A fortification of a foodstuff.

In support of the government's policy and strategy and working closely with the Ministry of Health (Departemen Kesehatan - Dep.Kes.), HKI developed its Child Survival Program. Over the past 18 months, HKI and Dep.Kes. have made significant progress in developing and strengthening vitamin A activities with the expressed objective of reducing vitamin A deficiency in the vulnerable under-five age group.

III. APPROACH

The Child Survival program designed and implemented by HKI in Indonesia is very different from most Child Survival grants. It is possible that the PVC Office of AID would not have funded the majority of activities included in Child Survival I of HKI/I if it had been submitted during the second (1986) or third (1987) rounds of Child Survival proposals. The Indonesian Child Survival program of HKI differs in several ways. First, instead of focusing on the "Twin-Engines" of child survival (i.e., immunization and oral rehydration therapy or ORT) which serve as the centerpiece for most PVO proposals, HKI/I has constructed a package of vitamin A-related activities.

All six components of HKI/I's Child Survival Program are related and complement each other. First, it is necessary to know the extent and location of the problem (vitamin A index). Then the various methods for improving vitamin A intake must be explored - education (social marketing to increase consumption of green leafy vegetables), mega-dose distribution (determining the feasibility and cost of distributing vitamin A in liquid form), fortification (of MSG). The efficiency of combining vitamin A mega-dose distribution and immunization at the community level is being studied. Finally, a computer capability within the Nutrition Directorate of Dep.Kes. is established so that the data generated by these activities can be analyzed.

The draftingg of the HKI/I Child Survival proposal and the launching of the program coincided with the findings on the impact of vitamin A on childhood morbidity and mortality. At that time, however, no funding mechanism in AID other then Child Survival existed for supporting PVO field operations involving vitamin A. Special vitamin A program funding for PVO's was not introduced until the following year, 1986. Moreover, including vitamin A as a Child Survival activity was justified as a nutrition-related intervention, a lower priority than immunization and ORT but still encouraged (usually in the form of community-based growth monitoring efforts). It certainly helped that, if the results of the field research were valid, vitamin A was now being viewed as a way to reduce child mortality, thus having a legitimate role a Child Survival intervention.

A second difference from most Child Survival programs is that HKI/I's program does not deliver services directly to the target group. In contrast, HKI has concentrated most of its energies in catalyzing and supporting government efforts, developing the capacity of local agencies to deliver vitamin A and child saving services to the vulnerable under-five age group. In many ways this is the most difficult approach, one that most PVO's are either not capable of or willing to take. It requires a close working relationship with the counterparts. This often calls for adopting different methods, compromising on certain issues and working at a slower pace, patiently waiting for the bureaucratic machinery to learn, adopt and put into practice. How much easier and more expeditious it would be to have a well defined area in whih a limited package of services is delivered to a specific population. Such projects fit the Child Survival monitoring criteria (Tiers I and II and even III) much more comfortably and have the potential of generating impressive numbers which will please Congress.

The approach taken by HKI in their Child Survival programming in Indonesia places priority attention on capacity building and sustainability. They could very easily have chosen to distribute vitamin A capsules to hundreds of thousands, even millions, of preschool children in Indonesia during the three-year period. If the research findings are correct, the health status of the target group would be improved and mortality reduced. However, in the long-run little would have changed. Little in the way of lasting impact would have been achieved. HKI/I has consciously chosen to pursue Child Survival activities which have long-term implications, both in the Ministry of Health and for the population as a whole.

The six vitamin A-related activities of HKI/I's Child Survival I program include a number of important and innovative capacity building areas. First is survey methodology. The exercises in Aceh and Sumatra Barat and the liquid vitamin A trial require considerable data collection and processing. Nutritionists from Pusat as well as the respective provinces have been actively engaged in the exercises and have had the opportunity to learn first hand through on-the-job training how quality field research is conducted.

Secondly, the Nutrition Directorate and the provincial-level health officials in Sumatra Barat are learning social marketing techniques. While tried several times in Indonesia, HKI's Child Survival effort is one of the largest and most ambitious undertaking of its kind ever undertaken in the country. In fact, this is the first attempt anywhere in the world to change consumption patterns and increase the intake of vitamin A-rich foods. Not only have the nutritionists been exposed to what social marketing is and how it is carried out by some of the most skilled and experienced professionals in the field, but they will also be able to witness the impact, confirming the power of well developed and implemented social marketing efforts.

A third area of capacity building is in computerization. Computers have become indispensable for the management of large organization, especially ones which generate a high volume of program-related data. Making officials and employees aware of the value of computers is the first step in institutionalizing computer capability within an agency. The second step is developing computer literacy among the staff so that the computers are properly utilized and contribute to the efficient and effective management of the agency's programs. This is what HKI has done in the Nutrition Directorate using Child Survival funds.

HKI/I's commitment to sustainability and establishing viable programming capability in collaborating institutions is represented by its attempt to develop "Tier IV" indicators of program effectiveness. From the design of their Child Survival package over two years ago, HKI in Jakarta was concerned with the question of what would happen after the child survival funding came to an end. The Country Director was not satisfied with tracking only inputs (Tier I), outputs (Tier II) and impact (Tier III). All these could be highly positive yet the program have little lasting effectiveness unless the agency with whom the PVO was working internalized the intervention and was able to manage it effectively on their own. The aforementioned capacity building approach is much more

challenging and very difficult to accomplish within the limited three-year timeframe provided under Child Survival grants.* To track their progress in sustainability and to determine how successful the program has been in this regard, HKI developed and has included a Tier IV list of indicators for most components of the Child Survival grant. By focusing on this vitally important aspect from the beginning, HKI not only developed a different package of Child Survival activities but paid greater attention throughout the grant to strengthening local capacity to program vitamin A effectively after Child Survival funding comes to an end in 1988.

The approach adopted by HKI/I is manifested in a number of ways. To begin with, one of HKI's offices is located and at least half of the Country Director's time is spent in the Nutrition Directorate itself. Although the ambiance and convenience may be lacking (e g., no private telephone), the advantage in terms of institution building is tremendously enhanced. HKI is viewed and often functions as part of the Directorate. Secondly, during the first 18 months of Child Survival activities in Indonesia, HKI has arranged for considerable technical assistance. A number of both foreign and local experts has contributed to the design and implementations of the Child Survival activities. The result is a small library full of reports on various aspects of HKI/I's Child Survival program (see Attachment III). It is difficult to conceive of any PVO Child Survival program being better documented than HKI's in Indonesia.

The lack of HKI control was more than compensated for by the increased involvement and commitment by the government. The basic approach by the HKI was to "have the government do it." HKI was involved as technical advisers and support for all six components but did not carry out the work themselves. Each activity had an HKI adviser attached to it, either at the center (computer, social marketing, fortification, index) or at the field site (Aech and liquid vitamin A). Through the technical assistance, HKI's objective was to strengthen the government's capacity to carry out such activities in the future. Indications at this mid-point are that HKI/I has achieved a great deal in developing Dep.Kes.'s implementation and policy-making capacity, particularly in vitamin A-related activities. HKI/I has intentionally attempted to bring different parts of Dep.Kes. together to improve programming; this has worked well in one case (Communicable Disease Control and Nutrition Directorate are working closely in the Aceh double intervention trial) and not well in another (Health Education Section is not working with the Nutrition Directorate in the social marketing exercise in West Sumatra).

One is impressed at how close HKI/I's Child Survival program is to what was described in its Detailed Implementation Plan of January 1986. The program is definitely "on course", and the chances of HKI/I carrying out everything it outlined are excellent. Several things may not be wildly successful, but the activities will have been given the fair trial that was planned. An explanation for the success of the HKI/I Child Survival plan is the fact that the plans for each component were drafted in very close

* In the third round of Child Survival grants a fourth year has been added for the expressed purpose of improving the sustainability of the efforts.

collaboration with the government counterpart responsible for implementing it. This close working relationship with the government and very good management by HKI/I enabled them to implement a much more sophisticated Child Survival program than will usually be found, and has increased the possibility that at least a few of the HKI/I Child Survival activities will have significant impact on the under-five age group in Indonesia over the long-term.

IV. FINANCIAL

The Country Director has devoted considerable thought, time and energy in developing an effective budgeting and financial management system for HKI/I. This is vital to a program that has so many components and so many different sources of funds. The existing system permits the director to control expenditures and know how much has been expended at any particular time. The percentage of annual as well as life of project funds spent is provided. Moreover, the phasing of funds (slowly in the initial phase, more rapidly as activities gear up) can be tracked so that the component manager has a clear sense of how the activities are doing in terms of expenditures. The system has provided HKI with a high degree of financial control, and one is given the impression that maximum use is derived from every dollar invested in HKI/I activities including those under Child Survival.

In addition to control and financial management, mention must be made of the impressive way that funding has been generated by HKI/I. A little less then three years ago, the HKI office in Jakarta had an annual budget of only a couple of hundred thousand dollars. It currently operates on a budget of over $1.3 million a year. Some of this is undoubtedly due to timing. The Child Survival grant alone added several hundred thousand dollars a year. But a great deal of the credit must go to the Country Director and his leveraging of Child Survival funds. The Child Survival grant has been used to generate support from a number of different sources - IBM (for computer training and equipment), Hoffman La Roche (for vitamin A distribution trial and fortification), International Center for Epidemiologic and Preventive Ophthalmology (ICEPO) at Johns Hopkins (for social marketing), from USDA (for technical assistance in fortification technology). The resources from PVC under the Child Survival I grant have been greatly increased through the support of other interested parties. In monetary terms, the following groups have contributed toward the various HKI Child Survival activities:

Institution	Estimated Amount
Johns Hopkins - KEPO Research Associate (Aceh) Manoff International (West Sumatra)	$200,000
Luce Foundation Research Associate (Aceh)	20,000
USAID (CHIPPS) Project Support (Aceh)	80,000
Hoffman La Roche Project Support (Liquid Vitamin A-trial)	30,000
IBM Training and Equipment (Computerization)	110,000
Estimated total	$440,000

Such support also raises the potential for supplemental funding once the Child Survival grant comes to an end; the private donors such as IBM and Hoffman La Roche have developed a vested interest in the activities and are likely to continue their support to ensure they go well and have an impact. To some extent, HKI/I has developed funding capabilities which will continue to assist in organizational strengthening after Child Survival. The amount can be expect to be less, but the needs will also be less after the major development phase is completed under the Child Survival funding. This phenomenon can be referred to as funding sustainability.

V. ACTIVITIES

This section will review the current status of each of the six child survival components which HKI/I is carrying out. The objectives of the respective activities and the progress made in achieving them will be summarized. The description will include particular strengths and weaknesses of each activity. While outputs will be identified, the use of the accepted Child Survival Tier I, II and III indicators will be limited since HKI has concentrated its efforts on the aforementioned process/capacity-building activities. The primary focus of attention will be on what the different activities have contributed or have attempted to contribute to the Government of Indonesia efforts to reduce under-five morbidity and mortality. For each activity the financial, personnel and sustainability aspects will be addressed. Finally, the subsection on each component will conclude with a comment of what can be expected in the future in their particular activity, with recommendations if appropriate.

1. Aceh Vitamin A/Immunization Integrated Intervention

The Aceh field trial is the most complex and challenging of the six Child Survival activities HKI has undertaken in Indonesia. It is also the one which typifies most closely the normal PVO Child Survival activity, in that it concerns the delivery of two interventions (i.e., immunization and vitamin A) that improve the health status of the target under-five age group. Four objectives were identified for the Aceh field trial and articulated in the Detailed Implementation Plan as follows:

- improve the coverage and distribution of vitamin A capsules and immunizations;
- improve the method of monitoring the distribution of vitamin A and immunization;
- improve the current method of monitoring birth and deaths in a manner which is effective and fits with local conditions;
- measure, in a simple fashion, the association between two interventions (vitamin A and integrated vitamin A plus immunization) in child and infant mortality.

The effort is carried out with the cooperation of the Nutrition Directorate (which is in the Directorate General of Community Health or BINKESMAS) and the Directorate of Epidemiology and Immunization (Directorate General of Communicable Disease Control or P3M). A steering committee made up of representatives from the Nutrition Directorate, the province, the kabupaten, CWIPPS, and HKI is responsible for making decisions relating to the field activity.

The director of the Directorate General of Communicable Disease Control mentioned the possible policy implementation of the effort - if it could be demonstrated that the combination of vitamin A and immunization could significantly reduce mortality in the under-five age group, the

government could justify concentrating its increasingly scarce resources on the twin interventions rather than investing money in interventions which are difficult to implement, are costly and have little immediate impact (e.g., growth monitoring).

The field activities are taking place in Aceh Province (westernmost province in Indonesia) in the district (kabupaten) of West Aceh (Aceh Barat). Six sub-districts (kecamatan) are included in the exercise:

Kecamatan	No. of village	Population (1980 census)	Under five target population
Vit A + Immunization			
Kuala	50	23,442	3,935
Samatiga	74	21,890	3,336
Vitamin A			
Kawai XVI	110	33,563	5,671
Teunom	54	15,395	2,207
Control (Iron)			
Jaya	48	17,204	2,689
Seunagan	89	27,352	4,339

In the service delivery aspect of the component, significant progress has been made. Because of the objective to determine impact on childhood mortality (ages 1 - 5), all children between 3 and 60 months are taken as the target group. This is compared to the governments focus on the 3 to 14 months old. If the situation in Kuala Kecamatan is analyzed, in the first month (May 1986) of collecting data (taken as the equivalent of a benchmark from which progress can be measured), the rates of the three best indicators of coverage were low: (DPT I - initiated process - 17%, DPT III - completed process - 6.2%; measles - important and can be given at any time once the child nine months old - 7.1%).* As of the end of June 1987, the figures stood at 62.7% for DPT I; 25.4% for DPT III and 45.1% for measles. This constitutes an almost four-fold increase in DPT and over six-fold in measles coverage. Attachment V gives the monthly figures and percentage coverage for these three immunizations. The deficiency of the immunization reporting system is the inability to determine age-specific coverage rates. Consequently, the indicator HKI wanted to track (% of 12 month olds completely immunized) is impossible, meaning that we have no way of knowing the timeliness of the coverage (i.e., maximum benefit.)

Performance of the immunizers has generally been good. If it had not been for an almost complete collapse in February, the overall results would have been better. The change which promoted renewed good performance was the initiation of a policy which set a minimum number of immunizations

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*The rates in Samatiga were somewhat lower. The figures from Kuala are used because they are more complete.

(eight) that would have to be given for the juru imunisasi (immunizer) to receive their incentive payment (Rp.5,000) for that particular village visit. Moreover, a new reporting form was introduced which gave the number of immunizations provided in each village by type. The supervisor added a column recently which gives the overall target number of children in the village. While this is an improvement, it still does not provide information on the number of children who have not yet completed their immunization (current target) and should be made a priority group to be motivated.

While progress has been encouraging, several issues should be raised. One is that the registration system is not utilized as fully as it could or should be. After devoting the time, energy and resources (payment of Rp. 10,000 or a little over $6 per month to the village headman) to carry out a complete census of the program villages and maintain it, the workers and village leaders have not utilized it to identify those still requiring immunizations and notifying them prior to the visit of the immunizer. The principal problem is that no one in the village can be counted upon to work on behalf of the intervention. The headman has limited interest, and the women's village organization (PKK) is not effectively organized or active in the Kabupaten.

Several relatively minor adjustments in the procedures followed by the immunizers have helped improve performance. First, instead of visiting a village for three consecutive months, the immunizer now visits a village every three months. Under the former system, it was possible for a child to be 11 months old before starting its immunization series. Now, ideally it is possible for every child to be immunized by the time it reaches the end of its first year.

A second change involved modifying the instruction for giving measles. The practice of the immunizer was to give measles along with DPT III. As can be seen on the widely used growth monitoring card, measles is placed under DPT III (see Attachment VI), leading the immunizer to believe that the two shots should be given simultaneously. If the child is immunized according to the ideal schedule (starting at three months old), this is fine. However, if as is often the case, the child starts its immunizations late, the child may be well over nine months old when he receives DPT III . Measles, identified as the most common cause of death among the childhood immunizable diseases, should be given as soon after reaching nine months as possible. Not only were instructions issued to change the practice in the two project kecamatans, but the Dokabu (Head of Health for the kabupaten) issued orders changing procedures for the entire kabupaten. The KaKanwil (Head of Health for the province) also instructed all the kabupatens in the district that measles is now to be given as soon as possible after nine months regardless of what other immunizations have been given. Measles coverage jumped dramatically in the project kecamatan when the procedure was changed in October 1986. A similar impact might be expected elsewhere in the province and possibly throughout Indonesia since the Head of the Directorate of Epidemiology and Immunization in Jakarta expressed interest in the finding and said he would instruct KaKanwils around the country to change procedures accordingly.

Vitamin A distribution has reportedly gone extremely well in the four

kecamatans involved. Prior to the Child Survival program, vitamin A capsule distribution was estimated at 20%. The rates for May and November 1986 have been well over 90% (ranging from 91% to 95% in the four kecamatans - averaging 94%). The results from the recent distribution (May 1987) have not been completed yet, but rates of over 95% are expected. Spot checks of villagers have given the project manager confidence that these rates are accurate.

Another major activity in the Aceh intervention is the birth and death registration system. Any population-based intervention (like immunization and vitamin A distribution) must have such a registration system if it is to achieve a high coverage rate on an ongoing basis. HKI has achieved a lot in this effort although it is expected that births are still under-reported by possibly 25 to 30% (based on the estimated number of births compared to reported). According to the village reporting system, the birth rate is 26/1000 population versus an expected 35/1000. Analysis of the data by village size indicates a lower than expected rate in villages with the largest populations. This may be explained by the fact that village headmen do not actively collect information on new births and the larger the village, the less likely he is to hear the news. The hope of utilizing the PKK for such purposes has proved unrealistic due to the very low level of development of the PKK in the villages of Aceh Barat.

Over the past year, the HKI project in Aceh has devoted most of its attention and efforts to developing the supply side of the immunization intervention . This now seems to be working reasonably well. In the process, the demand side has been neglected. Despite having several interesting studies carried out on how demand for immunizations might be generated, neither the manpower nor the time exists currently to permit the type of attention required to educate and motivate the community on the value of and need for immunization. Several suggestions were made earlier (e.g., hiring a man and woman team for each kecamatan with a motorcycle to motivate villagers) but were found impracticable.

The HKI Aceh component is constantly faced with conflicting interests - operations (i.e., service delivery) versus research. As the objectives of the component state, the steering committee wanted to demonstrated the impact of the dual interventions by showing reduced child mortality rates. This orientation resulted in several decisions being made which affect the overall effectiveness of the immunization activity. First, the age of children targeted for immunizations is up to the age of five. The government program, as mentioned, is only 3 to 14 months, a considerably more manageable number to service (3.5% of population versus approximately 17%, hence more within the realm of possibility for the limited capacity of the health staff). This is something that would never be replicated once the Child Survival activity comes to an end. Secondly, the project gave a low priority to the provision of tetanus toxoid (TT) to pregnant women or women of child bearing age. Evidence from the areas of the province and country indicates neo-natal tetanus accounts for approximately 20% of the infant mortality rate. Reducing the age of immunization to correspond to the official age and including TT as a priority immunization would have saved more lives although it obviously would have compromised the child mortality study. This being the case, the component objective should mention only the reduction of child mortality, excluding infant mortality

reduction since neither intervention is directed at or can significantly impact the under-one population.

The latter aspect has caused considerable discussion and controversy during the course of the Aceh activity. The original design of the component called for a study to determine the impact of the vitamin A/immunization interventions on child and infant mortality compared to vitamin A and control (iron distribution only) kecamatans. HKI Headquarters in New York and their advisers have objected to this study since it was first suggested. In June 1987 after a meeting of the involved parties in New York, HKI headquarters called for a discontinuation of the proposed case control mortality study. The study was seen as crude and unscientific. But as the minutes of the meeting indicate (Attached VII), particular concern was raised about "the interpretation and publication of negative results if encountered". While questions can be raised about the scientific soundness of the evaluation effort, HKI/I has maintained and continues to maintain that they are only trying to determine the relative effectiveness of the intervention. This will be done regardless since the birth and death reporting system in the six kecamatan will provide such data in any event. USAID/Jakarta and the Ministry of Health (especially P3M) are very interested in the outcome of the dual interventions, and the former has objected strongly to HKI/NY's unilateral action (see Attachment VIII). HKI/I and the person responsible for the Aceh component have redrafted the effort, making it a determinants of mortality study, which it is hoped will be acceptable to HKI/NY. In any event, USAID/Jakarta has agreed to fund the study if HKI/NY continues to refuse.

The biggest concern raised in the Aceh double intervention component is what will happen after HKI involvement comes to an end. The Dokabu is very interested in maintaining project activities such as the registration and birth/death reporting system. The major problem that will be faced is lack of funds. HKI/I compromised its concern for sustainability in favor of a system that would effectively deliver services (so that impact could be determined) and in evaluating the effectiveness. The village headmen are paid Rp.10.000 per month when they submit their birth and death reports. In addition, the immunizers are paid Rp.5.000 ($ 3.05) for every village they visit each month (averaging eight per immunizer per month). A discussion with one immunizer made it unmistakenly clear that without the incentive and special supervision, the level of immunizations will drop. With government resources so dramatically reduced in the last several years*, there is absolutely no way the health department can afford such payments.

The Aceh project in the limited time remaining for the project director in Meulaboh (4 months) will attempt to begin in one kecamatan a lowest cost immunization program utilizing lessons learned and procedures developed in the Child Survival double intervention to date. The age covered would be similar to the government (3-14 months), and the

*At the provincial level, P3M (Communicable Disease Control) which is responsible for immunizations has had its budget reduced in the last three years from Rp.500,000,000 ($500,000 at the 1984 exchange rate) to Rp. 75,000,000($46,000 at today's exchange rate), a 90% reduction.

immunizers would receive only Rp.2000/visit. No special supervision would be provided. If performance is improved, the small increment is considered possible to replicate, thus upgrading the performance of the kabupatens's immunization program.

The future prospects for these Aceh component are limited. The local government's capacity to carry on the effort are not encouraging. The most that can be hoped for in the year of Child Survival programming that remains is that, one, the duel interventions demonstrate some level of impact which encourages adoption of the approach on an ongoing basis and two, the pilot demonstrates that improved performance in immunization can be realized at a minimal, affordable cost. Moreover, the cause of under-five deaths study should give the health system data which will allow them to identify priorities among the various Child Survival interventions. Finally, as the birth and death registration continues to demonstrate its value in permitting the targeting of child saving interventions, means will be identified to assist the government institutionalize the procedure so that it can be maintained.

Several recommendations can be made which involve activities that would improve the sustainability of HKI's work in Aceh and spread the lessons learned in Aceh Barat to other areas of the province.

- Workshop - A workshop should be held in Meulaboh as the project manager completes his assignment. The purpose of the meeting would be to review the findings of the study and discuss the implications of the operational lesson learned over the last two years. A significant portion of the time of the participants should be spent in the field, interviewing service providers and recipients and observing project activities. Participants would include e provincial health officials and Dokabus from the other kecmatans of the province.

- Demand Side - More efforts should be made to improve the utilization of the village registration system and the development of a community level capacity to motivate and mobilize parents on behalf of the dual interventions. One suggestion is to focus more attention on the percentage of under-fives fully immunized in project villages and create competitions between villages.

- PKK - Closely related to the previous recommendation, PKK leaders from the kabupaten and kecamatans should tour Sumatra Barat to observe the operations and potential of PKK. This can be tied to a general upgrading of the PKK in Aceh Barat and might include their active involvement in birth/death reporting, and service delivery. The Bupati (top official of the kabupatan) might even be requested to withhold the annual grant of

Rp. 250,000 (about $150) to each village PKK if they do not cooperate and perform satisfactorily.

While HKI Child Survival funds for this component ($97,000) will be fully expended by the time the grant comes to an end, additional funding from CHIPPS is a possibility. CHIPPS has played a vital support role in the component to date and has funds which can be programmed during the remaining two years of CHIPPS (through 1989).

2. West Sumatra Social Marketing - Perhaps the most innovative of the six HKI/I Child Survival components is the social marketing effort in the province of West Sumatra. The objectives as stated in the Detailed Implementation Plan are:

- increase the coverage of vitamin A capsule distribution program;

- improve the utilization of the health centers and posyandu, especially when eye problems are present;

- increase the consumption of locally available vitamin-A rich foods for high risk groups;

- demonstrate the benefits of the social marketing approach to vitamin A deficiency prevention programs, combining public health and communications strategies;

- present a methodology for developing a social marketing program for vitamin A that can be used to adapt the West Sumatra program other provinces.

The social marketing component is supervised by HKI/I's anthropologist and carried out by Manoff International under a technical assistance agreement they have with ICEPO at Johns Hopkins University.

The component was delayed because HKI/I's original plan of collaborating with the AID-sponsored CHIPPS (Comprehensive Health Improvement Program - Province Specific) effort in West Sumatra (as it is doing in Aceh) was not approved by the long term consultant in Padeng. The HKI effort was not considered a priority of the epidemiologic based program being planned for the province. As a result, HKI had to initiate discussions with the Provincial government; developing plans and finalizing the agreement took longer than expected. Field work did not begin until mid-1986.

In HKI/I's Implementation Plan for the Social Marketing component, 10 activities were identified:

- Design of the social marketing plan.

- Design of the sampling and distribution plans.

- Focus group interviewers.
- Analysis of focus group interviewers and preparation of report.
- Design of messages and marketing strategies.
- Development and pretesting of prototype messages and development of media plan.
- Baseline study and production of final messages.
- Training and orientation meetings.
- Implementation of public education campaign.
- Studies to track progress and evaluate results.

With technical assistance provided by Manoff International, formative research (household individual depth interviews and observations) was carried out in July 1986. Four villages in two kecamatans (VII Koto and Sungai Liman) in Padang Pariaman Kabupaten were selected as the survey site. A total of 140 people were interviewed and observed - 80 mothers and 60 influentials (health staff, caders, dukun bayi or TBAs, lurahs - village headmen, religious and traditional leaders, PKK officials). Focus group sessions were also carried out with the five mother sub-segments to whom the messages will be directed (pregnant, lactating, with children 5 - 12 months, 13 - 24 months and 25 - 60 months).

As a part of HKI/I's commitment to institutionalization and capacity building, local agencies were involved in the formative research phase - University Andalas (Padang) in the ethnographic (in-depth interviews) aspect and Surindo Utama in the focus group interviewing. Both carried out the field work well, with the HKI and Ministry staff learning about field research methodology from Surindo Utama. Both groups, however, were less skilled and experienced at analyzing the data and reporting the findings. This was done primarily by Manoff personnel.

The decision was made that only data relating to the knowledge, attitude and practice of green leafy vegetable consumption would be included in the HKI social marketing effort in Sumatra Barat. Such things as colostrum consumption and breastfeeding were not included since it was thought this would distract from the major vitamin A theme and message pertaining to increased consumption by the target group.

The main finding of the formative research included the following information:

Pregnant women - Usage of green leafy vegetables is apparently high, but deterrents to eating more are loss of appetite and fear of delivery problems due to large size of baby;

Lactating mothers - Green leafy vegetables seen as good; connect diet and milk production;

5- 12 month olds - Apart from breast milk no other source of vitamin A or fat in diet; green leafy vegetables thought to be indigestible by young children;

13-24 month olds - Inadequate quantity of green leafy vegetables given because of apprehension on digestibility and inability to chew;

25-60 month olds - Basically the same as 13-24 month old children.

The major sources of vitamin A-rich foods were weekly markets in the area and the local environment where several varieties of green leafy vegetables grew wild. In terms of media exposure, research found that half of the households had radios, but only half of these were in working order. Of those who had working radios, 22% listened often, 60% occasionally, and 18% never. Listenership was found to be mostly passive (i.e., background music). As far as personalities are concerned, the highest percentage of people (by a factor of almost four) identified Elly Kasim, a local singing star, as their favorite entertainer.

In addition to radio spots, several other promotional activities are included in the media strategy. One consists of counselling cards for use by posyandu (monthly village MCH clinics) staff. The message is simple - 2 tablespoons of green leafy vegetables twice a day plus breastmilk for 5 - 12 month olds; four tablespoons plus breastmilk for 13 - 24 month olds; six tablespoons per meal for 25 - 50 month olds , as well as pregnant and lactating mothers. The same message is displayed on a poster that will be hung at health facilities throughout the experimental kecamatan.

A second approach will be developed for the popular weekly markets. First, point-of-sale material will reinforce radio messages. These will take the form of hanging items or strips from columns at or near the vegetable sellers' position. Secondly, the medicine ("obat" or pill) sellers who travel from market to market will be utilized. These sellers use stories, taped music, and "magic" to attract customers. They rely on mass impulse buying. The Association of Medicine Sellers in West Sumatra has agreed to cooperate and play tapes with the radio jingles and slogans mixed with popular songs - this will be played as loudly and as frequently as possible in between their own music and promotions.

The commercial advertising company of Fortune Indonesia has been contracted to develop the radio spots. Elly Kasim, the singing hero of the Minangkabau culture, has agreed to participate by taking part in the radio spots and singing the jingle which will became the centerpiece of the communications effort. Fortune has produced eight radio spots, one general theme and seven aimed at the various target groups (Attachment IX). These first drafts will now be revised, shortened and field tested.

Two concerns are raised by this effort. First is the willingness of the local health officials to continue the effort. Social marketing can only succeed in the long run if it is consistent and continuous. While the

intensity can be reduced, some reinforcement will be required or the new behavior patterns will be lost and the status quo ante resumed. After HKI involvement ends, the local government must assume responsibility, programmatically and financially. Little planning or attention has been directed at this aspect, and local officials currently do not demonstrate the willingness and capability to carry on the effort.

A second concern is the lack of attention directed at vitamin A capsule distribution. This is identified as a primary objective but has received little consideration to date. It is pointed out that for this to be realized, the province must designate two months each year during which all kecamatans will distribute vitamin A capsules. This has been done in several provinces of Indonesia, and there is every reason to believe it could be introduced into Sumatra Barat. If this is accomplished, a radio spot will have to be developed for broadcasting several weeks prior to the start of the designated vitamin A capsule distribution months. It is recommended that these steps be investigated so that the vulnerable sector of the population can receive the benefits of vitamin A while they are being educated on the virtues of consuming green leafy vegetables and so that participation at the posyandu is encouraged (another component objective).

As shown in Attachment IV, this is the most expensive component of HKI's Child Survival program. Because of CHIPPS' nonparticipation, HKI/I expects to have a shortfall in funds in this component even after utilizing funds unspent by other Child Survival components. Additional funds from HKI are expected to be programmed for this component to make up the difference. But the investment appears to be a good one in that it is consistent with the HKI/I theme of raising institutional capability and capacity. The Nutrition Directorate is learning what social marketing is and the skills and steps required to carry it out. They have gained practical experiences in formative research and media strategy development. They will be able to see the power of the social marketing approach once it is launched. This will serve them well in developing such efforts elsewhere in Indonesia.

3. Vitamin A Fortification of MSG - Of all the alternative vitamin A interventions being tested by HKI, the one with the greatest chance of having broad impact is fortification. Not only does it reach a sizable portion of the population with a supplement of vitamin A which has been proven effective, but it also reduces the delivery role of the government as well as the need for action on the part of the consumer. Whereas the capsule distribution requires active involvement from both the supply (health facility staff and community workers) and demand (target groups) sides and the social marketing from only the consumer side (accepting the message and changing behavioral patterns), fortification is passive on both the supply and demand side once the fortified product is in the market. No changes in behavior are required, making it the most preferred and easiest of the alternative interventions aimed at increasing vitamin A intake.

HKI has been instrumental in the promotion of the vitamin A fortification of MSG in Indonesia. HKI served as the funding coordinator and mechanism for the most recent field trials (1985-1986) on fortified MSG

carried out by the Nutrition Research and Development Center (Bogor).* Recent advances in the coating of vitamin A, making it white and indistinguishable from the pure white MSG crystals, now permits the production of a consumer-acceptable product and makes the intervention feasible. HKI/I support through the Child Survival grant has the following objectives:

- assure that data analysis on pilot project data provides a reliable picture of the exact impact of a fortified product on vitamin A deficiency;
- assist Dep.Kes. in defining the most appropriate strategy for implementing and financing a national fortification effort;
- provide information to policymakers as to methods, purpose, background to MSG fortification so as to allow them to make educated decisions about its future role in reducing vitamin A deficiency;
- provide Indonesia and international fora for discussing the results of the pilot fortification project steps necessary to make this a national program;
- secure the necessary technical assistance and funding for development of a national program.

Out of the HKI budget of approximately $45,000, less than 25% of the amount has been or will be spent. Several of the aspects included in the objectives (e.g., international meeting, expatriate technical assistance) were not required. HKI used the Child Survival funds to publicize the effectiveness of vitamin A fortification through a workshop of concerned parties in Indonesia and the publication/distribution of two publications on the subject.

The workshop (September 1986) provided the opportunity for all involved agencies to gather for two days of discussion (Directorate of Food & Drinks Supervision, Department of Health; Nutrition Research and Development Center; Trade Department; Directorate of Organic Chemical Industry, Industry Department; Consumers Group; Indonesian Pediatric Association). This provided a forum to disseminate the impressive results of the vitamin A fortified MSG field trials and discuss concerns over the safety of using MSG as the vehicle of fortification.

The study was carried out completely by Indonesian researchers, very much in line with HKI/I's commitment to building and utilizing local

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* Funders, including the International Development Research Center, Ford Foundation, USAID, USDA, Hoffman La Roche, channeled their support through HKI.

capabilities whenever possible*. It was conducted among approximately 4000 children under-five in two kecamatans of Bogor Kabupaten of West Java. The study showed the children received about 700IU of vitamin A or 50% of the requirement from their diet. With fortification the children consumed an additional 500IU (at the beginning) to 400IU (toward the end of the study).

The results of the field trial exceeded the expectations of even the principal investigator. Because of their significance, the relevant section of the report is appended (Attachment X). Very briefly some of the most important finding include:

	Experimental			Control		
	Before	6 mos.	12 mos.	Before	6 mos.	12mos.
Prevalence of Bitot's spots(%)	1.24	0.32	0.15	0.77	0.90	0.80
Vitamin A Serum levels	19.4	22.4	26.3	22.5	20.2	20.5
Vit A levels in breastmilk	17.31	19.11	19.20	17.58	16.47	16.65
Hemoglobin levels in pre-schoolers	11.3	12.3	12.1	11.4	11.2	11.4
Infant mortality rate (%)	-	-	80.1	-	-	97.9
Under five mortality rate (%)	-	-	13.4	-	-	19.5

The most serious problem faced by the fortification component is opposition from the Consumers' Union which has vigorously attacked the use of MSG as the fortification vehicle. They echo the anti-MSG forces in the West that point to research identifying MSG as a neurotoxin. The Indonesian experts with support from the international scientific community refute this charge with convincing evidence. To begin with, MSG consumption is self-limiting - if too much is used, the food is inedible. MSG when consumed with food is effectively metabolized in the body. Consumption in Indonesia is currently low; Taiwanese consume almost eight times more per capita than Indonesians, South Koreans five times more and Japanese three times more. There is no reason to expect Indonesian consumption to increase. In the field trial, adults consumed an average of 0.41g a day while pre-school children consumed 0.29g with the highest level being 1.6g and 1.1g, respectively. Both of these figures are far below WHO safety limits (approximately 7.5g/adult/day and 2.25g/child/day). To educate the public on MSG, HKI, with Child Survival funds, published in early 1986 a book summarizing the research findings on MSG's impact on health. It is encouraging that within the last month press coverage of the issue has been less emotional and more balanced, providing both sides of the story.

The successful field trial of vitamin A fortification of MSG and very strong support from the Government of Indonesia has resulted in the planning of phase II, an expansion of the effort to three kabupatens of three provinces (West Java, South Sulawesi, South Sumatra), testing

* Dr. Muhilal, principal investigator, spent three months in early 1987 at Johns Hopkins University further analyzing the data and working with experts who corroborated his findings.

population of almost 4 million people, with approximately three-quarters of a million children between six months and five years. Plans call for the MSG in packets of 5 grams and less to be fortified (35% of total MSG sales but covering as much as 90% of poor rural households, the primary target group). Strategically the principal investigator has made a smart move by inviting the Consumers' Union to join in the monitoring of the effort. The "we have nothing to hide" approach can only help increase the understanding and calm the fear of the principal opposition before the national effort is launched.

The cost of the fortification effort is expected to be recovered completely, relieving the government of any financial responsibility or burden. When fully operational and expended nationally, "white" vitamin A will require (at current prices) approximately $5 million in foreign exchange a year. The increase in cost of the MSG is approximately 14%; however, since only about a third of the MSG will be fortified, it will increase the cost of MSG by 5% if a surcharge were added to all MSG sold. Because the fortified MSG is targeted specially for the low-income groups, more cross subsidy is being considered (i.e., placing more of the fortification cost on the larger packets purchased by higher income sectors).

The next phase is to be supported with funds from USAID. HKI is to be commended for its financially small but catalytically significant role in the fortification effort. In the long run, it could do more to save under-five lives than all other Child Survival activities currently being pursued in Indonesia.

4. Computerization of Nutrition Directorate - Of all the six components of HKI/I's Child Survival program, computerization is furthest removed from direct service delivery. However, this alone is not enough to justify judging the effort a waste of time and resources. In HKI/I's underlying objective of increasing government's capabilities to program more effectively and manage resources more efficiently, this activity makes very good sense.

The specific objectives in the computerization component are:

- improve the computer literacy of the Nutrition Directorate staff;
- improve the Directorate's efficiency in routine administration;
- provide project support to other Child Survival initiatives undertaken by HKI in Indonesia;
- provide a control location for the entry and storage of vitamin A-related survey data for the national xerophthalmia survey and province-specific studies. Some of these data will be secondarily analyzed for the surveillance aspect of the Child Survival project.

HKI has been responsible for providing three IBM-XTs and two printers. A small room has been established as the Nutrition Directorate's computer center. It now has six computers with a total of 120 MB of memory.

Equipment is useless unless the staff is trained to use it. This aspect of the computerization effort has been particularly impressive. Two Directorate staff members were trained on the job by a local consultant and then attended a six week course at the Asian Institute of Technology in Bangkok where they distinguished themselves and gained confidence that they could handle the responsibility. They have trained other Directorate staff so that at present 20 out of the staff of 80 can and do regularly utilize the computer facility (20 are qualified in word processing, 12 in spread sheet use, 6 in data base and 2 in data base programming). According to Directorate records, the use of the computers has steadily increased from April 1986 through the end of the year (April - 98 hours; May - 158; June - 159; July - 326; August - 228; September - 478; October - 495; November - 342; December - 513).

Within less than a year the computer facility has become an integral part of the Directorate's operations. In fact, they have become dependent upon it. Productivity has increased greatly. Several examples illustrate the computer's contribution. For one the annual budget (DNP/DIP) preparation supposedly used to occupy eight people for one month (32 person weeks of work); now one person does it in a week. Other staff members relate how easy and quick it is to respond to questions (in such things as MSG fortification) by accessing data stored in the computers.

Not only the Nutrition Directorate has benefited from the computer facility; BINKESMAS (Directorate General for Community Health), of which the Nutrition Directorate is a part, has requested staff to enter and analyze data on the posyandu program. The facility is now responsible for developing a reporting/MIS system for the national posyandu program. Approximately 40% of the computer facility's time is devoted to posyandu work at present.

It is hard to imagine how any other activity could have changed the nature of the Directorate more than the computer facility. The Director himself says that the computerization component was the most important of the six Child Survival activities. Another person describes the effect of computerization as moving the Nutrition Directorate from the slow to the "fast lane". This is remarkable for an investment by HKI of a little more than $40,000 of Child Survival funds (two-thirds of the amount budgeted). HKI was able to leverage this amount and raise funds from IBM (e.g., support of AIT training).

The PVC office has requested that no more funds be spent on this component as it is not considered a legitimate Child Survival intervention. While it is difficult to identify direct benefits to saving lives, it definitely has increased the effectiveness of the Directorate which is responsible for delivering a number of child saving interventions. It can be agreed, therefore, that the successful computerization of the Directorate will help save more lives in the future.

Having successfully completed the first phase of computerization, three recommendations are made to increase the usefulness and effectiveness of the computer operation:

- Networking - with the number of individual computers (plus three more to be added under World Bank funding), local area networking is both the logical and required next step.

- Management - several of the most experienced computer experts in the Directorate should be trained in the management of a computer facility (e.g., data management, file storage, use scheduling).

- Full-time Manager - at present the computer room is being run by someone who is assigned to another section of the Directorate. No one has been appointed to assume this role. The facility has developed faster than the Directorate's ability to fit it into its structure. At a minimum, the current manager should be given an official letter recognizing his role and allowing him to take some of the credit for the work being done. In the near future someone will have to be appointed as full-time manager to ensure the machines are used effectively and efficiently and are properly maintained.

5. Liquid Vitamin A - The possibility exists that the supply of vitamin A capsules could be discontinued at any time. Currently, UNICEF supplies Indonesia with its requirement. However, recently UNICEF announced it would cease supplying vitamin A in the Philippines. Indonesia must be prepared so that when and if the time to be self-sufficient arrives, the most cost-effective means of distributing vitamin A has been identified and tested.

While capsules are easy to use and have a reasonably long shelf-life, they are relatively costly. A high percentage of the cost is for the gelatine capsules rather than the vitamin A. HKI wants to field test liquid vitamin A dispensers recently developed by Hoffman La Roche to determine if is a viable, lower cost means of distributing vitamin A.

The objectives of the liquid vitamin A supplement study component are:

- measure the degree to which liquid vitamin A, and the method of delivery liquid vitamin A, is acceptable to the target population (mothers of child bearing age and children under five) and providers (implementors and health center staff);

- estimate cost of and capacity within Indonesia for the preparation, "packaging" (in both disposable and reusable containers), storage and distribution

of liquid vitamin A, as well as capability for the distribution of the product to the field;

- measure and cost out, under field conditions, the amount of spoilage, contamination, and general wastage that comes from various size containers, either reusable or not, in field settings;

- calculate costs (including raw materials, manpower, wastage, "packaging" inventory and distribution) and compare differences in cost per unit of service between capsule and liquid (using 300cc aluminum reusable bottles or 100- and 200-dose disposable plastic bottles) approaches to vitamin A distribution.

The study is being carried out in Central Java under the direction of the chief of Public Health at the University of Diponegoro. Eight kecamatans (2 control with vitamin A capsules, 2 with refillable vitamin A containers, 2 with small disposable containers, 2 with larger disposable containers) will be covered in Jepara Kabupaten. An estimated 40,000 children under six years of age will receive vitamin A by one means or another semi-annually.

The data on the first distribution (February/March 1987) have been analyzed, but the report on the results has not yet been completed. However, some observations are available. The acceptability of the liquid vitamin A is poor. The volume of the liquid dose is three times the capsule (to assure recipients received proper dosage since plunger spout is not accurate enough in small quantities). Recipients complain of the oily taste, some even spit out the vitamin A. Different flavorings were tried and orange is preferred, but Hoffman La Roche refused for fear that some child might develop a liking for the vitamin A liquid, acquire a bottle and overdose on the substance. Flavoring, however, seems to be necessary and will be tried the next time around.

The alumminium container has been found to be too large for a field worker to use. The workers, however, prefer the liquid method since it is so much faster, cutting the distribution time in half. Wastage is not a major problem. Spoilage is not a serious concern since oil is inert and no cultures form in the medium. However, the nozzle is often in contact with children's mouths and can certainly become contaminated. Preliminary feelings after the first round are that the liquid vitamin A is probably not that much cheaper than the capsule to make it worth the complications it adds to the distribution process.

Once again an HKI activity has had an institutional building effect. The Nutrition Directorate has already made the decision to adopt the cost-effectiveness methodology developed through technical assistance on the liquid vitamin A component. The cost-effectiveness of liquid lipiodol for the control of iodine deficiency will be determined much the same way it will be for liquid vitamin A.

Budgeting estimates for the liquid vitamin A component, show that HKI/I expects to spend about half of the amount the budgeted from the Child Survival grant ($35,000 versus about $70,000). They have succeeded in raising over three times as much from Hoffman La Roche than they will spend from USAID. HKI/I's ability to leverage the Child Survival funds and stretch their limited resources enables them to do more than originally planned by transferring the funds to another project such as Social Marketing which will require additional resources.

6. Risk Index - This component of HKI/I's Child Survival program is closely related to the computerization activity. The specific objectives of the component are:

- Collect pertinent data on known vitamin A deficiency correlates (i.e., breastfeeding, diarrhea) and place these data in Nutrition Directorate data library;

- Develop a sensitive and specific vitamin A deficiency risk index based on further secondary analyses of above existing data (through simulation or computer modeling) to enhance Directorate's vitamin A distribution program;

- Using the risk index, map areas of Indonesia using the index to estimate areas of high risk of vitamin A deficiency;

- Follow up the mapping with field visits to high-risk and non-high risk area and determine sensitivity and specificity of the index in identifying high risk areas.

Six data sets from around the country were acquired and down-loaded to the Nutrition Directorate's computers. This is barely a third of the 17 data sets identified. Most principal investigators were too possessive of their data and refused to release it. A small-scale data bank was established, but some significant data sets (e.g., SUSENAS from Central Bureau of Statistics), were unable to be produced due to exorbitant costs.

With the help of a consultant, multivariate statistical model building was carried out. Data on the prevalence of diarrhea was found to be a good predictor of xerophthalmia. In another exercise 14 variables were identified as having high predictive power and explain variation in the occurrence of vitamin A deficiency among under-five children.

The risk index was never completed due to inability to acquire the data required. However, the component gave an impetus and momentum to the development of the computer facility at the Nutrition Directorate. It not only gave them a good data base on an important nutritional deficiency, but gave the staff the opportunity to learn how to enter and analyze data sets. This is an important element in the development of a computer facility in the Directorate.

At PVC's request, no more funding will be expended on this component. The basic concept has been established and staff made familiar with it so that if the data are acquired, and there is a desire to increase the cost-effectiveness of vitamin A programming through more accurate targeting to areas of maximum need, the approach can be activated. Approximately two-thirds of the budgeted amount ($39,000 out of $58,000) was spent out of the Child Survival grant before activities were stopped.

ATTACHMENTS

TERMS OF REFERENCE
MID TERM EVALUATION
HKI INDONESIA CHILD SURVIVAL #1

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

Location: Jakarta, Indonesia
Aceh Province, Indonesia

Responsibilities of Consultant:

1. Review with Country Director and Department of Health counterparts the status overall of HKI Indonesia Child Survival Projects (all 6 projects) in terms of what was planned and what the status, from a central perspective, is at this point in time.

2. Assess project progress from a central Department of Health and HKI perspective as well as from a provincial (Aceh) and local perspective based on stated project objectives.

3. Document coverage of vitamin A and immunizations in target children as per project objectives.

4. Document the amount and adequacy of project inputs in terms of money, materials, and manpower by source.

5. Define current financial status of the project, how funds are accounted for and spent and possibilities of future self financing and financial sustainability.

6. Outline project components which may be sustainable within the resources of the Department of Health.

7. Outline and assess project information system adequate to collect appropriate management information and to track project activities. Outline how project data are being used for planning and management purposes.

8. Document and assess project technical support from USAID, HKI/New York and plans for future technical input into project activities and evaluation efforts.

9. Recommend project modifications for remaining year of the project.

ATTACHMENT II

Officials Met/Interviewed

Helen Keller International/Indonesia

Daniel Kraushaar	Country Director
Agoeng Yoewono	Deputy Country Director
Raharjo Suwandi	Anthropologist

USAID/Jakarta

Katie McDonald	Health and Population Office
Dr. Subekti	Consultant, CHIPPS
Lalit Kraushaar	PVO Office, Child Survival Consultant

Nutrition Directorate, Ministry of Health

Ig. Tarwotjo	Director
Asmira	Head, Vitamin A
Sukarno Noer	Head, Section for Special Vitamin A Distribution
Tito Soegiharto	Computer Operations

Communicable Disease Control, Ministry of Health

Dr. Gunawon	Head, Directorate of Epidemiology and Immunization

Center for Nutrition Research and Development (Bogor)

Muhilal	Principal Investigator, Vitamin A Fortified MSG, Field Trial

University of Diponegoro

Satoto	Chief, Public Health Program

Aceh Province

Steve Salter	Consultant, CHIPPS
H. Hanif Ali	Dokabu, Aceh Barat
John Quinley	Project Manager
Fauzi	Head, P2M
Izwar B. Syam	Head, Immunization
Afrizal	Project Staff, Supervisor
T. Amir Hamzah	Puskesmas Doctor, Kuala
Muchtarudin	Statistician, Kuala
Zainal Abidin	Vitamain A, Kuala
Ibu Tien	Immunizer, Kuala
Mothahir	Immunizer, Kuala

ATTACHMENT II, continued

Manoff International	
Ashok Sethi	Consultant
Fortune Indonesia	
Triawan Munaf	Account Manager
Dynamic Technologies	
Berlian Siagian	Consultant, Vitamin A Index and Computer Operations

ATTACHMENT III

List of Project Documents/Publications

I. General Child Survival Program Documents

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IV. Fortification of MSG with Vitamin A

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V. Liquid Vitamin A Cost Study

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ATTACHMENT IV

Child Survival Budget/Expenditures by Component

Project	Original CS Budget	7/1985-6/87	Projected 7/1987-6/88	Estimated Total
Aceh Project	$97,000	26,000	71,000	97,000
Social Marketing	232,000	51,000	109,000	160,000
Fortification	45,000	10,000	--	10,000
Computerization	62,000	41,000	3,000	44,000
Liquid Vit. A	70,000	16,000	19,000	35,000
Risk Index	58,000	39,000	--	39,000
HKI/NY Costs	--	22,000	24,000	46,000
HKI/I Costs	--	39,000	68,000	107,000
			Estimated Total	538,000*

* The Child Survival I grant to HKI/I was for total of $606,000. The remaining $68,000 will be spent in the Social Marketing component in West Sumatra since this aspect has been underfunded because CHIPPS collaboration never materialized.

ATTACHMENT V

Immunization Coverage in Kuala Kecamatan

(May 1985 - June 1986) (N - 3935)*

	DPT I		DPT II		Measles	
	#	%	#	%	#	%
May 1985**	669	17.0	243	6.2	280	7.1
Jun.	1065	27.1	321	8.2	296	7.5
July	1276	32.4	444	11.3	390	9.9
Aug.	1464	37.2	521	13.2	493	12.5
Sept.	1565	39.8	530	13.5	526	13.4
Oct.	1818	46.2	562	14.3	816	20.8
Nov.	1924	48.9	599	15.2	985	25.0
Dec.	2021	51.4	627	15.9	1072	27.2
Jan. 1986	2108	53.6	648	16.5	1152	29.3
Feb.	2109	53.6	652	16.6	1153	29.3
Mar.	2195	55.8	751	19.1	1276	32.4
Apr.	2313	58.8	841	21.4	1472	37.4
May	2485	63.2	929	23.6	1674	42.5
Jun.	2549	64.8	998	25.4	1773	45.1

* For calculation purposes baseline figure remains constant
** Includes all previous immunizations that could be verified

Immunization Chart From Growth Monitoring Card

CATATAN PEMBERIAN IMUNISASI

Bayi umur 3 – 14 bulan	Tgl. diberikan Imunisasi		
	I	II	III
B.C.G.			
D.P.T.			
Polio			
Campak			

- Mintakan Imunisasi untuk anak umur 3 sampai 14 bulan.
- Setiap anak membutuhkan Imunisasi untuk menjaga kesehatannya.

Mintalah Imunisasi pada waktunya.

KAPSUL VITAMIN A-DOSIS TINGGI:

(Diberikan **hanya** kepada anak **balita kecuali bayi sampai umur 1 tahun**, satu capsul setiap 6 bulan).

Tanggal diberikan ke 1:
ke 2:
ke 3:
ke 4:
ke 5:
ke 6:

ATTACHMENT VII

Minutes of HKI/NY Meeting on Research Activities

EXECUTIVE SUMMARY

JUNE 3, 1987
REVIEW

Aceh Field Trial: Integration of Vitamin A Distribution and the Expanded Program for Immunization

Rovita (Rehidrasi Oral Dan Vitamin A) Double Intervention Project: Oral Rehydration Therapy and Vitamin A

Background

There is a historical cognizance of the severity of vitamin A deficiency in Indonesia. The first national xerophthalmia prevalence survey, conducted by the government of Indonesia and Helen Keller International, was completed in 1976 and reflected an extensive problem of vitamin A deficiency in preschool aged children. Further research in the country found children with xerophthalmia to be at substantially greater risk of death than children devoid of xerophthalmia, and that children receiving biannual prophylactic vitamin A capsules experienced fewer episodes of diarrhea and respiratory illness and lower mortality rates than children not receiving vitamin A prophylaxis. Lower rates of mortality were also recently observed in Indonesian children whose families consumed MSG fortified with vitamin A than children of families who consumed unfortified MSG. In country institutions and those well acquainted with the status and potential of vitamin A in Indonesia believe the future of nutritional blindness prevention lies in national fortification plans.

Currently, it appears that exclusive interest in vitamin A deficiency has waned, while interest in vitamin A supplementation as a child survival strategy is increasingly displayed. The Indonesian government, AID, WHO and other concerned institutions have suggested the integration of periodic vitamin A supplementation with other child survival strategies, such as oral rehydration therapy, expanded program for immunization, growth monitoring, etc. It was noted that WHO is sufficiently interested in this integration of services that it has recently released a request for proposals to conduct a randomized, double blind study of the potential impact of vitamin A capsules on the incidence and severity of diarrhea and has promoted the integration of vitamin A capsules and immunizations in recent scientific articles.

Review of Aceh Field Trial: Integration of Vitamin A Distribution and the Expanded Program for Immunization

This project originally had four objectives:

1. To improve the coverage and distribution of vitamin A capsules and immunizations;

2. To improve the method of monitoring the distribution of vitamin A and immunizations;

3. To improve the current method of monitoring births and deaths in a manner which is effective and which fits with local conditions;

4. To measure, in a simple fashion, the association between two interventions (vitamin A and vitamin A plus immunizations) on infant and child mortality.

All participants agreed that objectives #1 and #2 are consistent with HKI's purvue and that, with slight restructuring, programmatic information regarding the barriers and promoters to coverage could be identified. This information has obvious utility in the improvement of vitamin A capsule distribution and immunization.

The utility of objective #3 was questioned by various participants (AS,LDP,PB,NLS). It was proposed (DK, JQ) that the development and continuation of a system to record vital events is a necessary component of appropriately targetting children for health services. The necessity of targetting children for services was disputed as universal provision of services to children (in conjunction with a system that allows for illiteracy, such as stamped home health cards) is a general objective. The complexity of data collection, the purpose of this type of data collection, and the quality of the vital events data rendered the accomplishment of objective #3 to be low priority (biased and not sustainable beyond the project).

Objective #4 had been modified from its original intent (to compare villages receiving vitamin A capsules alone, and villages receiving vitamin A capsules and immunizations, with geographically contiguous villages not receiving these services), to comparing exposure to vitamin A capsules and immunizations in children who died (cases) with surviving children of the same age in years. Although the second design (retrospective) is an improvement over the initial design due to the incomparability of the original intervention groups, various participants (AS, NLS, Cornell)

were convinced that data resulting from this component would be inadequate to infer causality or to constitute definitive conclusions; these convictions are based on the inadequacy of the proposed retrospective design to circumvent biases (diagnostic/reporting, recall, various selection biases that are associated with receipt of intervention and mortality, etc.) which would entirely discredit the results observed. Some participants were not convinced that the quality of data and study design were necessarily inadequate to test the hypothesis (PB), and the investigators (DK and JQ) expressed their belief that this project component would render valid results and beneficial research experience.

There was much concern that a simple, crude approach that might well be inadequate was inappropriate to answer a question of such global consequence in the reduction of xerophthalmia, much less child survival. In consideration of the concerns regarding the study design and data quality (and thus the essential validity of the associations to be observed from the data), the current status of data collection which does not include the identification of cases and controls or the assessment of the intervention status of those included in the study, the review committee (AS, SP, EAG, JP, NLS) agree that this component of the Aceh Field Trial should be dissolved and that no further data for this component should be collected.

Some concern was voiced over committments previously agreed upon (DK) as there are various collaborators for this project component, including a variety of government departments, AID, and CHIPPS. There was also concern regarding the continuation of data collection to accomplish the modified forth objective, given the different concerns and comprehension of epidemiologic methodology of the other institutions involved in this effort. Of particular concern is the interpretation and publication of negative results if encountered (AS, LDP, PB, JP, EAG, SP, NLS).

In conclusion, the review committee (excluding the investigators, DK and JQ) came to a consensus that given the lack of high immunization rates, the unexected variations in baseline mortality, the biases inherent in either study design given the extant conditions in these project villages, that a definitive answer regarding the association between vitamin A supplementation and mortality cannot be adequately answered by this project. The group does recommend, however, that efforts should be made to describe the programmatic barriers and promoters and regarding risk factors associated with exposure and outcome status.

Rovita (Rehidrasi Oral Dan Vitamin A) Double Intervention Project: Oral Rehydration Therapy and Vitamin A

This project also has four goals:

1. To improve the distribution of megadose vitamin A to achieve a coverage of 90% of children 1 to 5 years old.

2. To improve diarrheal disease outcome in children less than 5 years through improved case management and improved supply and distribution of ORS.

3. To apply social marketing techniques including systematic coordinated communications to achieve (1) and (2).

4. To measure the change in incidence and severity of diarrhea in a small cohort of children before and after vitamin A supplementation.

There was group discussion that this project was designed to and would provide fairly comprehensive descriptive data of great benefit to programmatic improvement. All viewed this project to provide an opportunity to determine factors associated with the receipt of interventions, including barriers and promoters to receipt.

Most of the conversation revolved on objective #4 compared with all other objectives jointly. The utility of the data resulting from the quasi-experimental design proposed for objective #4 was deemed to be little given the lack of a contemporaneous control group, the choice of villages for this project component given the high rates of coverage at baseline, the probability of reduced incidence of diarrhea simply because initial incidence is so high (regression to the mean), etc. Concern was expressed about attempting analytic research (impact evaluation) as a subcomponent of a public health delivery program as either delivery becomes limited in the interest of the investigation or the investigation becomes confounded in the interest of service delivery. Participants generally agreed (with the exception of the ~~investigator~~) that HKI should not divert its efforts away from the larger programmatic focus of this project by the continuation of activities to accomplish objective #4. As WHO has currently released an RFP for the investigation of this issue, the submission of a proposal to conduct a research project (independent of a service delivery program) to WHO was suggested, if HKI wishes to pursue the investigation of the association between vitamin A and the incidence and severity of diarrhea.

JUNE 3, 1987

ACEH FIELD TRIAL: INTEGRATION OF VITAMIN A DISTRIBUTION AND THE EXPANDED PROGRAM FOR IMMUNIZATION

ROVITA (REHIDRASI ORAL DAN VITAMIN A) DOUBLE INTERVENTION PROJECT: ORAL REHYDRATION THERAPY AND VITAMIN A

PARTICIPANTS:

Peter Berman, PhD.
Assistant Professor, Johns Hopkins University

Edward A. Glaeser
Associate Executive Director, HKI

Jean-Pierre Habicht, M.D., Lenore Launer, PhD
Associate Professor, Research Assistant, Cornell University
(not present, sent comments)

Daniel Kraushaar, ScD., M.P.H.
Country Director, HKI

John Palmer, III
Executive Director, HKI

Susan Pettiss, PhD.
Vitamin A Consultant, HKI

Louis D. Pizzarello, M.D.
Medical Advisor, HKI

Nancy L. Sloan, Dr.P.H.
Epidemiologist, HKI

Alfred Sommer, M.D., M.H.S.
Director, ICEPO, Johns Hopkins University

John Quinley, M.D.,M.P.H.
Research Scientist, CHIPPS

USAID/J's Response to HKI/NY's Cessation of Aceh Study

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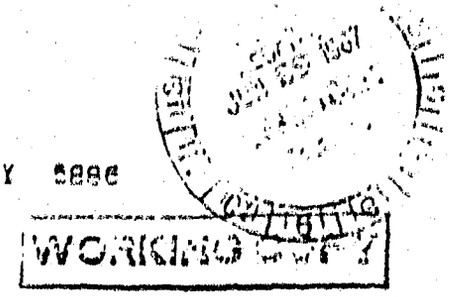

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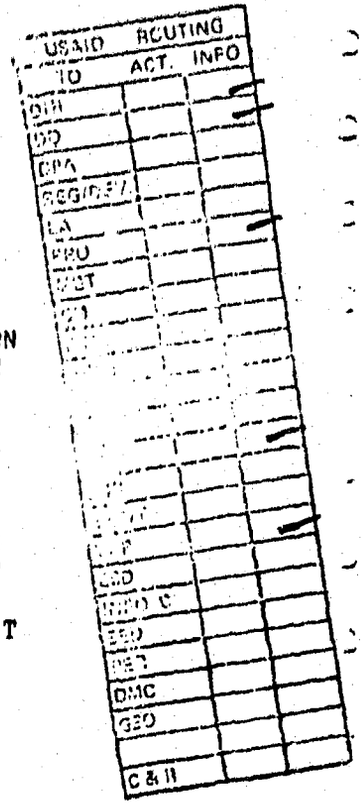
AIDAC FOR FVA/PVC. INFO ANE/TR/HPN. ST/N. ST/H

E.O. 12356: N/A

SUBJECT: INDONESIA: COLLABORATIVE HELEN KELLER WORLD STUDIES IN DIY, ACEH AND CENTRAL JAVA

REF: LETTER FROM HKI TO USAID/INDONESIA DATED 6/17/87



1. MISSION REGRETS TO REPORT THAT REFERENCE LETTER INFORMED US HELEN KELLER INTERNATIONAL (HKI) WILL NO LONGER PARTICIPATE IN TWO JOINT GOI/USAID/HKI VITAMIN A AND CHILD STUDIES WHICH ARE PART OF AID-FUNDED CHILD SURVIVAL GRANTS TO HKI IN THE PROVINCES OF ACEH AND CENTRAL JAVA. MISSION STRONGLY OBJECTS TO HKI'S UNILATERAL DECISION ON THIS MATTER.

2. THE TIMING THIS HKI DECISION IS PERPLEXING. HKI PARTICIPATION IN THE ACEH STUDY WAS PREVIOUSLY AGREED UPON BY ALL PARTIES AND PRELIMINARY WORK HAS BEEN UNDERWAY FOR TEN MONTHS. SIMILARLY, THE STUDY IN CENTRAL JAVA WAS DESIGNED WITH ASSISTANCE FROM THE INSTITUTE FOR INTERNATIONAL PROGRAMS (IIP) IN LATE 1986 AND PROJECT IMPLEMENTATION IS UNDERWAY. THE CURRENT HKI WITHDRAWAL FROM THE STUDIES HAS RESULTED IN INCONVENIENCE AND EMBARRASSMENT TO THE MISSION AND THE GOI AND NECESSITATES REVISIONS OF OUR COMMITMENTS WITH SEVERAL GOI COUNTERPART AGENCIES. FUTURE COLLABORATION WITH HKI WILL THUS NECESSARILY BE SUBJECT TO ARRANGEMENTS AND PROCEDURES THAT WILL PREVENT SIMILAR UNILATERAL ACTIONS FROM RECURRING.

3. LIKEWISE, THE RATIONALE FOR THE HKI DECISION IS UNCONVINCING. MOH AND USAID ALWAYS WELCOME SUGGESTIONS FOR MAKING METHODOLOGICAL IMPROVEMENTS IN RESEARCH ACTIVITIES ALTHOUGH COMPLETE AGREEMENT AMONG EPIDEMICLOGISTS ON METHODOLOGICAL ISSUES IN STUDIES OF THIS NATURE IS PROBABLY RARE. HOWEVER, COMPLETE WITHDRAWAL FROM A RESEARCH ACTIVITY IN PROGRESS BASED ON QUOTE POSSIBLE MISINTERPRETATION AND PUBLICATION OF NEGATIVE RESULTS, IF ENCOUNTERED UNQUOTE, DOES NOT APPEAR TO BE JUSTIFIED AND IS INCONSISTENT WITH GOOD SCIENTIFIC METHODOLOGICAL APPROACHES.

4. AFTER CONSULTATIONS WITH MOH, USAID HAS DECIDED TO FULLY FUND ACEH PROJECT AND PROCEED WITH SCHEDULED CASE CONTROL STUDY. OTHER DONOR ASSISTANCE WILL HAVE TO BE IDENTIFIED FOR CENTRAL JAVA WORK. HOWEVER, GIVEN THE

PROVISION IN THE HKI GRANT AGREEMENT WITH FVA/PVC ON TERMINATION OF AGREED UPON PROJECT ACTIVITIES. MISSION WISHES TO KNOW HOW FVA/PVC INTENDS TO REACT TO HKI ANNOUNCEMENT. PLEASE ADVISE.

WOLFOWITZ
ET
#0055

NNNN

FORTUNE
P.T. FORTUNE INDONESIA Jl. Let.Jen. Suprapto, Cempaka Putih, Jakarta Pusat
PO Box 2314 Tel. (021) 410109 Cable: Fortindac.

Social Marketing of Dark Green Leafy Vegetables
In West Sumatra - Draft Radio Spots

CLIENT M.O.H./HELEN KELLER INTERNATIONAL
MEDIUM D.G.L.V. RADIO SPOT, GENERAL THEME VERSION
SIZE 2 MINUTES (120 SECONDS)
JOB NO.
DATE 02.07.87

COPY

BACK TRANSLATION

Elly Kasim : Mothers, brothers and sisters.
Elly Kasim has a very good pantun
listen carefully.
Vocalizes a pantun : Little kedai at Teluk
Bayur. Near the port,
so crowded since little
likes vegetables.When
grow up, so clever.

Little boy : (chip munk effect)
Uni Elly Kasim, I'll buy the pantun
Listen to my answer ...
Danau Maninjau has many fishes.

Go fishing by boat.
D.G.L.V. has many vitamins
Makes healthy to everybody who knows.

Elly Kasim : Ha,ha,ha, alright. Elly lost.
And it's true, bu, D.G.L.V is full with
vitamins needed by your baby to grow healthy.
strong and resistant to illness.
Therefore you have to give D.G.L.V to your
baby ever since he/she starts eating prorridge,
everyday and everymeal . Also pregnant and
lactating mothers, have to eat D.G.L.V.
i.e spinach, water spinach, cassava leaves,
daun pakis and papaya leaves.
If you can make it everyday and everymeal,
your baby will get all the vitamins to grow
healthy, strong and resistant to illness.

(Sings the jingle).

FORTUNE
P.T. FORTUNE INDONESIA Jl. Let Jen. Suprapto, Cempaka Putih, Jakarta Pusat
P.O Box 2314 Tel. (021) 410109 Cable: Forindae

CLIENT HELEN KELLER INTERNATIONAL
MEDIUM DGLV RADIO SPOT - PREGNANT MOTHERS A
SIZE
JOB NO.
DATE 02.07.1987

BACK TRANSLATION

ELLY KASIM : It's me, Elly Kasim, bring message for pregnant mothers. During pregnancy, Mothers need more vitamins. Therefor, health experts recommend mothers to continuously eat d.g.l.v. everyday & everymeal.

MOTHER : Why d.g.l.v., bu Elly ?

ELLY KASIM : Because d.g.l.v. is full with vitamins needed by pregnant mothers and her baby.

MOTHER : What are the vegetables, bu Elly ?

ELLY KASIM : For instance spinach, water spinach, cassava leaves, daun pakis and papaya leaves.

MOTHER : But to prepare it everyday and everymeal will be difficult bu Elly.

ELLY KASIM : It's true, bu. But it is also very important. That way you can ensure that all the vitamins needed by mothers and the baby in fulfilled.

MOTHER : So, in that case d.g.l.v. is very important. Alright bu Elly, from now on I'll eat d.g.l.v. everyday and everymeal.

ELLY KASIM : Sings the jingle.

FORTUNE
P.T. FORTUNE INDONESIA Jl. Let Jen. Suprapto, Cempaka Putih, Jakarta Pusat
PO Box 2314 Tel. (021) 410109 Cable: Forindac.

CLIENT M.O.H/HELEN KELLER INTERNATIONAL
MEDIUM D.G.L.V RADIO SPOT MOTHERS B. Pregnant
SIZE UP TO 90"
JOB NO --
DATE 02.05.1987

BACK TRANSLATION

ELLY KASIM : Pregnant mothers. I'm Elly Kasim. Health experts say that mothers need more vitamin during pregnancy.

MOTHER : But, Ibu Elly. How do we get enough vitamin ?

ELLY KASIM : Mothers have to eat D.G.L.V. continuosly, i.e. spinach, water spinach, cassava leaves, pakis leaves and papaya leaves. D.G.L.V is full with vitamin you need. However, to fulfill your needs, you have to eat 1 bowl D.G.L.V. everymeal, everyday.

MOTHER : One bowl everymeal ? Won't it make my stomach very full and cause difficulty during delivery?

ELLY KASIM : Oh not at all, bu. Let's hear what the doctor say.

DOCTOR : Pregnant mothers need more vitamin to make the baby healthy and strong and make delivery easier. To ensure that the need is fulfilled, pregnant mothers are recommended to eat D.G.L.V minimum 1 bowl everymeal and everyday.

MOTHER : If so I will not hesitate again. I will eat 1 bowl of D.G.L.V everymeal and everyday.

ELLY KASIM : Sings the jingle : green vegetables everyday makes you healthy.

FORTUNE
P.T. FORTUNE INDONESIA Jl. Let Jen. Suprapto, Cempaka Putih, Jakarta Pusat
P.O Box 2314 Tel. (021) 410109 Cab e: Forindac.

CLIENT HELEN KELLER INTERNATIONAL
MEDIUM D.G.L.V. = LACTATING MOTHERS VERSION
SIZE
JOB NO
DATE 02.07.1987

BACK TRANSLATION

ELLY KASIM : Lactating mothers, I Elly Kasim bring messages from health experts. Maybe you have already known that d.g.l.v. is full with vitamins that is needed by your baby. So, you have to eat d.g.l.v. continuously everyday and everymeal.
It will make your breast milk healthy, full of benefits needed by your baby to grow healthy, strong and resistant to illness.

MOTHER : What are the vegatables you mean, bu Elly ?

ELLY KASIM : For intance: spinach, water spinach, cassava leaves, pakis leaves or papaya leaves.

MOTHER : But to prepare it everyday and everymeal will take time, bu Elly !

ELLY KASIM : Yes, it is bu, But it is nothing compare to the benefit you will get.
Your breast milk will become healthier, full of benefits needed by your baby to grow healthy, strong and resistance to illness.

IBU : Now I really believe that d.g.l.v. is important.
Therefore I will now start eating d.g.l.v. continuously everyday and everymeal.

ELLY KASIM : (Sings the jingle)

FORTUNE
P.T. FORTUNE INDONESIA Jl. Let.Jen. Suprapto, Cempaka Putih Jakarta Pusat
PO Box 2314 Tel. (021) 410109 Cable: Forindac

CLIENT M.O.H./HELEN KELLER INTERNATIONAL
MEDIUM DGLV RADIO SPOT - 5 MONTHS
SIZE UP TO 90"
JOB NO --
DATE 02.05.1987

BACK TRANSLATION

Elly Kasim : Mothers, do you have 5 Months old baby ? I, Elly Kasim bring message from health experts.
That You have to give your baby D.G.L.V. everyday and everymeal. Because D.G.L.V. is full of Vitamin needed for growing strong and healthy.

Mother : What are the D.G.L.V., by Elly ?

Elly Kasim : For instance spinach or water spinach

Mother : How do we give it, bu ?

Elly Kasim : Take Boiled spinach or water spinach, poached it with spoon and mix it with your baby's porridge approximately 2 teaspoon full every meal.

Mother : But my baby is only 5 months old.
Is her/his stomach already strong ?

Elly Kasim : Now, for this good question, Pak Doctor can explain.

Doctor : Boiled and poached D.G.L.V. is best for 5 months old baby and older D.G.L.V. is full with vitamins needed by baby to grow healthy, strong and resistant to illness.

Mother : If so, I'll add boiled and poached D.G.L.V. into my baby's porridge. Approximately 2 teaspoon , isn't it bu Elly ?

Elly Kasim : Correct, bu! Approximately 2 teaspoon. everyday and every meal.
(sings the jingle).

FORTUNE

P.T. FORTUNE INDONESIA II Let Jen Suprapto Cempaka Putih Jakarta Pusat
PO Box 2314 Tel (021) 410109 Cable Forimdac

CLIENT HELEN KELLER INTERNATIONAL

MEDIUM D.G.L.V. RADIO SPOT - 8 MONTHS

SIZE

JOB NO.

DATE 02.07.1987

BACK TRANSLATION

ELLY KASIM : Mothers, does your baby eat porridge ?
I Elly Kasim bring important message for your baby's health. You surely know that d.g.l.v. is full of of vitamins needed by your baby to grow healthy and strong. Have you given d.g.l.v. everyday, everymeal to your baby ?

MOTHER : I have tried bu Elly, but my baby resists it.

ELLY KASIM : (laughing) Surely, bu. Every strange food would be rejected by baby. Therefore you have to keep trying until he/she is used to it.
How did you give it last time, bu ?

MOTHER : I took boiled spinach, poached it with spoon, then I put it to my baby's porridge approximately 2 teaspoon.

ELLY KASIM : Very good, bu. It is correct, so is the vegatable. It could be spinach, water spinach as long as it is dark green.

MOTHER : It has to be everyday and every meal, bu ?

ELLY KASIM : Yes, because it is very important. Only with that way you can ensure that your baby receives all the vitamins needed to grow healthy, strong and resistance to illness.

MOTHER : If so, I'll give d.g.l.v. to my baby, everyday and everymeal.

ELLY KASIM : (sings the jingle)

FORTUNE

P.T. FORTUNE INDONESIA Jl. Let Jen. Suprapto, Cempaka Putih, Jakarta Pusat
P.O Box 2314 Tel. (021) 410109 Cable Forindac

CLIENT HELEN KELLER INTERNATIONAL

MEDIUM D.G.L.V. RADIO SPOT 12-24 MONTHS

SIZE 90 SECONDS

JOB NO

DATE 02.07.1987

BACK TRANSLATION

ELLY KASIM : Mothers, I am Elly Kasim, do you have one to two years old children ?
You surely know that at that age your child needs vitamins to grow.

IBU : But Bu Elly, what do I do to ensure that my child gets enough vitamins ?

ELLY KASIM : Give d.g.l.v. everyday and every meal.
Health experts say that d.g.l.v. such as spinach, water spinach, cassava leaves and daun pakis, are full with vitamins needed by your child to grow healthy, strong and resistant to illness.

MOTHER : Oh, it's very troublesome. My child doesn't like d.g.l.v.

ELLY KASIM : Yes, but it is very important bu.

MOTHER : What are the vegetables, bu Elly ?

ELLY KASIM : It could be spinach, water spinach, cassava leaves, or daun pakis. And you can cook it as gulai putih or gulai manis/curry, without chilly.

MOTHER : All right, bu Elly. But, how much should I give him/her every meal ?

ELLY KASIM : Minimum 4 tablespoon.

MOTHER : Alright Bu Elly, Now I know it's very important.

ELLY KASIM : (Single the jingle)

P T FORTUNE INDONESIA Jl. Let Jen Suprapto Cempaka Putih Jakarta Pusat
PO Box 2314 Tel. (021) 410109 Cab. Forindac

CLIENT HELEN KELLER INTERNATIONAL
MEDIUM D.G.L.V. RADIO SPOT 25-60 MONTHS
SIZE
JOB NO
DATE 02.07.1987

BACK TRANSLATION

ELLY KASIM : Mother, I'm Elly Kasim
Do you have 2-5 year old child ?
Health experts say that children of that age need more vitamin to grow. And you can fulfill the need by giving them d.g.l.v. everyday and everymeal.

MOTHER : But it's difficult to control my child's eating habit, bu.
Because my child prefers playing outside the house, buys snacks and the eating habit becomes irregular.

ELLY KASIM : (laughing) Oh, if so your task becomes double.
However, you must try to make your child eats regularly and give him/her d.g.l.v. every meal.

ELLY KASIM : They can be spinach, water spinach, cassava leaves or daun pakis.

MOTHER : How much for every meal, bu Elly ?

ELLY KASIM : Minimum 6 table spoon. And I must repeat that you must be sure that the vegetable is eaten.
That way, you can ensure that your child gets all the vitamins needed to grow healthy, strong and resistant to illness.

MOTHER : All right, bu Elly. If so I'll try to make my child eats 6 table spoons d.g.l.v. everymeal and everyday

ELLY KASIM : (Sings the jingle)

A Prom... for C...
Vitamin A Deficiency and Xerophthalmia with MSG Fortified with Vitamin A

Department of Health
Directorate General of Community Health
Republic of Indonesia

Helen Keller International
Indonesia

RESULTS

1. Demography

The Cijeruk sub-district, 6,520 hectares in size, had a total population of 98,484, consisting of 49,652 women and 48,832 spread over 19,696 homes. The population density for the Cijeruk sub-district was 1,510 people/km2. The Caringin sub-district, in contrast, was 6,730 hectares in size and had a population of 65,902, consisting of 33,300 women and 32,602 men, spread over 13,933 homes. Its population density was 1,150 people/km2.

More than 99% of the population in both sub-districts Moslem. The remaining 1% were Protestant, Catholic, Hindu Buddhist.

In the Cijeruk sub-district, there were 86 primary schools, 13 junior high schools, 1 senior high school, 57 Islamic schools and 7 Islamic training centres. In the Caringin sub-district, there were 32 primary schools, 3 junior high schools, 2 senior high schools, 32 Islamic schools, and 8 Islamic training centers.

The health service facilities in the Cijeruk sub-district were : 2 community health centers, 2 assistant community health centers, maternal and child health center, and 5 clinics with a health staff consisting of 4 doctors, a dentist, 3 supervisors/nurses, 6 mid-wives and 40 traditional mid-wives (Dukun). In the Caringin sub-district there was 1 community health center, an assistant community health center, 3 polyclinics and one doctor's surgery clinic. Health was provided by 2 doctors, a dentist, 5 mid-wives and 14 traditional mid-wives, 25 of whom had been trained.

The size of the experimental area was 2,434.5 hectares with a total population of 29,750 and a population density of 1,222 people/km2. The size of the control area was 2,295.2 hectares with a total population of 33,188 people and a population density of 1446 people/km2.

Of the villagers in the control group, 47.6% had completed the final grade of primary school, 43.8 % did not complete primary school, 5.5 % completed junior high school, 2.8 % completed senior high school, and 0.3 % completed tertiary education. Of the villagers in the control group, 49.6 % had completed primary school, 43.1 % had not completed primary school, 4.9 % had completed junior high school, 2.3 % completed senior high, and 0.1 % completed tertiary education.

The occupations of the villagers in the experimental group were: 5.66% owner-farmers, 41.51 % farm laborers, 18.87 % in their own business, 9.43 % public servants, 11.32 % laborers in industry and 13.21 % others. These figures for the control group are 8.26%, 37.61%, 20.18%, 7.34%, 4.59% and 22.02%, respectively. Villagers in the experimental group who had visited the community health center over the past year numbered 70.75 %, compared to 78.90% in the control group.

The types of housing structures in the experimental area were as follows: cement 56.6%, wood 1.9 %, bamboo 20.7 %, and other types 20.75 %. In the control area there were 67 % cement houses, 13.76 % bamboo and 19.24 % other kinds.

The water source for the experimental group was mainly (47.2%) from a permanent well (surrounded by a brick wall), followed by the

spring 29.3 %, non-permanent well 12.3 %, river 8.5% and paddy 2.7%. In the control area, 43.1% obtained water from a walled 38.4 % from the spring, 11.01 % from a non-permanent well, from the river, and 0.2 % from the paddy field.

The distances from a villager's house to the water source in the experimental area were 61.5 % around the houses, 20.8 % 2 minutes away, 10.4 % 2-5 minutes away and 7.3 % more than 5 minutes away. In the control area the figures were: 61.3 % , 20.2 %, 9.2 % and 9.3

In the experimental group, 11.3 % had western-style toi 18.9% squat-type toilets, 1.9 % used public toilets, 42.5 % relieved themselves in the garden, and 25.4 % used other ways. In the control group 5.5 % had western-style toilets, 8.3 % squat type toilets, 1.8 % public toilets, 56.9 % used the garden and 27.5 % used other way

Table 1. Size, Population, and Socioeconomic Conditions of the Experimental and Control Groups

Description	Experimental Group	Control Group
1. Land size	2,434.5 hectares	2,295.2 hectares
2. Total population	29,750 people	33,188 people
3. Population density/km2	1,222 people	1,446 people
4. Occupations (%)		
- Owner farmer	5.66	8.26
- Farm laborers	41.61	37.61
- Own business	18.87	20.18
- Public servant	9.43	7.34
- Laborer in industry	11.32	4.59
- Other	13.21	22.02
5. Educational level (%)		
- Not completed prim.school	43.8	43.1
- Completed prim.school/equiv.	47.6	49.6
- Completed junior high	5.5	4.9
- Completed senior high	2.8	2.3
- Completed Tertiary	0.3	0.1
6. Visits to the community health center over the last year (%)	70.75	78.90
7. House structure (%)		
- Brick house (cement)	56.6	67.0
- Wood	1.9	0
- Bamboo	20.75	13.76
- Other	20.75	19.24
8. Water source (%)		
- A walled well	47.2	43.1
- A non- perm.well	12.3	11.01
- River	8.5	7.3
- Spring	29.3	38.4
- Paddy	2.7	0.2
9. Distance to the water source (%)		
- Around the house	61.5	61.3
- 2 minutes away	20.8	20.2
- 2-5 minutes away	10.4	9.2
- More than 5 minutes away	7.3	9.3
0.Types of toilet (%)		
- Western -style	11.3	5.5
- Squat-type	18.9	8.3
- Public toilet	1.9	1.8
- Garden/river	42.5	56.9
- Other	25.4	27.5

2. The Marketing, Monitoring and Analysis of MSG-A

MSG-A marketing commenced in January 1985, one month after the basic data were collected. Because the MSG-A produced in the SASA factory in Surabaya was sent directly to the MSG agent for the area, supervision of the MSG-A distribution in the target area was facilitated. Thus, there was little possibility of the control being penetrated by the marketing of MSG-A, even though this did occur.

In this study, initially, there were 5 villages in the experimental area in the Cijeruk sub-district, consisting of 48 "kampung." In the control area there were five villages consisti 44 "kampung."

In the implementation of this study there was a penetrati MSG-A marketing in three "kampung" situated close to a contro village. The reverse also occurred where six "kampung" in experimental area were not affected by the MSG-A marketing because they were closer to the control group. Despite this, the number o pre-school children in the experimental group (42 kampung) and the control group (41 kampung) still fulfilled the statistical requirements. In the each area, around 4,000 pre-school children examined. The MSG-A marketed was packaged in the weights shown in Table 2.

The results of monitoring the MSG-A revealed that there about 2,650 IU of vitamin A per gram of MSG-A at the first sampling. After around 2 months, there were about 2,500 IU/g or 93 % of the first level. After 11 months of marketing, the content was in in

only 1,550 IU/g or around 58 % of what it was initially. More detailed data are provided in Table 3.

Table 2. Size and Price of MSG-A Marketed in the Experimental Area

Code*	Size/Weight (g)**	Price (Rp)
1 s	0.6468	5.00
2kt	1.2748	10.00
5kt	2.9057	15.00
15kt	6.4729	25.00
25kt	13.6426	50.00

* From the SASA factory
** The result of careful weighing by the Bogor Center for the Research and Development of Nutrition.

Table 3. The Results of Monitoring the Marketing of MSG-A Sold at Street Foodstalls

Length of Time Marketed (in months)	Vit-A Level IU/g ± SD	Retention %
1	2650 ± 1317	99 *
2	2500 ± 1026	93
4	2250 ± 1395	84
6	1600 ± 1184	60
9	1850 ± 1394	70
11	1550 ± 1060	58

*: 99% based on the previous research results that for 1 month's storage the Vitamin A retention remains 99 %.

The results of monitoring in households are provided in Table 4.

Table 4. The Results of Monitoring MSG-A in Households

Length of Time Marketed (in months)	Vit A Level IU/g ± S.D	Retention %
1	2800 ± 444	100
2	2450 ± 1187	92
3	2700 ± 674	100

The monitoring of MSG-A in households was carried out only up to the third month of marketing. It ceased when households questioned this activity and then the community requested detailed explanations about the MSG problem. Thus, so that the marketing could be conducted properly and suspicion in households would not become great, MSG-A sample taking at the household level was stopped.

Overall, vitamin A levels in MSG-A obtained from households showed quite high retention. In general, at up to 3 months of being on the market, the retention was more than 90%. These results, which were slightly higher than the sample analysis results from foodstalls, indicated there was a variability of vitamin A levels in each packet; thus, the mixing of vitamin A in MSG was not yet truly homogeneous.

3. The Consumption of Nutritional Substances and MSG

The results of the survey on nutritional substances consume pre-school children showed that there was no difference between experimental and control groups' consumption. The energy consumption for both groups was around 500 calories or around 40% of the required daily intake. However, the average provitamin A consumption of children in the experimental group was 718 mg/day or 47% of recommended required intake; for the control group, it was 789 mg/day or 49%. More complete data are provided in Table 5.

Table 5. The Nutritional Substance Consumption of the Experimental and Control Groups

Nutritional Substance	Experimental Group (N=118), average, prim. school	Requirement* %	Control Group (N=137) on the average, prim. school	Requirement* %
Energy (Kcal)	496 ± 287	39	518 ± 309	40
Protein (g)	13 ± 9	53	14 ± 9	56
Fat (g)	12 ± 9	-	13 ± 9	-
Provit. A(ug)	718 ± 1047	47	789 ± 1203	49
Vitamin C (mg)	18 ± 21	92	22 ± 29	108
Iron (mg)	3.2 ± 2.7	32	3.6 ± 3.3	36

Note : * Calculated based on the requirement recommended in Widya Karya Nasional Pangan dan Gizi, 1983.

Data on MSG consumption in food were collected from 110 families in the experimental group and 109 families in the control group. No babies under 3 months of a[ge consumed food containing MSG.

The results showed that the average MSG consumption for each family member was 9.38 g in the experimental area and 0.37 g in the control area. The consumption of MSG for adults and pre-school children, respectively, was 0.40 g and 0.24 g for the experimental group. For the control group, the average MSG consumption for adults and pre-school childr~n was 0.41 g and 0.21 g, respectively (see Table 6).

Thus, the consumption of vitamin A originating from MSG was around 650 IU per child per day at the beginning of the marketing period. This fell to around 400 IU per child per day during the 9th to 11th months of the marketing period, with an average of around 500 U per child per day for 11 months.

The highest MSG consumption rate among adults was 1.6 g/person/day, while among pre-school children it was 1.1 g/pre-school child/day. Thus, the MSG consumption among adults and pre-school

...rson/day

Code	of Families	of Adults	of Pre-School Children	Average Family member, standard deviation	Average Adult standard deviation	Average Pre-School child, standard deviation
Experimental Area						
1	18	79	26	0,29 ± 0,15	0,27 ± 0,16	0,29 ± 0,13
2	21	103	33	0,34 ± 0,31	0,41 ± 0,34	0,26 ± 0,31
3	14	47	23	0,38 ± 0,26	0,47 ± 0,25	0,17 ± 0,10
4	30	131	43	0,61 ± 0,46	0,59 ± 0,47	0,35 ± 0,37
5	18	63	37	0,27 ± 0,22	0,27 ± 0,21	0,14 ± 0,10
Total	110	423	162			
Average				0,38 ± 0,28	0,40 ± 0,29	0,24 ± 0,20
Control Area						
6	21	98	29	0,39 ± 0,27	0,40 ± 0,34	0,27 ± 0,33
7	29	122	49	0,47 ± 0,25	0,56 ± 0,26	0,24 ± 0,17
8	19	89	26	0,43 ± 0,28	0,43 ± 0,28	0,18 ± 0,12
9	15	66	18	0,28 ± 0,31	0,29 ± 0,18	0,17 ± 0,16
10	25	104	44	0,29 ± 0,19	0,35 ± 0,21	0,18 ± 0,12
Total	109	479	166			
Average				0,37 ± 0,26	0,41 ± 0,27	0,21 ± 0,18
The "Acceptable Daily Intake" estimation with an estimation of 50 Kg. for adult body weight and 15 g. for pre-school child body weight					7,5	2,25

children was far below the safety limit set by WHO, that is, 0.15 g/kg of body weight/day. If body weights for Indonesian adults and pre-school children are estimated at 50 kg and 15 kg, respectively, then the limits regarded as safe for adults and children are 7.5 g/person/day and 2.25 g/person/day, respectively.

4. The Results of the Clinical Eye Tests

The "cross sectional" data, which constituted the basic data and results of the two clinical eye tests, are displayed in Table 7. It can be seen from the table that the prevalence of Bitot's Spots sufferers in the experimental group before the marketing of MSG-A, based on basic data, was 1.24 % and in the control group it was .77 %.

Table 7. The Prevalence of Xerophthalmia Sufferers Before and After the Marketing of the MSG-A (Cross-Sectional)

Group	Period	N	XIB Prevalence (%)
Experimental	Basic data	3803	1.24
	Evaluation I	4059	0.32
	Evaluation II	4065	0.15
Control	Basic data	4135	0.77
	Evaluation I	4115	0.90
	Evaluation II	4400	0.80

After the MSG-A had been marketed for 5 months, the prevalence of Bitot's Spots in the experimental group was 0.32 % and in the control group it was 0.90 %. According to the calculated result of the proportional differences test (T-Test), which had been corrected,

there was a significant reduction in the prevalence of Bitot's Spots in the experimental group (P<0.01).

After 11 months of marketing MSG-A, the prevalence of xerophthalmia in the experimental group was 0.15 % and in the control group it was 0.80 %. The result of the T-Test, which was corrected, revealed a significant reduction in the prevalence of Bitot's Spots (P<0.001).

The cohort data, which constituted the basic data and results of two clinical eye tests, can be seen in Table 8.

Table 8. The Prevalence of Xerophthalmia Sufferers Before and After the Marketing of MSG-A (Cohort)

Group	Period	N	XIB Prevalence (%)
Experimental	Basic Data	2102	1.24
	Evaluation I	2102	0.33
	Evaluation II	2102	0.19
Control	Basic Data	2169	0.83
	Evaluation I	2169	0.92
	Evaluation II	2169	1.11

From the table above it can be seen that the prevalence of xerophthalmia sufferers before the marketing of MSG-A in experimental group was 1.24 % and in the control group it was 0.83 %. After MSG-A had been marketed for 5 months, the prevalence of xerophthalmia in the experimental area was 0.33 % and in the control area was 0.92 %. With the T-Test calculation which had been corrected, there was a significant reduction in the prevalence of xerophthalmia in the experimental group (P<0.01).

After 11 months of MSG-A marketing, the prevalence of xerophthalmia in the experimental area was 0.19 % and in the control

area it was 1.11 %. With the T-Test calculation, which had been corrected, there was a significant reduction in the prevalence of xerophthalmia in the experimental group (P<0.001).

Graph 1 illustrates the changes in the prevalence of xerophthalmia for both the experimental and control groups. The changes in the XIA prevalence determined from the cross-sectional data, can be seen in Table 9.

Table 9. The Prevalence of XIA Sufferers Before and After the Marketing of MSG-A (Cross-Sectional)

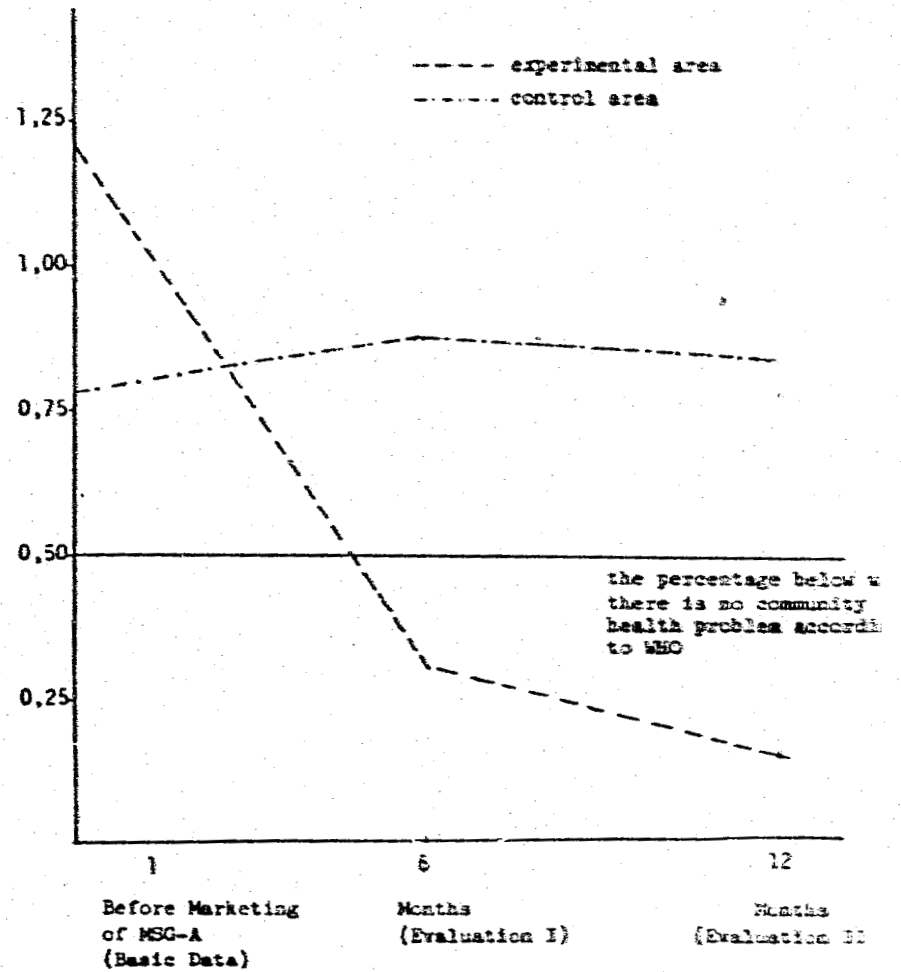
Group	Period	N	XIA Prevalence (%)
Experimental	Basic Data	3803	0.60
	Evaluation I	4059	0.34
	Evaluation II	4065	0.25
Control	Basic Data	4135	0.89
	Evaluation I	4115	0.73
	Evaluation II	4400	0.50

From the above table it can be seen that the prevalence of XIA sufferers before the marketing of MSG-A in the experimental group was 0.60 % and in the control group 0.89 %. After the marketing had continued for 5 months, the XIA prevalence in the experimental group was 0.34 % and in the control group 0.73%.

The T-Test calculation, which was corrected, revealed a P>0.05 result, which was insignificant.

After 11 months of MSG-A marketing, the XIA prevalence in the experimental group was 0.25 % while in the control group it was 0.50 %. The results of the corrected proportional test, comparing the basic and second evaluation data, were also insignificant (P>0.05).

Graph 1. Changes in the Prevalence of Xerophthalmia



The results of the cohort data on the prevalence of XIA sufferers can be seen in Table 10.

Table 10. The Prevalence of XIA Sufferers Before and After the Marketing of MSG-A (cohort)

Group	Period	N	XIA Prevalence (%)
Experimental	Basic Data	2102	0.38
	Evaluation I	2102	0.33
	Evaluation II	2102	0.29
Control	Basic Data	2169	0.60
	Evaluation I	2169	0.78
	Evaluation II	2169	0.65

From the table it can be seen that the prevalence of XIA sufferers before the marketing of MSG-A in the experimental group was 0.38 % and in the control group 0.60 %. After 5 months of the MSG-A marketing, the XIA prevalence in the experimental group was 0.33 % while in the control group it was 0.78 %. The T-Test calculation, which had been corrected, revealed that P>0.05, quite insignificant.

After 11 months of MSG-A marketing, the prevalence of XIA in the experimental group was 0.29 % while in the control group it was 0.65 %. The results were, in fact, insignificant at P>0.05.

For the prevalence of shortsightedness (XN), no acurate data were obtained because quite a number of children examined were not accompanied by their perents. Thus, neither the child nor mother who brought the child was able to answer the questions asked.

5. Children's Nutritional State Based on Body Measurement

The "cross sectional" data, which consisted of the results o checks on body weights at the beginning of the study and aft marketing of MSG-A, can be seen in Table 11.

Table 11. The Nutritional State of Pre-School Children Before a After the Marketing of MSG-A, Based on Body Weight/A (Cross-Sectional)

Group	Period	N	Nutritional State: Good Nutrition n	%	Lack of Nutrition n	%	Poor Nutritio n
Experimental	Basic Data	809	432	55.9	334	41.3	23
	Evaluation I	824	463	56.2	340	41.3	21
	Evaluation II	729	449	61.6	262	36.0	18
Control	Basic Data	868	425	49.0	410	47.2	33
	Evaluation I	864	395	45.7	425	49.2	44
	Evaluation II	788	448	56.8	315	40.0	25

From the table above it can be seen that in the experimental group the prevalence of good nutrition was 55.9 %, lack of nutrition was 41.3 % and poor nutrition 2.8 %, while in the control group there was a 49.0 % prevalence of good nutrition, 47.2 % of lack of nutrition and 3.8 % poor nutrition. After the MSG-A had been marketed for 5 months in the experimental area, the prevalence of good nutrition 56.2 %, lack of nutrition 41.3 % and poor nutrition 2.5 %. For control group, the prevalances were 45.7%, 49.2% and 5 respectively. Thus, the prevalence of good nutrition in experimental group had a tendency to increase after 5 months, while in the control group it decreased. However, after testing using proportional test (T-Test), the result of P>0.05 was found to be

insignificant. The prevalence of lack of nutrition in the experimental group remained the same while in the control group there was an increase. However, after testing using the proportional test (T-Test), the result of P>0.05 was found to be insignificant. The prevalence of poor nutrition in the experimental group decreased while in the control group there was an increase. However, after testing using the proportional test (T-Test), with correction, the increases and decreases (P>0.05) were found to be insignificant.

The results of the proportional test (T-Test) after 11 months of marketing the MSG-A were insignificant (P>0.05) for the prevalence of good nutrition, lack of nutrition and poor nutrition.

The cohort data, based on body weight/age, can be seen from Table 12.

Table 12. The Nutritional State of Pre-School Children Before and After the Marketing of MSG-A, Based on Body Weight/Age (Cohort)

Group	Period	N	Nutritional State: Good Nutrition n	%	Lack of Nutrition n	%	Poor Nutrition n	%
Experimental	Basic Data	360	200	55.5	151	42	9	2.5
	Evaluation I	360	193	53.6	160	44.4	7	2
	Evaluation II	360	219	60.8	136	37.8	5	1.4
Control	Basic Data	328	160	48.8	156	47.6	12	3.7
	Evaluation I	328	151	46	160	50	15	4
	Evaluation II	328	176	53.6	145	44.2	7	2.1

Data in Table 12 reveal that there was a 55.6 % prevalence of good nutrition at the beginning of the study in the experimental group while in the control group, it was 48.8 %. The prevalence of lack of nutrition in the experimental group was 42 % and in the control group it was 47.6%. The prevalence of poor nutrition in the experimental group was 2.5 % and in the control group 3.7 %.

The proportional test (T-Test) revealed that the di between the prevalence of good nutrition in the experimenta control groups for the basic data and after 5 months of MS marketing was insignificant at P>0.05. In addition, there was increase, although insignificant, at P>0.05, if the basic data compared with Evaluation II.

The change in nutritional status among pre-school childr 11 months of MSG-A marketing in both groups was found insignificant after the T-Test was calculated.

After 5 months of MSG-A marketing, the result of the propo T-Test for the prevalence of lack of nutrition also did not significant differences. This was also the case if the basic data compared with Evaluation II. A reduction can be seen for both groups but after testing with the proportional test (T-Test), it was to be insignificant (P>0.05). The result of the proportiona (T-Test) after 11 months of MSG-A marketing was also insignificant.

The result of the proportional test (T-Test) for the prevalence of poor nutrition between the basic data and Evaluation insignificant (P>0.05) for both the experimental and the contro groups. This was also the case between the basic data and Evaluation II. The result of the proportional test (T-Test) after 11 months was also insignificant (P>0.05).

The "cross-sectional" data based on body weight/height can be seen from Table 13.

From Table 13, it can be seen that in the experimental group the prevalence of good nutrition was as high as 77.5 %, lack of nutrition 21 % and poor nutrition 1.5 % when basic data were collected. In the control group, the prevalence of good nutrition was 65.9 %, lack of nutrition 32.7 %, and poor nutrition 1.4 %. After 5 months of MSG-A marketing, the prevalence of good nutrition in the experimental group was 74.4 %, lack of nutrition 25 %, and poor nutrition was 0.6 %.

The result of the proportional test (T-Test) between both the experimental and control groups did not show a significant difference (P>0.05). This was also the case between the basic data and Evaluation I.

After 11 months of MSG-A marketing in the experimental group, the prevalence of good nutrition rose to 83.3 %, lack of nutrition fell to 16.7 % and there was no further incidence of poor nutrition. For the control group, the good nutrition prevalence rose to 79.4 %, lack of nutrition decreased to 19.8 % and poor nutrition decreased to .8 %.

The result of the proportional test (T-Test) between the experimental and control groups after 11 months of marketing also did not reveal a significant difference (P>0.05).

The cohort data, consisting of the results of anthropometric tests stated in body weight/body height, can be seen in Table 14.

Table 13. The Nutritional State of Pre-School Children Before After the Marketing of MSG-A, Based on Body Weight/Body Height (Cross Sectional)

Group	Period	N	Nutritional State: Good Nutrition n	%	Lack of Nutrition n	%	Poor Nutrition n	%
Experimental	Basic Data	809	627	77.5	170	21	12	1.
	Evaluation I	824	533	74.4	286	25	5	0.
	Evaluation II	729	607	83.3	122	16.7	0	0.
Control	Basic Data	868	572	65.9	281	32.7	12	1.4
	Evaluation I	864	612	70.8	235	27.2	17	2
	Evaluation II	788	626	79.4	156	19.8	6	0.8

Table 14. The Nutritional State of Pre-School Children Before and After the Marketing of MSG-A, Based on Body Weight/Body Height (Cohort)

Group	Period	N	Nutritional State: Good Nutrition n	%	Lack of Nutrition n	%	Poor Nutrition n	%
Experimental	Basic Data	360	281	78.1	74	20.6	5	1.4
	Evaluation I	360	261	72.5	96	26.7	3	0.8
	Evaluation II	360	297	82.5	63	17.5	0	0.3
Control	Basic Data	328	223	68.0	103	31.4	2	0.6
	Evaluation I	328	235	71.7	91	29.1	4	1.2
	Evaluation II	328	255	77.7	71	21.7	2	0.6

In the above table it can be seen that the prevalence of good nutrition in the experimental group 78.1 %, lack of nutrition 20.6 and poor nutrition 1.4 %. In the control group the prevalence of good nutrition was 68.0 %, lack of nutrition 31.4 % and poor nutrition 0.6 %. After 5 months of marketing MSG-A the prevalence of good nutrition in the experimental group was 72.5 %, lack of nutrition 26.7 %, and poor nutrition 0.8 %. In the control group the prevalence of good nutrition was 71.7 %, lack of nutrition 29.1 % a poor nutrition 1.2 %. The prevalence of poor nutrition in the

experimental group decreased while in the control group it rose. The result of the proportional test (T-Test) of the change was insignificant (P>0.05).

After 11 months of MSG-A marketing, the prevalence of good nutrition in the experimental group rose to 82.5 %, lack of nutrition declined to 17.2 %, and poor nutrition declined to 0.3 %. For the control group, the prevalence of good nutrition increased to 77.7 %, lack of nutrition declined to 21.7 %, and poor nutrition returned to 0.6 %. The proportional test result (T-Test) for each nutritional status in the experimental group compared to the control group was insignificant (P>0.05).

Children's nutritional state based on body weight/age differed from that based on body weight/body height. Bearing in mind that the nutritional state based on body weight/body height is a better measurement than one based on body weight/age, this difference indicates that when some pre-schoolers' body height does not increase as it should, this can be referred to as "stunted growth."

6. Disease Prevalence

The prevalence of diseases before and after the marketing of MSG-A can be seen in Table 15 (cross-sectional data) and Table 16 (cohort data).

Of the various kinds of diseases suffered by pre-school children at the time of the study, the only significant difference found was between the basic data and Evaluation I for upper respiratory tract infections. When the basic data were compared with Evaluation II no significant differences were found, which could be attributed to the

Table 15. The Prevalence of Diseases Before and After the Marketing of MSG-A (Cross-Sectional)

Group	Period	N	Eye Infections N	Eye Infections %	Upper Respiratory Track Infections N	Upper Respiratory Track Infections %	Skin Diseases N	Skin Diseases %	Digestive System Diseases N	Digestive System Diseases %	Measles N	Measles %	Diarrhea N	Diarrhea %
Experimental	Basic Data	3803	87	2.29	480	12.62	159	4.18	111	2.92	25	0.66	128	3.37
	Evaluation I	4059	40	0.99	153	3.77	153	3.77	158	3.89	8	0.20	137	3.38
	Evaluation II	4065	50	1.23	602	16.30	157	3.86	253	6.20	4	0.10	200	4.92
Control	Basic Data	4135	103	2.49	457	11.05	153	3.70	166	4.00	20	0.48	177	4.28
	Evaluation I	4115	60	1.46	645	15.60	172	4.20	149	3.62	13	0.32	167	4.06
	Evaluation II	4400	60	1.36	632	14.40	196	4.45	252	6.73	4	0.10	200	4.54

Table 16. The Prevalence of Diseases Before and After the Marketing of MSG-A (Cohort)

Group	Period	N	Eye Infections N	Eye Infections %	Upper Respiratory Track Infections N	Upper Respiratory Track Infections %	Skin Diseases N	Skin Diseases %	Digestive System Diseases N	Digestive System Diseases %	Measles N	Measles %	Diarrhea N	Diarrhea %
Experimental	Basic Data	2102	45	2.14	264	12.60	159	4.18	111	2.92	25	0.66	128	3.37
	Evaluation I	2102	17	0.81	258	12.30	153	3.77	158	3.89	8	0.20	137	3.38
	Evaluation II	2102	26	1.20	375	17.60	157	3.86	253	6.20	4	0.10	200	4.92
Control	Basic Data	2169	56	2.60	263	12.10	85	3.92	91	4.20	114	4.19	177	4.28
	Evaluation I	2169	31	1.47	353	16.40	89	4.10	74	3.41	78	2.87	167	4.06
	Evaluation II	2169	29	1.43	319	14.70	101	4.66	118	5.40	117	4.30	200	4.54

fact that only "point prevalence" data were collected; thus, the instances of illness throughout the year were not noted.

7. The Results of Vitamin A (Retinol) Serum Analysis

The results of the vitamin A serum analysis, before and after the marketing of MSG-A, can be seen for the cross-sectional data in 17.

From this table it is obvious that the vitamin A serum in pre-school children in the experimental group at the beginning of the study was 19.3 ± 9.35 ug/dl, and after the MSG-A had been marketed for months, it rose significantly to 22.4 ± 9.20 ug/dl (P<0.01). the MSG-A had been marketed for 11 months, the vitamin A serum pre-school children rose to 26.3 ± 9.52 ug/dl, indicating a very significant increase from the basic data (P<0.01).

Table 17. The Average Retinol Serum Before and After the Marketing (Cross-Sectional)

Group	Period	N	Vit A Serum X ± SD	P
Experimental	Basic Data	205	19.3 ± 9.35	<0.
	Evaluation I	258	22.4 ± 9.20	<0.
	Evaluation II	217	26.3 ± 9.52	
Control	Basic Data	240	22.5 ± 9.95	<0.05*
	Evaluation I	289	20.2 ± 8.60	<0.05*
	Evaluation II	290	20.5 ± 9.42	

** Very significant increase
* Significant decrease

In the control group, the average vitamin A serum at beginning of the study was 22.5 ± 9.95 ug/dl, after 5 months (Evaluation I) it fell to 20.2 ± 8.60 ug/dl ; thus there was a

significant decrease. After 11 months of MSG-A marketing (Evaluation II), the vitamin A serum of pre-school children was 20.5 ± 9.42 ug/dl ; if compared with the basic data there was a significant reduction (P<0.05).

The effect of fortifying MSG with vitamin A on the shift in vitamin A serum levels for both the experimental and control groups for these data is shown in Table 18.

Table 18. The Effect of Fortifying MSG on the Shift in Vitamin A Serum Value (Cross-Sectional)

Group	Period	N	<10 ug/dl		10-19 ug/dl		20 ug/dl	
			N	%	N	%	N	%
Experimental	Basic Data	205	21	10.2	78	38.0	106	51.8
	Evaluation I	259	10	3.9	93	36.1	156	60.1
	Evaluation II	217	8	3.7	56	25.8	153	70.5
Control	Basic Data	240	22	9.2	93	38.8	125	52.0
	Evaluation I	289	29	10.0	121	41.9	139	48.1
	Evaluation II	260	30	10.3	115	39.7	145	50.0

The above table gives a picture of the distribution of vitamin A serum status in pre-school children in both groups under study. A child with a vitamin A serum level of < 10 ug/dl was classified as being deficient, between 10-19 ug/dl was classified as being low in vitamin A serum, and 20 or more ug/dl was classified as having sufficient vitamin A serum. The spread of vitamin A serum status, whether in the deficient, low or sufficient categories before the marketing of MSG-A, did not differ greatly between the experimental and the control groups. In the experimental group the percentages of children having a deficient, low or sufficient vitamin A serum level were 10.2 %, 38.0 % and 51.8 % respectively. In the control group the percentages were 9.2 %, 38.8 % and 52.0 %, respectively.

After 5 months of MSG marketing, there had been a shift to a better vitamin A serum status. In the experimental group, the percentage of those with deficient vitamin A serum fell to 3.9 %, and those with low vitamin A serum fell to 36.1 %, while the percentage of those with sufficient vitamin A rose to 60.1 %. The above shift was significant at P<0.05.

After 11 months of MSG-A marketing in the experimental group, the prevalence of those with deficient vitamin A serum status fell to 3.7 %, low vitamin A status fell to 25.8 % and those with sufficient vitamin A status rose to 70.5%. It would thus appear that there had been a shift from low vitamin A status to sufficient vitamin A status. In the control group, the percentage with deficient vitamin A serum status was 10.3 %, low vitamin A status was 39.7 % and sufficient vitamin A status was 50.0 %. Graphs 2 and 3 illustrate the shift in the vitamin A serum distribution in both the experimental and control groups.

The cohort data consist of the results of the vitamin A serum controls. Data after 11 months of marketing MSG-A could not compared, as many parents objected to blood tests being performed their children at the second and third health examinations. Nevertheless, for the basic data and results of Evaluation I, the data on the vitamin A serum levels of pre-school children could compared.

Table 16. The Prevalence of Diseases Before and After the Marketing of MSG-A (Cohort)

Group	Period	N	Eye Infections N	Eye Infections %	Upper Respiratory Track Infections N	Upper Respiratory Track Infections %	Skin Diseases N	Skin Diseases %	Digestive System Diseases N	Digestive System Diseases %	Measles N	Measles %	Diarrhea N	Diarrhea %
Experimental	Basic Data	2102	45	2.14	264	12.60	159	4.18	111	2.92	25	0.66	128	3.37
	Evaluation I	2102	17	0.81	258	12.30	153	3.77	158	3.89	8	0.20	137	3.38
	Evaluation II	2102	26	1.20	375	17.80	157	3.86	253	6.20	4	0.10	200	4.92
Control	Basic Data	2169	56	2.60	263	12.10	85	3.92	91	4.20	114	4.19	177	4.28
	Evaluation I	2169	31	1.47	353	16.40	89	4.10	74	3.41	78	2.87	167	4.06
	Evaluation II	2169	29	1.43	319	14.70	101	4.66	118	5.40	117	4.30	200	4.54

fact that only "point prevalence" data were collected; thus, the instances of illness throughout the year were not noted.

7. The Results of Vitamin A (Retinol) Serum Analysis

The results of the vitamin A serum analysis, before and after the marketing of MSG-A, can be seen for the cross-sectional data in Table 17.

From this table it is obvious that the vitamin A serum in pre-school children in the experimental group at the beginning of the study was 19.3 ± 9.35 ug/dl, and after the MSG-A had been marketed for 5 months, it rose significantly to 22.4 ± 9.20 ug/dl ($P<0.01$). After the MSG-A had been marketed for 11 months, the vitamin A serum in pre-school children rose to 26.3 ± 9.52 ug/dl, indicating a very significant increase from the basic data ($P<0.01$).

Table 17. The Average Retinol Serum Before and After the Marketing (Cross-Sectional)

Group	Period	N	Vit A Serum X ± SD	P
Experimental	Basic Data	205	19.3 ± 9.35	<0.01
	Evaluation I	258	22.4 ± 9.20	<0.01
	Evaluation II	217	26.3 ± 9.52	
Control	Basic Data	240	22.5 ± 9.95	<0.05*
	Evaluation I	289	20.2 ± 8.60	<0.05*
	Evaluation II	290	20.5 ± 9.42	

** Very significant increase
* Significant decrease

In the control group, the average vitamin A serum at the beginning of the study was 22.5 ± 9.95 ug/dl, after 5 months (Evaluation I) it fell to 20.2 ± 8.60 ug/dl ; thus there was a

significant decrease. After 11 months of MSG-A marketing (Evaluation II), the vitamin A serum of pre-school children was 20.5 ± 9.42 ug/dl ; if compared with the basic data there was a significant reduction (P<0.05).

The effect of fortifying MSG with vitamin A on the shift in vitamin A serum levels for both the experimental and control groups for these data is shown in Table 18.

Table 18. The Effect of Fortifying MSG on the Shift in Vitamin A Serum Value (Cross-Sectional)

Group	Period	N	<10 ug/dl		10-19 ug/dl		20 ug/dl	
			N	%	N	%	N	%
Experimental	Basic Data	205	21	10.2	78	38.0	106	51.8
	Evaluation I	259	10	3.9	93	36.1	156	60.1
	Evaluation II	217	8	3.7	56	25.8	153	70.5
Control	Basic Data	240	22	9.2	93	38.8	125	52.0
	Evaluation I	289	29	10.0	121	41.9	139	48.1
	Evaluation II	260	30	10.3	115	39.7	145	50.0

The above table gives a picture of the distribution of vitamin A serum status in pre-school children in both groups under study. A child with a vitamin A serum level of < 10 ug/dl was classified as being deficient, between 10-19 ug/dl was classified as being low in vitamin A serum, and 20 or more ug/dl was classified as having sufficient vitamin A serum. The spread of vitamin A serum status, whether in the deficient, low or sufficient categories before the marketing of MSG-A, did not differ greatly between the experimental and the control groups. In the experimental group the percentages of children having a deficient, low or sufficient vitamin A serum level were 10.2 %, 38.0 % and 51.8 % respectively. In the control group the percentages were 9.2 %, 38.8 % and 52.0 %, respectively.

After 5 months of MSG marketing, there had been a shift to a better vitamin A serum status. In the experimental group, the percentage of those with deficient vitamin A serum fell to 3.9 %, and those with low vitamin A serum fell to 36.1 %, while the percentage of those with sufficient vitamin A rose to 60.1 %. The above shift was significant at P<0.05.

After 11 months of MSG-A marketing in the experimental group, the prevalence of those with deficient vitamin A serum status fell to 3.7 %, low vitamin A status fell to 25.8 % and those with sufficient vitamin A status rose to 70.5%. It would thus appear that there had been a shift from low vitamin A status to sufficient vitamin A status. In the control group, the percentage with deficient vitamin A serum status was 10.3 %, low vitamin A status was 39.7 % and sufficient vitamin A status was 50.0 %. Graphs 2 and 3 illustrate the shift in the vitamin A serum distribution in both the experimental and control groups.

The cohort data consist of the results of the vitamin A serum controls. Data after 11 months of marketing MSG-A could not compared, as many parents objected to blood tests being performed their children at the second and third health examinations. Nevertheless, for the basic data and results of Evaluation I, the data on the vitamin A serum levels of pre-school children could compared.

Table 19 shows the cohort data, consisting of the results of the vitamin A serum analysis at baseline and after 5 months of MSG-A marketing.

Table 19. The Average Vitamin A Serum Before and After the MSG-A Marketing (Cohort)

Group	Period	N	Vit A Serum M ± SD	P
Experimental	Basic Data	156	18.1 ± 8.25	
	Evaluation I	156	21.7 ± 8.77	<0,01**
Control	Basic Data	191	20.7 ± 9.58	
	Evaluation I	191	21.0 ± 8.19	>0,05(TS)

From the table above it can be seen that the vitamin A serum level in the basic data for the experimental group was 18.1 ± 8.25 ug/dl. For the control group it was 20.7 ± 9.58 ug/dl.

After 5 months of MSG-A marketing, in the experimental group, here was a most significant increase in vitamin A serum to 21.7 ± .77 ug/dl (P<0.01). In contrast, in the control group there was a slight increase, of little significance, to 21.0 ± 8.19 ug/dl (P>0.05).

The effect of fortifying MSG-A on the shift of vitamin A serum in the experimental and control groups, for the cohort data, can be seen Table 20.

Table 20 reveals that there was a shift in the vitamin A status pre-school children towards a higher value for the experimental group, while for the control group the shift that occurred was insignificant. The shift in the vitamin A serum levels in these ort data is significant at P<0.05 for the experimental group.

Graph 2. The Distribution of Vitamin A Serum Levels in the Experimental Area

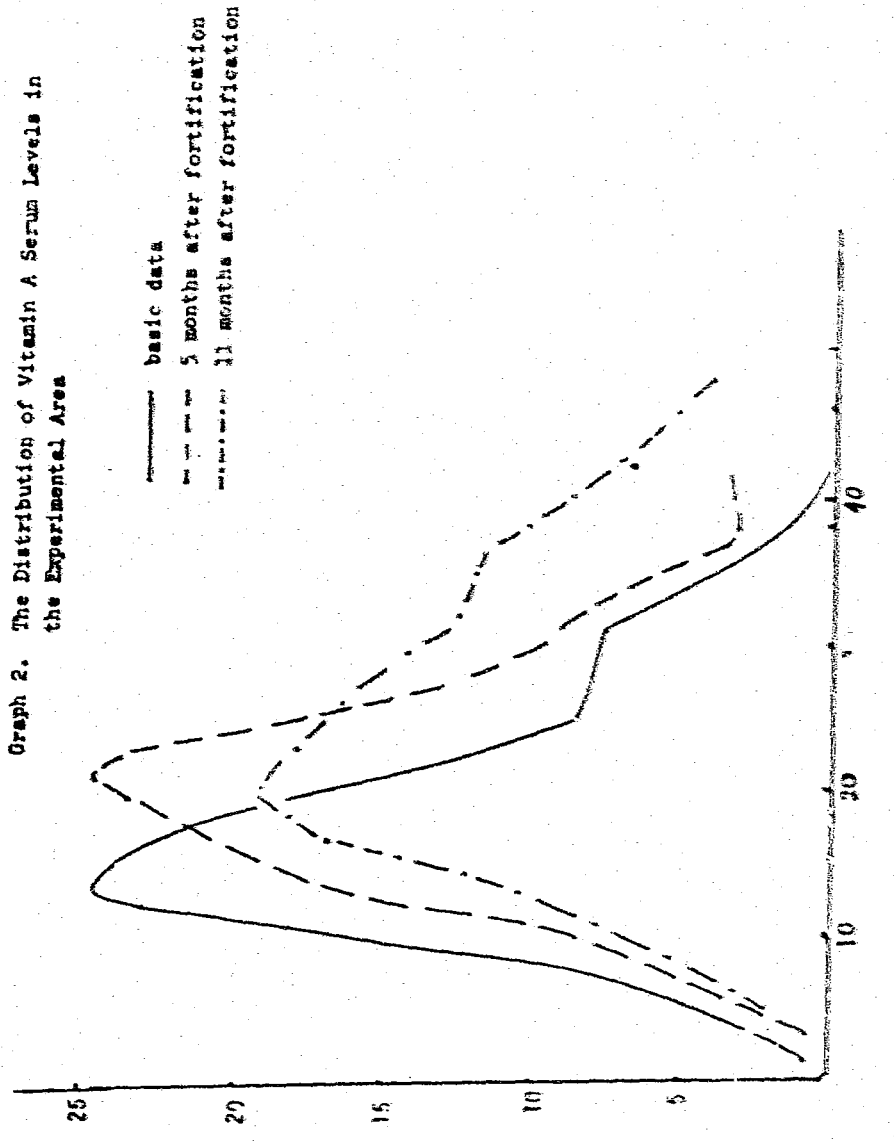


Table 19 shows the cohort data, consisting of the results of the vitamin A serum analysis at baseline and after 5 months of MSG-A marketing.

Table 19. The Average Vitamin A Serum Before and After the MSG-A Marketing (Cohort)

Group	Period	N	Vit A Serum M ± SD	P
Experimental	Basic Data	156	18.1 ± 8.25	
	Evaluation I	156	21.7 ± 8.77	<0,01**
Control	Basic Data	191	20.7 ± 9.58	
	Evaluation I	191	21.0 ± 8.19	>0,05(TS)

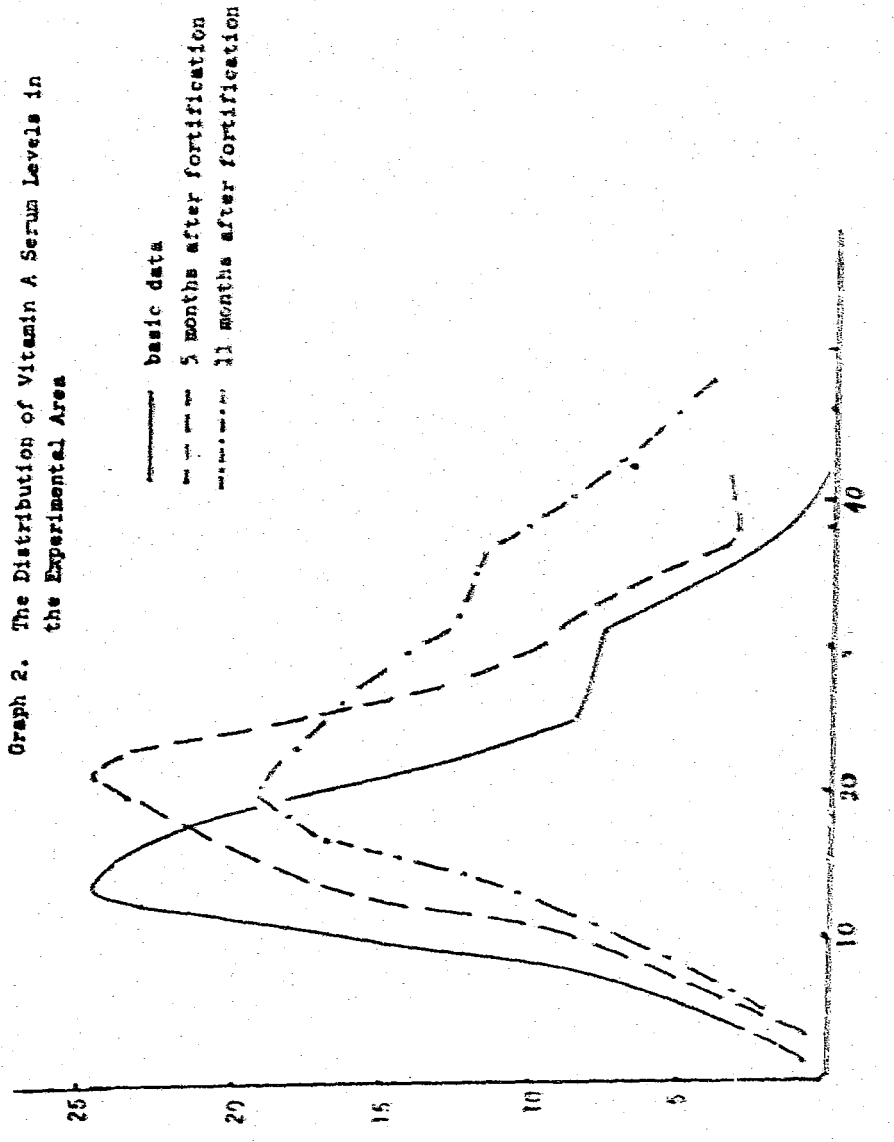
From the table above it can be seen that the vitamin A serum level in the basic data for the experimental group was 18.1 ± 8.25 ug/dl. For the control group it was 20.7 ± 9.58 ug/dl.

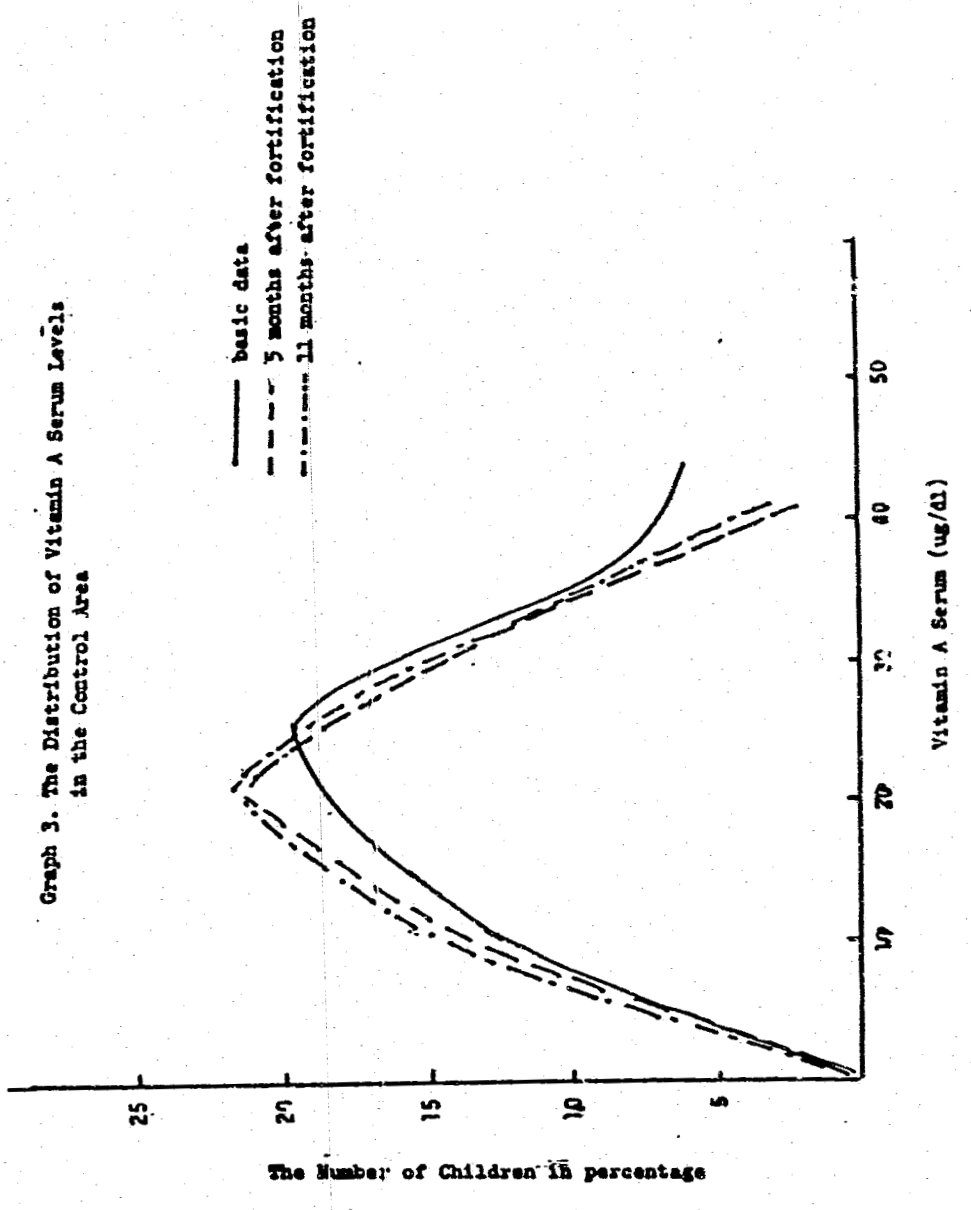
After 5 months of MSG-A marketing, in the experimental group, here was a most significant increase in vitamin A serum to 21.7 ± .77 ug/dl (P<0.01). In contrast, in the control group there was a slight increase, of little significance, to 21.0 ± 8.19 ug/dl (P>0.05).

The effect of fortifying MSG-A on the shift of vitamin A serum in the experimental and control groups, for the cohort data, can be seen Table 20.

Table 20 reveals that there was a shift in the vitamin A status pre-school children towards a higher value for the experimental group, while for the control group the shift that occurred was insignificant. The shift in the vitamin A serum levels in these ort data is significant at P<0.05 for the experimental group.

Graph 2. The Distribution of Vitamin A Serum Levels in the Experimental Area





Graph 3. The Distribution of Vitamin A Serum Levels in the Control Area

Table 20. The Effect of Fortifying MSG on the Shift of Vitamin A Serum Levels (Cohort)

Group	Period	N	<10 ug/dl N	<10 ug/dl %	10-19 ug/dl N	10-19 ug/dl %	>20 ug/dl N	>20 ug/dl %
Experimental	Basic Data	156	20	12,8	78	50,0	58	37
	Evaluation I	156	7	4,5	65	41,7	84	53
Control	Basic Data	191	22	11,5	74	38,7	95	49
	Evaluation I	191	18	9,4	81	42,4	92	48

8. The Results of the Test of Vitamin A Levels in Breast Milk

The results of the analysis of vitamin A levels in breast from the experimental group at the beginning of the study were 17.31 ± 8.43 ug/dl. Five months after the marketing of MSG-A, the vitamin A level in breast milk rose significantly to 19.11 ± 7.83 ug/dl (P>0.05). Eleven months after the marketing of the MSG-A, the vitamin A serum level in breast milk was 19.20 ± 8.74 ug/dl. The last result indicates that the vitamin A in breast milk rose significantly (P<0.025).

In the control group, the level of vitamin A in breast milk at the beginning of the study was 17.58 ± 12.77 ug/dl. Five months after the marketing of MSG-A, the vitamin A content in breast milk decreased insignificantly to 16.74 ± 9.93 ug/dl (P>0.05) and at end of the study was 16.65 ± 5.84 ug/dl, of no significant difference when compared to the previous level of (P>0.05). The overall result can be seen in Table 21.

9. The Results of the Hemoglobin Tests

The cross-sectional data results for the hemoglobin tests before and after the marketing of the MSG fortified with vitamin A can be seen in Table 22.

Table 21. Results of the Analysis of Vitamin A Levels in Breast Milk in the Experimental and Control Groups

Period	GROUP							
	Experimental				Control			
	N	X ± SD	t	P	N	X ± SD	t	P
Basic Data	178	17.31 ± 8.43			200	17.58 ± 12.77		
Evaluation I	218	19.11 ± 7.83	2.20	> 0.05*	245	16.47 ± 9.93	1.01	> 0.05
Evaluation II	263	19.20 ± 8.74	2.28	< 0.025*	192	16.65 ± 5.84	0.93	> 0.05

* indicates a significant increase

Table 22. The Average Hb Levels in Pre-school Children Before and After the Marketing of MSG Fortified with Vitamin A (Cross-Sectional)

Group	Period	N	Hb Level Average ± SD	P
			g/dl	
Experimental	Basic Data	205	11.3 ± 1.55	< 0,01*
	Evaluation I	258	12.3 ± 1.59	
	Evaluation II	217	12.1 ± 1.34	< 0,01*
Control	Basic data	240	11.4 ± 1.58	> 0,05
	Evaluation I	289	11.2 ± 1.48	(TS)
	Evaluation II	290	11.4 ± 1.39	

* indicates a significant increase and TS = insignificant

From the above table it can be seen that the hemoglobin levels in pre-school children before the marketing of the MSG fortified with Vitamin A in the experimental group was 11.3 ± 1.55 g/dl and in the control group it was 11.4 ± 1.58 g/dl. The differences in hemoglobin

levels between the experimental and control groups in the basic data were insignificant (P>0.05). After 5 months of MSG-A marketing (Evaluation I), the hemoglobin levels of under-5 year olds in experimental group were 12.3 ± 1.59 g/dl. When compared with basic data, the increase was significant (P<0.001). After 11 months of MSG-A marketing (Evaluation II), their hemoglobin level was 12.1 ± 1.34 g/dl, an insignificant decrease if compared with Evaluation I (P>0.05), but if compared with the basic data there was still a significant increase of (P<0.001).

For the control group, in Evaluation I, the hemoglobin levels were 11.2 ± 1.48 g/dl, an insignificant decrease of P>0.05. At second evaluation, the hemoglobin levels were 11.4 ± 1.39 g/dl, same as the basic data, also indicating an insignificant increase.

If the results of Evaluation I for the experimental group compared with the results of Evaluation I for the control group, there is a significant difference (P<0.001). This was also the case after 11 months of MSG-A marketing. The average Hb in under 5-year olds from the experimental area was 12.1 ± 1.34 g/dl and in control area 11.4 ± 11.4 g/dl. The difference, at P<0.001, significant. The cohort data, consisting of the results hemoglobin testing before and after the marketing of MSG-A, co only be used for the basic data and Evaluation I because Evaluation II, most children refused to have blood tests done. data can be seen in Table 23.

From Table 23 it can be seen that the hemoglobin levels of under 5 year olds in the experimental group before the marketing of MSG

fortified with vitamin A was 11.4 ± 1.55 g/dl, and in the control area it was 11.3 ± 1.52 g/dl. The average Hb levels before the second marketing in the experimental and control groups were nearly the same and the difference was insignificant (P>0.05). After 5 months of MSG-A marketing (Evaluation I), the average hemoglobin levels of pre-school children in the experimental group was 12.4 ± 1.64 g/dl. When compared with the basic data, this was a significant increase (P<0.01).

For the control group where the MSG-A was not marketed, the average Hb level at the basic data was 11.3 ± 1.52 g/dl. After 5 months (Evaluation I), the average Hb level was 11.1 ± 1.44 g/dl, indicating an insignificant decrease (P>0.05).

Table 23. The Average Hb Levels in Pre-School Children Before and After the Marketing of MSG Fortified with Vitamin A (Cohort)

-	Period	N	Average Hb Levels of Hb ± SD	P
			g/dl	
imental	Basic Data	163	11.4 ± 1.55	< 0,01*
	Evaluation I	163	12.4 ± 1.64	
Control	Basic data	191	11.3 ± 1.52	> 0,05 (TS)
	Evaluation I	191	11.1 ± 1.44	

* indicates "most significant" and TS indicates "insignificant"

10. The Mortality Rates for Infants and Children Under 5 Years Old

n the experimental group there were 157 deaths, consisting of 96 t deaths and 61 deaths of children under 5 years old. In the control group there were 195 deaths, consisting of 111 infant deaths and 84 deaths of children under 5 years old (see Table 24).

The number of infants in the experimental and control groups were 1,199 and 1,134, respectively. Thus, the rough infant mortality rate in the experimental area was 80.1 %, while for the control area was 97.9 %. The infant mortality rate in the control group roughly 1.22 times that of the experimental group.

The number of 1-5 year olds in the experimental group was 4,556, while in the control group the number was 4,311. Thus, the mortality rate for children age 1-5 in the experimental group was 13.4 % and for the control group it was 19.4 %, 1.45 times that in the experimental group. The infant mortality rates in both the experimental and control groups were tested with the proportional test (T-Test) and were not found to be significantly different (P>0.1).

With a similar test it was found that the infant mortality rate in the experimental group was significantly lower than that of with the control group (P<0.05).

Table 24. The Infant and Pre-School Child Mortality Rates in the Experimental and Control Groups

Group	Deaths		Births			
	Infants	Under-Five	Infants	Under-5	AKB*	AKBAL**
Experimental	96	61	1199	4556	80.1‰	13.4‰
Control	111	84	1134	4311	97.9‰	19.5‰

AKB* - Infant Mortality Rate
AKBAL** - Under-Five Mortality Rate

The causes of death stated were not based on anything definite, making it difficult to know the exact nature of the illnesses causing death. The causes of infant deaths in the experimental and contr

groups were more or less the same, except that there was a greater ncidence of deaths due to convulsions in the control group (14.4 %) han the experimental group (3.1%) as can be seen from Table 25.

Table 25. Reasons Given for Infant Mortality in the Experimental and Control Groups

Reasons Given	Experimental Group N	%	Control Group N	%
er	86	89.6	83	71.8
vulsion	3	3.1	16	14.4
_gh	1	1.0	0	0
iarrhea	2	2.1	3	2.7
lueness	4	4.1	7	6.3
nfection of brain	0	0	2	2

The causes of death in under-five year olds in the experimental and control areas were relatively similar. In the experimental group, the reason given for 80.3 % of deaths was fever while in the control group it accounted for 91.7 %. The results can be seen in Table 26.

Table 26. Reasons Given for Pre-School Child Mortality in the Experimental and Control Groups

Reasons Given	Experimental Group N	%	Control Group N	%
ver	49	80.3	77	91.7
----lsion	1	1.6	1	1.2
_	3	4.9	0	0
arrhea	6	10	4	4.8
hers	2	4.5	2	2.3
Total	61	100	84	100