

PN-ABF-269
66245

**GROWTH MONITORING: SOCIAL, ENVIRONMENTAL AND INSTITUTIONAL
FACTORS WHICH INFLUENCE SUCCESSFUL IMPLEMENTATION**

July 18, 1988

**Frank D. Zinn
William D. Drake**

**Community Systems Foundation
1130 Hill Street
Ann Arbor, MI 48104 U.S.A.
Tel:(313)761-1357
Telex: 759114
Fax: (313)761-1356**

ACKNOWLEDGEMENTS

This study has benefitted enormously from the assistance of many individuals. First, we thank Dr. Nancy Pilemeler at AID/PPC, for both her administrative support and substantive input throughout the life of the project. Funding was provided under Cooperative Agreement number PDC-0082-A-6198-00.

In Indonesia, discussions with Dr. Dewa Nyoman Wirawan, Dr. Ketut Tangking Widarsa and Sri Djuarini were of great value in interpreting analysis results. We would also like to thank Dr. Sriharti P. Pandi, Deputy of Program Development at BKKBN, for her permission to use the Indonesian data for this project.

We held very productive discussions with Edwin McKeithen and Narintr Tima at USAID in Bangkok; and Dr. Vallop Thaineau and Dr. Chawalit Suntikitrungruang at the Nutrition Division of the Thai Ministry of Public Health.

We would also like to thank Dr. Jose O. Mora for his insights on the ANEP in the Dominican Republic. In addition, Dr. Alfred Zerfas spent a great deal of time with us to prepare appropriate data sets for additional analysis.

Mary Ann Anderson was kind to read drafts of our section on ICDS, and to share many of her insights.

Appreciation is also due to Richard Mandara in Tanzania, with whom productive discussions were held. In addition, Dr. Roy I. Miller, of the Joint Nutrition Support Program (JNSP), gave helpful feedback throughout the twenty months of this report, and made himself particularly useful to us by sharing his detailed knowledge of the Iringa Nutrition Program.

Finally, no report would be completed at CSF were it not for the willingness of the entire staff to pitch in during all stages of preparation. Dr. John D. Nystuen and Dr. Robert J. Timmons were kind enough to read, and respond to, various drafts of this document. Thanks to Dr. Barbara Timmons and Cathy Antonakos for their editing assistance; to Naomi Gottlieb for her administrative support, and to Gwen Nystuen for her help with word processing.

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	ii
PART 1: INDONESIA ANALYSIS	
I. BACKGROUND TO ANALYSIS.....	1
II. A MODEL FOR CONTEXTUAL ANALYSIS OF GROWTH MONITORING	14
III. DATA AND METHODOLOGY	22
IV. PRELIMINARY ANALYSIS.....	31
V. THE EFFECT OF CONTEXT ON PROGRAM SUCCESS	35
VI. CONCLUSIONS REGARDING INDONESIA ANALYSIS	45
PART 2: ADDITIONAL SITES	
VII. GROWTH MONITORING IN THAILAND.....	50
VIII. GROWTH MONITORING IN THE DOMINICAN REPUBLIC.....	64
IX. GROWTH MONITORING IN THE INTEGRATED CHILD DEVELOPMENT SERVICES PROGRAM IN INDIA.....	72
X. GROWTH MONITORING IN THE JOINT NUTRITION SUPPORT PROJECT IN TANZANIA	77
PART 3: CONCLUSIONS	
XI. GENERAL FINDINGS AND IMPLICATIONS.....	97
BIBLIOGRAPHY	102

Contextual Analysis of Growth Monitoring Executive Summary

This study explores the growth monitoring component of nutrition programs to determine the conditions under which growth monitoring is most effective. Special attention is given to the wide variety of community conditions that might influence optimal program design.

During the first phase of the study, a detailed analysis of growth monitoring in Indonesia was conducted and interpreted. Findings from this phase provided a framework for review and analysis of growth monitoring programs in a selection of other countries, namely, Thailand, India, Dominican Republic and Tanzania. Comparisons amongst different contextual settings were used to indicate the bounds of the findings.

Phase I: The In-depth Indonesian Study

The first phase of the analysis utilizes data on 3400 children in 2500 households in 93 communities in Indonesia. It is built on a previous study of the data, conducted by Community Systems Foundation and three universities in Indonesia, which evaluated the Indonesian Integrated Family Planning and Nutrition Program (*KB-Gizi*), of which growth monitoring is a component. The analysis methodology incorporated chi-square tests of the relationships between program design factors and contextual (community) factors, analysis of variance tests to determine interaction between program and contextual factors with respect to households, and covariance structure modeling to compare household-level relationships among various contextual settings.

The analysis was conducted using several different indicators of program success including attendance rates, accuracy of charting, immunization coverage, participants' knowledge and practice of program messages, and nutritional status. Program design factors included staffing, support by community leaders, intensity of program implementation and weighing post crowding. Initial analysis found that the Indonesian program is generally successful in changing knowledge and practice of attenders. Furthermore, well-executed programs with accurate charting and high rates of immunization coverage of attenders, are better attended. Where programs are not well designed, the educational component is most likely to be deficient.

The following five contextual factors were used in the study:

Modernization An index of modernization was constructed from the following components: 1) quality of roads; 2) availability of electricity; 3) number of schools per population; 4) recreational facilities; 5) level of market activity; 6) availability of television sets.

Government Intervention An index was developed based on the number of government programs (out of a possible total of 22) that currently or had ever operated in the community.

Community Organization An index was created based on the number of community groups which met regularly in the community.

Average Education An index was created at the household level based on the number of years of formal education completed.

Acceptance of Modern Medicine The health center doctor was asked to evaluate the community's acceptance of modern medicine.

The analysis of the effect of context focuses on: 1) the conditions related to a need for growth monitoring and a nutrition program; 2) the relationship between the contextual factor and the quality of growth monitoring execution; and 3) interaction between design factors and the contextual factors with respect to attendance.

The first finding of interest is that there is a relationship between each of the contextual factors tested and socio-economic conditions pertinent to targeting. The lowest levels of household wealth, education and nutritional status occur where community modernization, organization, average education and acceptance of modern medicine are low. This suggests targeting communities in low contextual settings. However, resource constraints may indicate other priorities, as described below.

The one contextual factor for which this pattern does not strictly hold true is government intervention. High levels of government intervention are found in communities where the levels of family wealth and education are low. This finding indicates that a targeting strategy has been implemented in Indonesia which favors communities most in need. It also suggests that government interventions have a positive influence on nutritional status, and mediate the usually negative effect of poverty on nutritional status.

Community organization, average education and acceptance of modern medicine all affect rates of attendance and the quality of growth monitoring execution. This suggests that additional efforts be made in training, staffing and outreach in communities where these factors are low. Not surprisingly, in communities where the need is greatest, it is most difficult to weigh and chart accurately. Moreover, the PKK (women's group in Indonesian villages) was identified as a key supportive organization in this respect.

It is also the case that the program brings all attenders to approximately the same level of knowledge and practice, regardless of context. In regard to program policy, this finding shows that growth monitoring has the most relative benefit in communities where the contextual factor is low. When considered in light of previous findings, this reinforces the notion that a stronger effort must be made to maintain attendance and the quality of program execution in areas where the contextual factor is low (i.e. where need is the greatest).

Growth monitoring is influenced by acceptance of modern medicine in a somewhat different manner. In communities where acceptance is moderate (mixed), there is moderate attendance, but a large difference between the knowledge and practice of attenders and non-attenders. However, there is little or

no difference in knowledge, attitudes and practice (KAP) in areas where acceptance is either low or high. This finding may indicate that in communities where acceptance is low or high, people adhere to their beliefs regardless of the existence or quality of the program. The strong difference in knowledge and practice of attenders, as compared to non-attenders, in communities where acceptance is moderate may be a result of predisposition -- that attenders are inclined toward good knowledge and practice, and that non-attenders are predisposed to traditional or other knowledge and practice. However, it appears that the program has the potential to be most effective in communities where acceptance is mixed, especially if attendance can be increased to include those not predisposed to accept program messages.

When the interactions between contextual and program design factors are examined, the most consistently influential design factor is the number of children for which the weighing post is responsible. As one would expect, when crowding increases, attendance decreases. Yet in communities where the contextual factor is high, higher levels of attendance are maintained under crowded conditions (where the number of children per post is greater than 50). This suggests that a smaller child to weighing post ratio is appropriate in communities where the contextual factors are low.

In a related analysis, the extent of the effect of each contextual factor on the relationship between distance to weighing post and attendance was determined. As expected, distance has a negative effect on attendance. However, when there is strong community organization, the negative effect is less pronounced. Furthermore, both education level and acceptance of modern medicine mediate the negative effect of distance. Better educated women are willing to "pay a higher price" to attend the weighing sessions.

With respect to the number of children per weighing post and the distance between household and weighing post, the ratio of posts to population must be higher in communities where the context is low in order to maintain commensurate rates of attendance. Again, in communities where the need is greatest, more resources must be allocated to achieve successful implementation.

Staffing affects attendance as does the distance people are willing to travel to attend the weighing. In general, as the contextual factor increases, so does the effect of staffing on attendance. This may result from higher attendance in communities where the contextual factors are high. An adequate staffing ratio (1 health worker per 25 households) is needed to keep the mother's waiting time at the weighing to a minimum, in these communities.

Phase II: Review and Analysis of Selected Countries

During the visit to Thailand, these general findings were confirmed through discussions with people at the Thai Ministry of Public Health and USAID in Bangkok. It was agreed that successful implementation of growth monitoring is most difficult in remote areas, where the need is greatest. In addition, it is difficult to formulate a differential implementation strategy at a national level. Consequently, the Thai program

gives the local level the power to determine its implementation strategy. The Thai government is working through several innovative programs to increase the local community's ability to solve its own problems.

In the Dominican Republic, the Applied Nutrition Education Program (ANEP) was examined. Though ANEP's goals are similar to those of *KB-Gizi*, its implementation strategy is somewhat different. ANEP employs a home weighing approach, which increases coverage relative to *KB-Gizi*, and uses the existence of an active community organization as a prerequisite for program implementation. Analysis conducted during a recent ANEP evaluation found that program impact was greatest among women with moderate education, and additional analysis conducted for this report found that the program was most successful in communities where there is a moderate level of formal education.

The Integrated Child Development Services Program (ICDS) in India operates in an environment where the prevalence of malnutrition and illiteracy is extremely high. Consequently, growth monitoring has been effective as a forum for supplementary feeding, with less emphasis on nutrition education. Currently, an effort is being undertaken to strengthen the nutrition education component of ICDS. Also, as a consequence of the harsh conditions, household participation in ICDS is unaffected by socio-economic conditions. Finally, ICDS sees the development of community organizations for mothers as being important, though there are cultural barriers to effective implementation of this strategy.

The Iringa Nutrition Program in Tanzania is very different from the other nutrition programs examined in this study. The focus of the Iringa Program is to teach all levels of society to identify and address the causes of malnutrition. Consequently, different communities may devise very different means of addressing malnutrition. This non-standardized approach allows growth monitoring to be used in different ways depending on contextual conditions at a given time in a given community.

A limited field study undertaken in Tanzania to determine misclassification of child nutritional status yielded a misclassification rate of 26.7 percent. Misclassifying the nutritional status of a child has many implications. First, through misclassification there may be an inappropriate diagnosis and treatment of the child. (In the sample taken in Tanzania, none of the children who should have received referral were neglected due to misclassification.) Second, it is likely that the true change in nutritional status of the population over time will be understated if children are misclassified. In Tanzania, if a constant level in misclassification is assumed, the actual reduction in child malnutrition would be from 83 to 33 percent, rather than the reported change of 66 to 42 percent.

Some General Implications

Given the findings from the two phases of this study, some general implications can be reported. It is clear that growth monitoring is more effective in some settings than others. In this study we have been able to identify two dimensions to the notion of effectiveness.

First, communities must have the capacity to implement growth monitoring successfully. Some communities require relatively little beyond basic program inputs in order to successfully implement growth monitoring while other communities require much more. However, growth monitoring will not be effective unless the capacity exists within a community to successfully implement growth monitoring activities.

Important contextual factors are those which serve to expand a community's capacity to implement growth monitoring. Those communities which have the most difficulty implementing growth monitoring, are those where illiteracy rates are high, modern medicine is suspect, community groups do not exist, and contacts with the modern world are few. In these communities, the program must take responsibility for expanding the community's capacity to implement successfully. Consequently, more energy must be spent on activities such as training and supervising health workers, and outreach to mothers. If an adequate commitment is not made in these communities, the growth monitoring component will have little, if any, positive effect.

The second dimension of program effectiveness is the need for growth monitoring within the community. The higher the prevalence of malnutrition, the greater potential benefit growth monitoring can provide. Not surprisingly, there appears to be a negative relationship between capacity to implement growth monitoring and need for its services. In other words, in areas where implementation is most difficult, malnutrition is also the highest. Consequently, the greater the potential effectiveness, the greater the resources necessary to implement growth monitoring properly.

When implementing growth monitoring activities, program planners must be cognizant of both the capacity and the need in the community. In areas where conditions are particularly harsh and capacity is relatively low, the implementation of growth monitoring should focus at the onset on those functions which are most easily executed (i.e. the basics of weighing and charting, and very simple educational messages). The program as a whole might be developed such that the objectives of growth monitoring are expanded over time as the capacity of the community becomes greater. Moreover, some programs specifically seek to develop community capacity on dimensions related to growth monitoring.

Methodological Implications

During this study, considerable effort was devoted to testing the sensitivity of alternative analysis methodologies, ranging from ANOVA to structural equations modeling. Many projects are compelled by time and resource constraints to rely primarily on more straightforward approaches to understanding the inter-relationships between complex phenomena. In this study, *only* when more sophisticated approaches such as structural modeling were employed, did the complex relationships become clear and statistically significant. This finding, which concerns appropriate evaluation methodology, may have important policy implications. Growth monitoring, unlike many nutrition intervention components, is *entirely* dependent upon other elements of the intervention for its usefulness. This inherent interdependence, present in all interventions but perhaps more so in growth monitoring, may require that the complexity be reflected in the

evaluative model. Without such richness, there is a high likelihood that the true underlying relationships will not be shown to be statistically significant when in fact, they are.

Another methodological issue which relates to the interpretation of studies using growth monitoring data is the effect of misclassification in nutritional grade. Prior studies have shown that, under most conditions, misclassification results in an understatement of the true program impact. The sample taken in Tanzania during this study is an example of this phenomenon.

It is important to note, therefore, that the true benefits of nutrition programs with growth monitoring components may be under-valued due to both the failure to capture the complexity of the program setting in evaluation models, and to misclassification of the children's nutritional status.

Community Systems Foundation
June 30, 1988

PART 1: INDONESIA ANALYSIS

CHAPTER I

BACKGROUND TO ANALYSIS

1.1 Definition of Growth Monitoring

Growth monitoring is a process of sequential measurement for the assessment of physical growth and development of individuals in the community with the purpose of promoting child health, human development and quality of life.¹

In the case of children in the developing world, growth retardation is often a result of poor nutrition and, therefore, growth monitoring is a tool applied to the detection and measurement of malnutrition in both individuals and communities. Similarly, in women, a lack of proper weight gain during pregnancy is often, but not always, due to inadequate nutrition. Consequently, measurement of change in weight is a tool for detecting and measuring malnutrition in mothers-to-be. Though growth monitoring of pregnant women is a common activity in the developing world, this study will confine itself to growth monitoring of children.

An important premise of growth monitoring is that the periodic measurement of weight be used to monitor the pattern of an individual's growth. This notion of ongoing, periodic measurement differentiates growth monitoring from nutrition surveillance. While growth monitoring is oriented toward the individual and is used as a dynamic measure of his or her health over time, nutrition surveillance is performed on a sample of children as a measure of the health status of the entire child population.²

As defined above, growth monitoring by itself does not constitute a nutrition intervention. In the absence of related interventions, the act of monitoring the growth of a child cannot improve his or her nutritional well-being except through teaching the mother the relationship between

¹*Growth Monitoring as a Primary Health Care Activity.* Workshop Proceedings, Yogyakarta, Indonesia, 20-24 August 1984. Ford Foundation/Foundation for Indonesian Welfare (YIS), January 1985.

²See Jon E. Rohde, *Growth Monitoring--The Basic Tool of Primary Health Care* for a discussion of the differences between growth monitoring and nutrition surveillance.

good food, growth and child health. Yet, growth monitoring is an important component of many nutrition and health programs.

To illustrate the role of growth monitoring, consider Figure 1-1, a model of a typical nutrition program. Growth monitoring does not appear in the figure as a distinct intervention because of its indirect nature. Unlike the other interventions in the figure, growth monitoring is not related to only one sub-objective. Instead, growth monitoring operates through the other interventions as a device to make each work better. It is important to note in this regard that growth monitoring could be used to achieve the various sub-objectives, though the sub-objectives and interventions represented in Figure 1-1 are not necessarily present in all nutrition programs.

To see how growth monitoring cuts across the various sub-objectives and interventions, consider it in relation to each. Growth monitoring is often the center of community organization. It is the forum for one-to-one nutrition education and provides the impetus for group education sessions. Immunizations, oral rehydration therapy and curative treatment of many kinds are often linked to growth monitoring sessions. Targeting for supplementary feeding is often done through growth monitoring. Growth monitoring data can be used as a tool for impact assessment of specific nutrition and health interventions. Finally, the motivation for participation in a number of other agricultural interventions like home gardens is generated through the growth monitoring program.

1.2 Measuring Growth Monitoring Effectiveness

Any effort to measure either the effectiveness or efficiency of the growth monitoring component of a nutrition program should first identify precisely the role that component is to play in the larger program. Effectiveness or efficiency of the component can then be determined relative to that role and the importance of that role in the overall program can then be assessed. (Note that effectiveness refers only to whether the activity is working, while efficiency includes the notion of whether the costs of making it work are justifiable.) Simply put, change in the nutritional status of a population is not, by itself, an appropriate indicator of the effectiveness or efficiency of growth monitoring as growth monitoring is usually a necessary but not sufficient input to a program designed to change nutritional status.

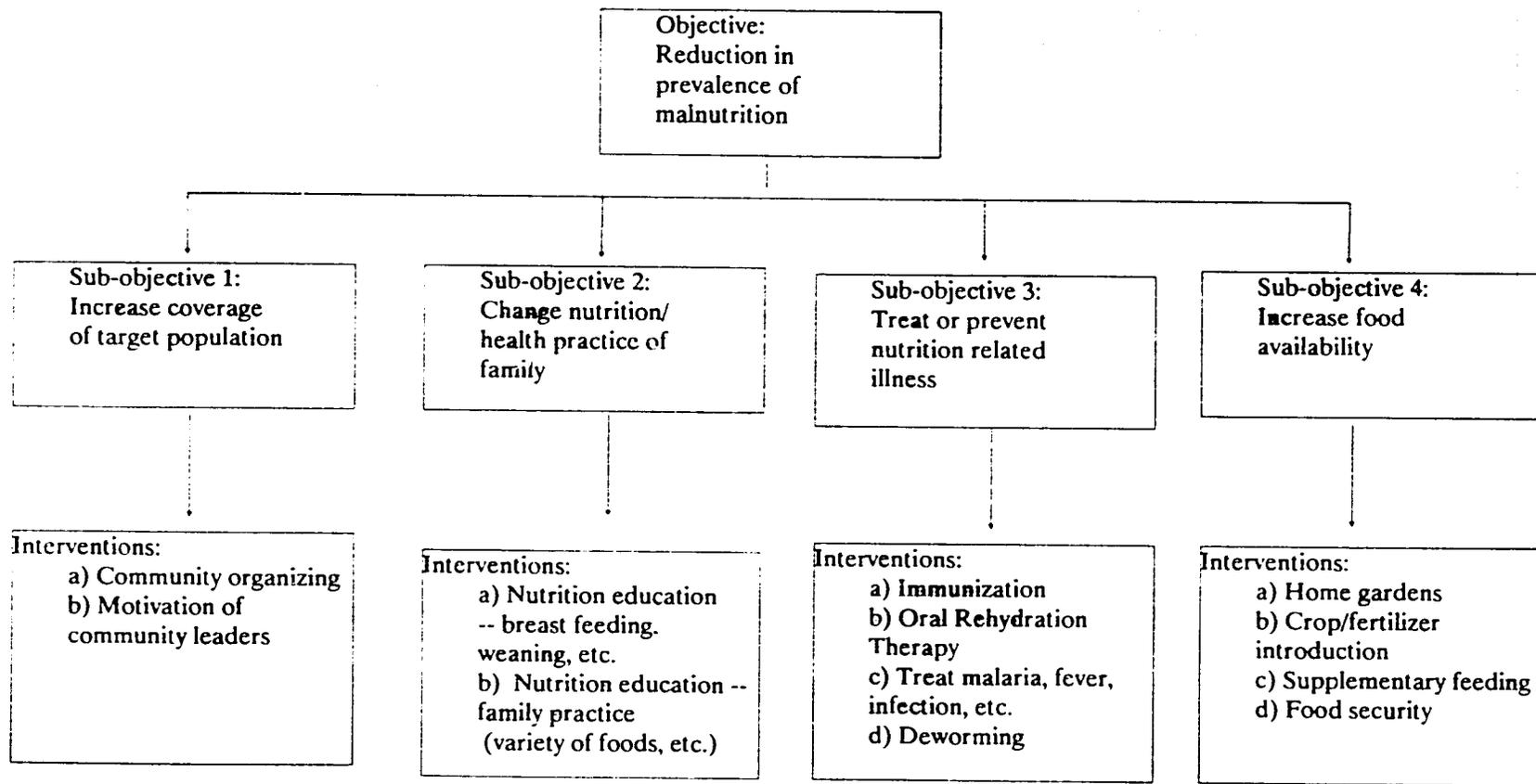


FIGURE 1-1: MODEL OF A NUTRITION PROGRAM

It is possible for the growth monitoring component of an intervention to be well executed, but due to weaknesses in the selection, design, or execution of the interventions with a direct bearing on health, neither the primary nor the sub-objectives will be met. In fact, a criticism of growth monitoring is that the time investment required to make the component work is sufficiently great that making it work becomes an end in itself. The critics argue that growth monitors often forget that the activity is only a means to a larger end. Given this complexity, the difficult issue of measuring the effectiveness or efficiency of a growth monitoring program must be addressed.

First, the specific role of the growth monitoring component in the larger intervention program must be defined. Generally, this role can be expressed in terms of the chain of events to be triggered by the growth monitoring component in order to achieve the sub-objectives and primary objectives of the larger program.

Consider a typical case. Children are to be weighed monthly with the specific objective of identifying those whose growth is faltering prior to their falling into a state of nutritional risk. Mothers of children whose growth is faltering are to receive special nutrition education in a one-on-one (health worker to mother) exchange. The children themselves are to be given a more complete clinical examination to search for disease-related causes of malnutrition. Relative to the nutrition program model in Figure 1-1, this case operates only on sub-objectives 2 and 3. Neither coverage nor food availability will change in response to this program.

To evaluate this typical case, it is useful to partition "success" into three components:

- a) are the mechanical aspects of the growth monitoring being executed well?
- b) are the nutrition education and treatment being given well? and,
- c) are the causes of malnutrition likely to be reduced through nutrition education and treatment of disease?

Each of the above questions needs to be posed and answered separately and in sequence in any serious effort to determine whether the growth monitoring activity is successful within the context of the larger program.

For example, the mechanical aspects of the program can best be assessed by determining the percentage of the children weighed every month; the percentage of the mothers of children whose growth is faltering who received special education; and the percentage of children who received in-depth clinical examinations. Inadequate execution of these mechanical steps might result in the failure to make progress towards the sub-objectives of the program.

But, even when the mechanical part of growth monitoring is done well, children may not regain normal growth patterns due to the inadequacy of the education and/or the inability of the health professionals to treat the illnesses detected during the clinical examination. This inability, in turn, might reflect weaknesses in training of the health staff or, more likely, breakdowns in the

logistical support systems such as drug distribution. Independent assessments of both the education component and the medical treatment component can be made but these do not necessarily reflect upon the growth monitoring.

Finally, the ancillary services, such as the education and treatment, may be executed well along with the growth monitoring but, due to the fact that the entire package fails to address the key factors contributing to malnutrition, the major nutritional status objectives of the program may not be achieved.³ It is important to note that this methodology for evaluation looks at the relationship between the health and nutrition conditions in the community, and at growth monitoring's role in the way in which the package of interventions addresses the situation. This approach to defining success in terms of a chain of conditions which must be met for an activity to be judged successful is generalized in Figure 1-2.

An additional issue needs to be considered in defining the role of growth monitoring in a larger program. Growth monitoring is often initiated to prevent children who are at-risk from becoming malnourished. Prevention is more difficult to measure than cure. It is easier (though not necessarily easy) to determine that a sick child was cured by a certain action than it is to determine whether a child who did not get sick remained healthy due to a particular action.

Consider as illustration a program which introduces a growth monitoring component through an already functioning health delivery system. Prior to the introduction of growth monitoring, cases of diarrhea were treated at the health post or clinic with oral rehydration therapy. As part of the growth monitoring component, mothers were counseled to use oral rehydration therapy at home prior to bringing their children to the clinic. The objective was to rehydrate children earlier in the course of the disease in order to prevent serious dehydration where treatment by the health-sector personnel was necessary. In order to determine whether the broadly defined growth monitoring project was successful (which includes the training of mothers in the use of oral rehydration therapy) one would need to know how many cases of diarrhea were treated effectively at home. This is far more difficult than counting the number of cases responding to treatment in a clinic or at a health post.

³Of course, it should be mentioned that there are factors which influence nutritional status which fall outside the domain of growth monitoring and the nutrition program. Agricultural and sanitation projects are two cases in point.

MECHANICS OF EXECUTION

If the mechanics of weighing children and identifying risk are done well, growth monitoring may be successful. If not, growth monitoring will be unsuccessful.

COMPLEMENTARY ACTIVITIES

If complementary activities (other interventions) are effective and children show improvement as a result of referral, then growth monitoring may be successful. If not, growth monitoring will be unsuccessful.

OVERALL DESIGN

If network of interventions is effective in reducing prevalence of nutritional deficiency, then project is successful. If not, project is unsuccessful due to the fact that it does not address the real problem.

FIGURE 1-2: COMPONENTS OF GROWTH MONITORING SUCCESS

Once a clear statement of the role of a growth monitoring component in a larger nutrition program is made, it is possible to seek sets of indicators which might measure the degree to which the growth monitoring component is being realized. This methodology for measuring success will be incorporated into a model which will be used in the course of measuring the influence of context on the "success" of growth monitoring in Indonesia.

This study will focus on the effect of community-level context (factors external to the program) on growth monitoring success. The indirect position of growth monitoring in relation to nutrition and health status results in these other factors playing a role in program implementation. Identification and specification of the influence of these contextual factors to inform policy is the focus of this study.

1.3 Growth Monitoring Objectives

In most cases growth monitoring centers around a periodic weighing session, usually monthly or once every three months. Weight, weight and height(length), and/or arm circumference are measured and charted on a master growth chart and on road-to-health cards for each child. The child's card enables the health worker and mother to witness a trend in the child's growth (usually two or three consecutive monthly measurements) as well as to quickly determine if the child has fallen below a critical level of growth (represented graphically as a "red line" or red area). Universal or, less frequently, local child growth standards are used as a reference. In this way, growth monitoring provides an indication of the nutritional status of the child.

A second activity that often takes place at periodic weighing sessions in many nutrition programs is some form of nutrition education for mothers. Usually a set of nutrition-related messages has been developed by the program that center around nutrition practices appropriate at various stages of a child's development, as well as practices appropriate when the child's growth falters over consecutive sessions. Often messages are transmitted in group sessions, then reinforced in one-on-one meetings with the mother in reference to her child's chart (one-to-one sessions may take place during the weighing session, or at a later time in the family home). Ideally, the child's nutritional status is related to one or more practices, reinforcing the mother's understanding of the relationship between dietary practice, sanitation, infectious disease, and the child's health.

In many cases, growth monitoring is only one component of a nutrition program, primary health care program, or an intersectoral program (integrated and multisectoral are synonyms) combining, for example, nutrition services with family planning services in the community. Often, the weighing session becomes the center and catalyst for other activities such as immunization,

oral rehydration therapy, vitamin A distribution, supplementary feeding, and education. Consequently, growth monitoring becomes indistinct from other services.

There is wide variation in the implementation and objectives of growth monitoring around the world. Participants in a workshop entitled "Growth Monitoring as a Primary Health Care Activity" (1985) laid out a wide range of possible objectives and applications. First, growth monitoring might be used to educate and motivate various target groups including mothers and health care providers about the health of children. This strategy is used to identify faltering growth and allow early action to prevent more serious malnutrition.

Second, growth monitoring might be used as a screening tool to identify children with faltering growth patterns, "to predict mortality and morbidity risk, and to target appropriate interventions to the most vulnerable groups."⁴ Third, growth monitoring might be used as an entry point for comprehensive health care. Since growth monitoring brings mothers and children into contact with the health system on a regular basis, it can be used as a contact point for other primary health care services.

Fourth, growth monitoring can be used as an entry point for women's participation. Since the child is often brought to the weighing post by its mother or a female sibling, the weighing session provides a good opportunity to extend health information and referral service to women. Fifth, the weighing session provides an opportunity for formation of community self-help efforts to address related problems.

Sixth, growth monitoring can be used by program managers to assess the health status of the target population, which is useful in planning appropriate follow-up activities. Seventh, information from growth monitoring can be used to assess the impact of other health or nutrition related interventions. Eighth, growth monitoring data and charts can be used to supervise the activities of the health workers and mothers, as well as the progress of the growth monitoring component itself. Finally, growth monitoring can be used as a tool for social, political and individual advocacy with regard to health and nutrition issues.

The objectives laid out above are by no means mutually exclusive. In fact, many health and nutrition programs use growth monitoring in many of the forms laid out above. However, growth monitoring can be more or less successful at meeting its objectives depending on a number of factors both in- and outside program control.

⁴*Growth Monitoring as a Primary Health Care Activity.* Workshop Proceedings, Yogyakarta, Indonesia, 20-24 August 1984. Ford Foundation/Foundation for Indonesian Welfare (FIS), January 1985.

1.4 Determinants of Growth Monitoring Success

Some authors have identified guidelines in areas such as program staffing and frequency of weighing. Many of these guidelines have not been quantified or supported analytically, but can be thought of as experiential insight into the implementation of a successful program. In this section some of these guidelines are laid out in order to lay the foundation for the research to follow. In general, it is important that all design components be adequate, or else the program is likely to be ineffective (Gopalan and Chatterjee 1984).

Growth monitoring is a means of collecting information about children. It does not directly provide supplementary feeding or any other direct nutrition intervention. Consequently, it is important that growth monitoring be integrated with other programs if it is to be successful in rehabilitating severely malnourished children. In fact, Griffiths (1981) suggests that the better integrated growth monitoring is with other health-related programs, the more useful growth monitoring can be to the community.

At the same time, some have stressed the importance of maintaining a strong distinction between the nutrition tracking and educational services provided by the growth monitoring component from the supplementary feeding or other curative interventions provided by the health center (Jeffalyn, Johnson & Associates 1984). This reasoning is based on two related ideas. First, the stigma associated with rehabilitation (i.e., that the need for curative measures reflect on the parent) should not be associated with participation in growth monitoring. Instead, growth monitoring should stress changes in nutritional status through positive changes in diet. Second, by separating the curative function, the mother will more likely understand that she is the principal actor in growth monitoring with respect to her child. The expert care provided by the doctor is something that the mother is not expected to participate in or understand. The dietary changes and subsequent nutritional improvement evolving from participation in the growth monitoring program are processes she must understand and take responsibility for.

In order to support this understanding on the part of participants, the program must strive to enroll children in the program while their nutritional status is good, and focus on maintaining good health. Enrolling at a time when the child is in good health enables the mother to learn about good nutrition practice without a curative intervention taking place. One strategy in this regard is to enroll children when they are younger than six months of age. This insures that the mother and child participate in growth monitoring before the child is weaned. Participation before weaning is desirable because a child is unlikely to be malnourished while breastfeeding is still taking place.

Much of the literature has underlined the distinction between growth monitoring and simple periodic nutritional assessment (Bhan, Ghosh, Arora and Paul 1986; Hendrata 1984). While periodic assessment consists of only measurement and classification, growth monitoring must include significant involvement on the part of the mother. Without the mother's involvement,

growth monitoring is less likely to be successful because there will be no fundamental change in family nutrition knowledge or practice.

In general, the level of interaction between mothers and health workers (and mothers and other mothers) increases the level of growth monitoring effectiveness. Limiting the people attending the workshops to an acceptable number increases the likelihood that mothers will receive some level of individual interaction with a health worker. A limit of 25 to 30 mothers per group has been suggested (Fajans and Sudiman 1983). Promoting the successful mother as a role model or teacher of others can serve to increase the teaching and transmission of the messages.

Furthermore, training of health workers should be ongoing, not a one-time event. This insures that the workers themselves understand measuring, charting and the health messages. In addition, by continually testing and upgrading health worker skills, the depth of their understanding can be enhanced, thereby increasing their usefulness and credibility in the community. Ongoing training coupled with adequate supervision of health workers is important to the success of growth monitoring.

It is important that the intensity of the program remain constant and regular. Measurement sessions must occur with regularity, and at an appropriate frequency (Drake and Timmons 1984). If measurement sessions occur erratically, the level and quality of participation will suffer. In addition, the measurement sessions should take place at enough locations that potential participants live within reasonable distance. It has been shown that there is a negative correlation between distance to the post and frequency of attendance (National Family Planning Coordinating Board (BKKBN), et al., 1986). Fajans and Sudiman suggest that participation is maximized when mothers live within 30 minutes walk of the post.

In the same way, a sufficient number of health workers must be on duty at the post to insure that the sessions run smoothly. The time it takes to measure and talk with each participant is magnified the fewer the health workers who attend the session. Long waits with children in arms can be very frustrating for a mother, and may discourage future attendance. In addition, long lines may cause the health workers to hurry, increasing the chances of measurement error, and reducing time spent discussing the growth chart and dietary practices with each mother.

Community leaders must also be involved in the measurement activity. Attendance of community leaders adds credibility to the program, and exerts some level of social pressure on mothers to attend. It is also true that their absence can be viewed as votes of non-support and, consequently, can serve to encourage mothers not to attend the sessions.

To insure a match between the program and community needs, an ongoing evaluation of the growth monitoring component should be implemented. Program objectives must be evaluated with respect to changes in the community, and implementation must be evaluated with respect to the objectives. The conditions within which growth monitoring occurs can change

quite quickly, and the successful program is flexible enough to change and respond to new needs as they arise (Drake, Miller and Schon 1983).

1.5 Growth Monitoring in Indonesia

In Indonesia, growth monitoring is a component of an integrated family planning, nutrition and health program (*KB-Gizi*). Historically, *KB-Gizi* is an enhanced version of an older Family Nutrition Improvement Program (UPGK), and was implemented in the province of Bali and in ten Regencies in East Java in 1979. The goal of the *KB-Gizi* program is to improve the health and nutrition status of children under five years of age while providing family planning education and services. More specifically, the Indonesian government has targeted a reduction in the infant mortality rate from 90.3/1000 to 70/1000, and a reduction in the mortality rate of children aged 1 to 4 from 17.8/1000 to 14/1000 by 1989.⁵ The implementing agency is the National Family Planning Coordinating Board of Indonesia (BKKBN). Some of the support for implementation in the two provinces was provided by USAID through its Village Family Planning/Mother Child Welfare Project.

By policy, the *KB-Gizi* program is implemented only in those communities where family planning acceptance is greater than 30%. The rationale behind this policy is that it will provide communities with an incentive to increase family planning participation. It also insures that it is only those communities with the greatest contact with modern medicine where the program is implemented.

The basic health/nutrition activities at the village (*banjar*) level consist of monthly weighings of children under five years of age (*balita*), as well as nutrition education for mothers regarding appropriate diets for pregnant and lactating women, and for children in the various stages of development. The program also refers severely malnourished children to the health center for treatment, and offers education on family planning, immunization, the use of oral rehydration solutions for the treatment of diarrhea, home gardening, and the raising of poultry, small livestock and fish.

In addition, "Nutritional First Aids" are distributed to the appropriate women and children. These include iron folate tablets for women in the third trimester of pregnancy, Vitamin A capsules for children over the age of one year, and prepackaged oral rehydration salts (oralyte) for children suffering from diarrhea.

The *banjar* weighing post (*pokbang*) is the center for all activity. It is equipped with a scale, growth charts, nutrition education aids, reporting and recording forms, facilities for the preparation of foods for demonstrations and feeding activities, as well as the "Nutritional First

⁵Government of Indonesia, Repelita IV (National five-year development plan for 1984-89).

Aids" described above. All activities are performed by village nutrition volunteers (*kader*). *Kader* are trained to implement the program in a two to five day training session and are supervised and assisted by sub-district level program staff.

Though the *KB-Gizi* program is a national one, implementation has been tailored to some extent to reflect local community needs and resources. This arrangement is a positive one in that it enables communities to operate the program in such a way that it addresses local needs. In the following paragraphs the implementation of the *KB-Gizi* program with respect to growth monitoring activities will be discussed. This discussion will focus on issues that have been raised with respect to program effectiveness.

Once the decision has been made to start *KB-Gizi* in a particular *banjar* the process of introducing the program into the *banjar* begins. The process is a careful one, where a great deal of time is spent discussing the *KB-Gizi* program with various community religious and traditional leaders, being sure to obtain their support for and participation in program activities. Once their support is obtained, it is the community leaders that actually introduce the program to the community. Fajans and Sudiman consider the support of these leaders essential to a successful program because of the influence they hold and the relatively authoritarian structure of most Indonesian villages.

The process of *kader* selection is considered by Fajans and Sudiman to be another crucial issue in the success of *KB-Gizi*. They attribute high *kader* drop out rates to selection on the basis of literacy as opposed to some other criterion. Two factors seem to be important in the selection of an effective *kader*. First, it is important that the prospective *kader* have some status. The most effective female *kader* are married and/or are village leaders. Men can also be effective because of their social influence. Second, the method by which *kader* are selected is important as well. It has been suggested that *kader* selected by the community or more effective than those selected by the village head.

Another important issue pertaining to the *kader* is the number trained. Twenty are selected per community according to program policy. While this may be appropriate in small communities, it has been recommended that a ratio of one *kader* for every 10-15 mothers is appropriate.

It has also been suggested that the frequency of *kader* training has bearing on *kader* effectiveness. Though the program has a policy of one-time training, some communities have initiated on-going sessions where program activities and problems are discussed. These sessions often occur in communities where strong supervision is in evidence. Ongoing training, and supervision and support from the program staff can increase the *kaders'* knowledge of the program, as well as increase their level of motivation.

Finally, the number of weighing posts has been found to be correlated with program participation. Increasing the number of weighing posts serves two important functions. First, it decreases the distance the mother must travel to come to the weighing. Second, increasing the

number of posts decreases the number of mothers that must be served at each post. Congestion at the post increases the general noise level, making education more difficult, and increases the amount of time each mother spends waiting. Fajans and Sudiman have recommended that the number of children registered at each post be less than 50.

1.6 The Effect of Context

Little research has been done on the effect of contextual factors on program implementation and success. However, there has been some work done which sets the stage for the analysis carried out in this study.

Porter (1979) has done research on the influence of environmental uncertainty on the evolution of indigenous agricultural and social systems in the semi-arid zone of eastern Africa. In addition, he discusses what happened to people and the system when a Western agricultural system was introduced during the colonial period. While this research does not appear to be directly relevant to the operations of a food and nutrition program in Indonesia, it does highlight the importance of environmental factors on the way in which social systems evolve and people behave.

Chon (1984) has done research on the effect of social equity on population pressure in relation to resource endowment in Mexico. She found that equity is important in defining carrying capacity, since control of the majority of land by a few leaves little for the many.

Junadi (1986) found that modernization has an effect on nutrition, health and family planning practices in Indonesia. Furthermore, he found that modernization reduces the differential in practices between high and low income participants. His work in defining a measure of modernization provided the groundwork for the modernization analysis in this study.

CHAPTER II

A MODEL FOR CONTEXTUAL ANALYSIS OF GROWTH MONITORING

2.1 The Importance of Context

The environments within which community-level interventions occur are dynamic. They vary between communities as well as within communities over time. The uniqueness of a single community at any time influences, to an often unknown or indeterminate extent, the success of the intervention. In the case of growth monitoring, it is certain that conditions as diverse as geographic features, modernization and other program activities affect program operations.

The influence of the context should be of great interest to program planners. To know, for example, that in less modern villages the distance between the home and the weighing post influences program attendance, would give the planner information relevant to program design and implementation. In this case, he or she might consider increasing the number of weighing posts in order to increase the rate of weighing post attendance or accelerate outreach efforts.

It is clear from previous studies that there is considerable variation in the implementation of the *KB-Gizi* program between communities in Indonesia.¹ This variation is due, in part, to variation between community-level factors external to the program. The fundamental question this study addresses is the extent to which various community-level contextual (non-program) factors influence household conditions in the community, as well as household participation in growth monitoring in the Indonesian *KB-Gizi* program. Because this study strives to provide decision-makers with guidelines relevant to growth monitoring planning and implementation, the focus of the study is on those design factors which can be manipulated by the program, and which have adequate variance in the Indonesian case.

¹Peter Fajans and Herman Sudlman, *The Indonesian National Family Nutrition Improvement Programme (UPGK): A Case Study of Seven Villages*. Submitted to UNICEF Jakarta, September 1983. And, National Family Planning Coordinating Board (BKKBN), the Universities of Udayana, Brawijaya and Airlangga and Community Systems Foundation, *KB-Gizi--An Indonesian Integrated Family Planning, Nutrition and Health Program: The Evaluation of the First Five Years of Program Implementation in West Java and Bali*. October 1986.

2.2 Measuring Growth Monitoring "Success" in Indonesia

Indonesia is a country which has made good progress towards the installation of a uniform growth monitoring program on a nationwide basis. However, in large parts of the country, the growth monitoring program, as part of a more broadly defined nutrition program, is linked to a well-established family planning program. As one might expect, among the people responsible for the program, expectations vary about the contribution of the growth monitoring.

Managers of the family planning program see the nutrition program as a means to induce households not yet coming to the family planning clinics to make an appearance at the clinic. Once in the clinic, it is hoped that exposure not only to the nutrition component of the project but also to the family planning component would increase family planning acceptance rates. Thus, from the perspective of the family planning personnel, the success of the growth monitoring would be measured according to the degree to which family planning acceptance rates increase among weighing post attenders.

Managers of the nutrition program see the linking of their program to that of the family planners as an opportunity to utilize existing infrastructure to promote better nutrition throughout Indonesia. Thus, from their perspective, the success of growth monitoring would be measured by its contribution to the overall nutritional objectives of the nutrition component of the project. Ultimately, the success of growth monitoring should contribute to the improvement of the nutritional status of Indonesia's preschool children.

However, due to the fact that so many factors influence the nutritional well-being of a population, using nutritional status as a measure of the effectiveness of a single component of a larger health program which touches on only a few of the causes of malnutrition in children and women is questionable. In Indonesia, the role of growth monitoring is relatively well defined so it is possible to seek other measures of success.

First, growth monitoring is intended to lead to the referral of children who are at risk to the health establishments capable of dealing with the source of that risk. Thus, growth monitoring should be associated with an effective referral system. Second, growth monitoring is the major mechanism for delivery of nutrition messages to the population. Thus growth monitoring should lead to greater knowledge, improved attitudes and changed practices regarding nutrition. Third, immunization is a part of growth monitoring in Indonesia; therefore, vaccination coverage might well be indicative of the effectiveness of the growth monitoring component of the health program.

In technical terms, the indirect indicators of the success of growth monitoring--referrals, nutrition knowledge, and vaccination coverage--are sensitive but not specific. That means that a good growth monitoring program will have positive effect on each of the complementary programs but that the indicators of the success of those programs may change in response to many factors other than the growth monitoring program. Thus, differences in any of the indicators among geographical locations may be linked to the growth monitoring but, equally likely, those

differences may be linked to other factors as well. This creates problems in using any single indicator as a proxy for a successful growth monitoring component. However, if one were able to demonstrate that the collection of indicators measuring performance of the direct interventions were higher in geographical zones where growth monitoring execution was good, one's confidence in the positive contribution of growth monitoring would increase.

In sum, the success of the growth monitoring component of the Indonesian nutrition program must be evaluated at three different levels. The first addresses the execution of growth monitoring itself. Are children being weighed properly and weights correctly recorded on the growth charts? Are malnourished children being identified? Are the attenders being immunized, receiving oral rehydration therapy when appropriate, etc.? These questions are all related to the execution of the basic growth monitoring service in Indonesia.

The second level of evaluation addresses the quality of the related activities. Since growth monitoring in Indonesia is, among other things, the center for other activities, the effectiveness of these activities must be evaluated. Are children who were referred recuperating? Is the level of knowledge higher for mothers who received education?

The third level of measuring success involves looking at the nutritional well-being of the population served. Unfortunately, because nutritional status is determined by many factors outside the domain of growth monitoring and related activities, it is not expected that this relationship is a strong one. Furthermore, there are additional factors which make it unlikely that significant relationships will emerge. First, age data in Indonesia are very inaccurate, as evidenced by age heaping. This, of course, results in imprecise nutritional status indicators. Second, the prevalence of malnutrition in Indonesia is low, thereby reducing variance in nutritional status indicators.

2.3 Expected Results

As mentioned earlier, the primary objective of this study is to investigate the influence of context on the success of the growth monitoring component of an integrated nutrition and family planning program in Indonesia. The analysis will be framed in such a way that statements can be made regarding the effect of context on various measures of growth monitoring success. Ultimately, the findings can be interpreted into policy relevant statements regarding the Indonesian program.

The subject of this study is the *KB-Gizi* program in Indonesia, and caution should be exercised in applying findings to other studies for the following reasons. First, though Indonesia has, in many ways, a "typical" program, it also has its own set of goals and objectives which may

or may not be shared by other countries. Consequently, the criteria by which the effectiveness of growth monitoring is evaluated in Indonesia are probably different than the criteria used elsewhere.

Second, since the study is designed to focus on the interaction between design factors and contextual factors, much of the analysis is centered on the effect of design factors. In Indonesia, as in many other countries, these factors are highly standardized across communities. Consequently, the design factors which could be used in this study were those which had some variance across communities. This means that in the analysis itself, questions regarding the effect of *kader* (health worker) training, for example, could not be examined.

In addition, study of one setting is always restricted, and certain contextual factors do not vary enough across communities to allow meaningful analysis. The nutrition profile of participants is a case in point. In Indonesia, the prevalence of malnutrition is relatively low. This fact influences the objectives and design of growth monitoring and related activities, as well as the criteria for evaluation.

However, this study does have some relevance outside the domain of the Indonesian program. Most importantly, the methodology employed utilizes various multi-level statistical techniques that allow one to make increasingly detailed statements about the influence of factors at one level (the community) on elements at another level (the household). This type of analysis is clearly of importance to program planners. Consequently, a secondary goal of this study is to evaluate the methodology employed.

2.4 A Growth Monitoring Model

The first step of the analysis is to determine a general model that describes "successful" growth monitoring. After this general model is described, the influence of contextual factors on success can then be examined. The specification of the model is difficult because, as outlined in the section on measuring success, growth monitoring can fill a variety of functions. Consequently, as universal a model as possible is specified. Figure 2-1 portrays this conceptual model.

Next, the model is made specific to Indonesia. Figure 2-2 shows the growth monitoring program portion of the model and available measures. It is this model on which analysis in this report is based. This model was developed using a process that utilized the current state of knowledge regarding growth monitoring implementation, then statistically tested and validated.

The first set of factors in the model are the design elements. In the end, it is these factors about which statements will be made. The interaction between the design of the growth

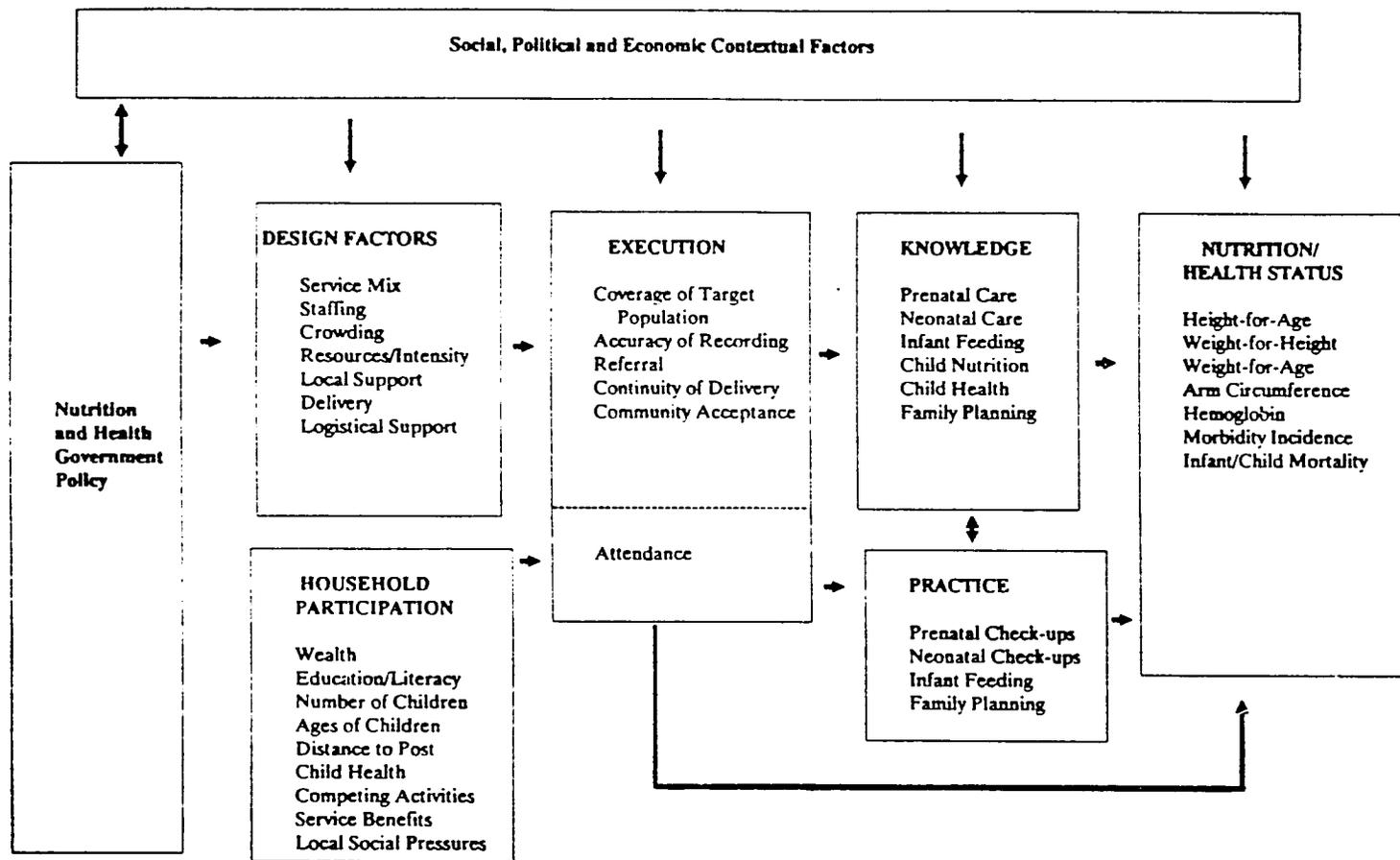


FIGURE 2-1: GENERAL PROGRAM PARTICIPATION EFFECT MODEL

19

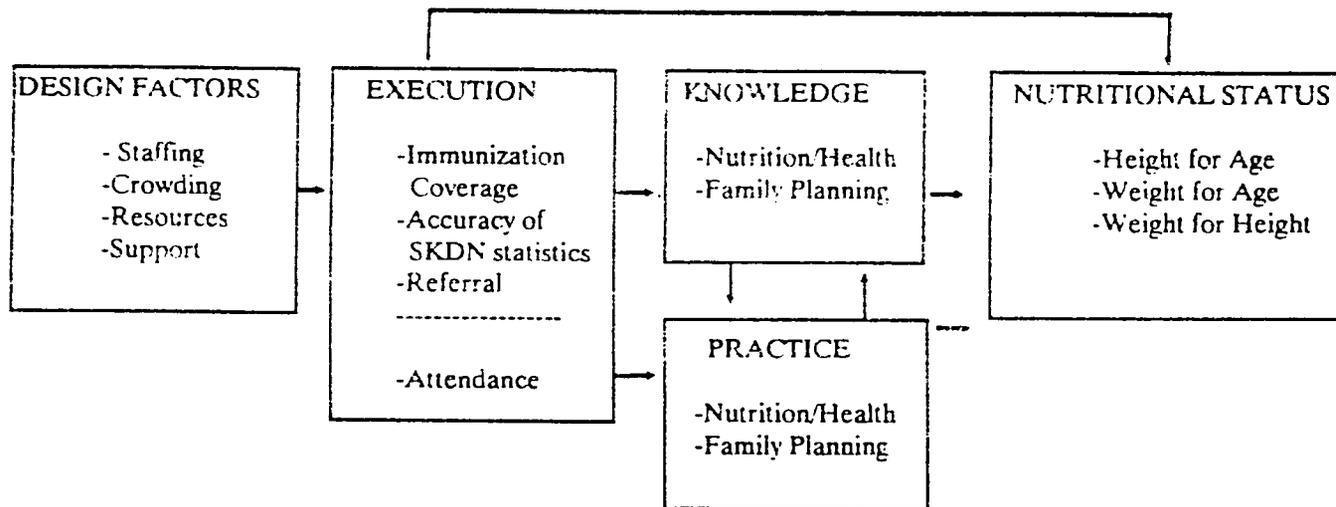


FIGURE 2-2: INDONESIAN PROGRAM PARTICIPATION ANALYSIS MODEL

19

monitoring component and contextual factors is of ultimate interest in this report. However, at this stage of the analysis, the hypothetical link between design factors and quality of execution is presented.

In a general sense, these design factors should include elements not shown in the model. The level and type of *kader* training and the means of program introduction into the community are among the growth monitoring design factors that have been thought to be important to successful implementation. However, in the Indonesian program these factors are held constant, making meaningful analysis impossible. In fact, a high level of program standardization exists even in the elements included. So, although there is some variance, it may be that determining threshold levels of design variables will be impossible because communities below the threshold do not exist in Indonesia.

The second stage of the model is growth monitoring execution. The issue of concern here is whether the various growth monitoring activities are well executed. These activities include the weighing of *balita* (children under five years of age), accurate charting of weight on KMS cards, provision of related services including immunization and oral rehydration therapy (ORT), detection of at-risk children and referral to the appropriate place, and nutrition/health education.

Quality of execution is a very important factor in this model. If program design elements are appropriate, and quality of execution is good, then one might determine growth monitoring to be successful. On the other hand, if no one attends, it is probably the case that the package of growth monitoring and related programs do not meet the needs of people in the community. Consequently, attendance is portrayed here as a component of program execution. If the program is executed well and is designed to meet a real need, then attendance will be good.

Since the question of attendance is a critical one, some of the factors which go into the household's decision to attend the weighing post are included in the model. These factors must be considered for two reasons. First, it is important to control for, or at least accurately characterize, the influence of household demographic characteristics which have bearing on the decision of whether or not to attend. Second, the relative weight given to the costs and benefits of attending the weighing post under the various contextual conditions must be characterized. The interaction of program design factors and contextual conditions relative to the decision to attend is a question of great interest.

The third major link in the model is that between attendance and knowledge/practice. A sub-objective of the *KB-Gizi* program as a whole, and of the growth monitoring component in particular, is to improve the nutrition and health related knowledge of attenders.² If related practices are adhered to, nutritional status is improved. Previous analysis has shown that

²See Lucas Hendrata, *Growth Monitoring: Basic Concept, Management Strategy and Operational Issues*.

knowledge does not always precede practice.³ In fact, it seems to be that practice reinforces knowledge, and vice versa. Consequently, knowledge and practice are shown in a recursive relationship.

Finally, it is hypothesized that changes in nutrition/health knowledge and practice will lead to a positive change in nutritional status of the children. However, there are reasons why the analysis is not expected to show a significant relationship between practice and nutritional status. First, previous analysis has shown that there is substantial inaccuracy in the nutritional status data. The effect of this misclassification will be discussed in some depth later.

Previous analysis has also shown that growth monitoring has little direct effect on the nutritional status of participants. This may be due in part to the large number of factors which influence nutritional status, and are impossible to control for in a statistical sense. However, it may also be due to the limited power of simple bivariate statistical techniques. One goal of this study is to employ a potentially more powerful multivariate approach which may help control for these other factors.

³National Family Planning Coordinating Board (BKKBN), et al.

CHAPTER III

DATA AND METHODOLOGY

3.1 Data Collection Procedure

The data were collected in summer of 1985 as part of an evaluation of the Integrated Nutrition and Family Planning Program (*KB-Gizi*) in Indonesia. The survey was conducted to investigate household knowledge, attitude, behavior and characteristics related to family planning and health and nutrition of *balita* (children under five years old).¹ In the province of Bali 1180 households were surveyed, and 1278 households in the province of East Java.

Because the focus of the *KB-Gizi* evaluation was to determine the effect of the program on pregnant and lactating women and children under five years of age, a proportionate sampling scheme was used in conducting the survey. The household behavior survey used proportionate samples such that seventy-five percent of women interviewed had *balita* and twenty-five percent were without *balita* whether married or unmarried.

This study makes use of the data from Bali and East Java. The two data sets were combined in order to generate a data set with a sufficient number of observations to test for differences between contextual conditions. As a result, data on 3400 *balita* from 2500 households in 93 communities were used in the analysis.

3.2 Construction of Indexes Used in Analysis

Some of the indexes used in this analysis were developed and tested during the *KB-Gizi* evaluation.² Others were developed specifically for the growth monitoring analysis. Following is a summary of each of the composite indexes used in the growth monitoring analysis.

¹Community Systems Foundation, *Survey Design: Final Sampling Scheme*. Working Document 11: January, 1986.

²National Family Planning Coordinating Board (BKKBN), et al.

3.2.1 Program Design Factors

Support by Various Leaders at Weighings -- This composite index was formed on the basis of a series of questions asking whether each of nine different community leaders and program officials attend the weighing post regularly.

- PLKB (village family planning field worker)
- PLKB Supervisor
- Kelian (sub-village headman)
- Village Mayor
- Secretary of Village Mayor
- Midwife
- Immunizer
- Doctor
- Kader (health worker)

Program Staffing -- The number of *balita* (children under 5) in the community was divided by the number of trained, active *kader* (health workers) to determine a measure of program staffing. Communities were then assigned to three groups of equal size corresponding to relatively low, medium and high levels of staffing as shown below. The communities ranged from an average of 4.9 households per trained *kader* to 842 households per trained *kader*. There were even some communities that had no trained *kader*, which were placed in the low group.

Program Intensity -- A composite index was calculated where each of the following were given equal weight:

- Staffing (see above)
- Number of weighing stations in the community
- Whether weighings were consistent
- Whether weighings held monthly
- Whether food distributed at weighings

Communities were then assigned to three groups of equal size corresponding to relatively low, medium and high levels of program intensity.

Balita per Weighing Post (Crowding) -- The number of *balita* was divided by the number of weighing posts in the community to determine a measure of crowding at the weighing post. The communities ranged from an average of 18 *balita* per weighing post to 322 *balita* per weighing post. Communities were then assigned to three groups of equal size corresponding to relatively low, medium and high levels of crowding.

3.2.2 Household Factors

Family Wealth Index -- Since no direct inquiry was made concerning family income, a composite index was constructed on the basis of family ownership of the following eleven items:

- | | |
|-------------------|-------------------|
| 1. Radio | 6. Kerosene stove |
| 2. Watch/clock | 7. Television |
| 3. Sewing machine | 8. Furniture |
| 4. Mattress | 9. Bicycle |
| 5. Kerosene lamp | 10. Motorcycle |
| | 11. Automobile |

The survey contained a series of dichotomous questions, where the family answered "yes" or "no" to ownership of each of the eleven items.

The composite index was constructed applying a statistical technique called stochastic cumulative scaling (SCS). The underlying assumption of this technique is that the probability of ownership of a given item is conditional on prior ownership of other items that most households would need or desire before acquiring the given item. Thus a scale and weighting are determined based on the frequency of ownership of each item in the data set under study. Furthermore, if a particular item does not fit well into the sequence of acquisition (e.g., people do not necessarily acquire a radio prior to acquiring a watch), it is dropped from the composite.

There are two advantages to using this technique in constructing the measure of wealth in the case of the Indonesia data. First, by using the data, it is possible to give a relative weight to each of the items based on the observed frequency (probability) of ownership. This is a more accurate technique than merely weighting each item equally. Consequently, SCS provides a continuous, interval measure of wealth. Second, it enables one to formulate an index that is comparable between the two provinces. This is important because availability of goods, and consequently the sequence of ownership, follow different patterns on Bali and East Java. In the end, the scales and items used to determine the wealth index in each of the provinces turned out to be somewhat different (and thus comparable).

Woman's Education Index -- The highest grade completed by the woman was recoded into a measure of her education.

Distance to Weighing Post -- The interviewer was asked to observe and estimate the distance between the respondent's house and the weighing post (in meters). The accuracy of these estimates is somewhat suspect, given the heaping that results when histograms are generated. At the same time, accuracy to the nearest meter is not important to this analysis, especially since it makes more sense at times to recode the response into broader categories.

Two such measures were generated. The first was calculated in such a way that the number of attenders in each of the groups were of significant size, and substantial distance breaks occurred between each of the groups. A second recoding of this variable was also calculated. The reason for creating the second measure was that a measure with a greater number of groups was needed for some of the analysis, and groups based on some of the guidelines in the literature were preferred.

3.2.3 Quality of Program Execution

Accuracy of SKDN Statistics -- Analysis was performed in order to determine the determinants of a "successful" program, where success is measured by quality of execution. The first way in which "quality of execution" was measured was by comparing the SKDN statistics submitted by the community, with the sample data obtained through the survey.

The SKDN monitoring system in Indonesia has four principal indicators:

S: The number of *balita* (children under five years of age) in the *banjar* (community);

K: The number of *balita* in the *banjar* registered in the program;

D: The number of *balita* weighed in the previous month;

N: The number of *balita* exhibiting weight gain in the previous month.

These four indicators are used at the *banjar* level to measure program coverage (K/S), program participation (D/K), and program effectiveness (N/D). The Indonesia data set contained the SKDN statistics that the *banjar* reported in the previous month.

The following indexes were also created at the household-level. EVAT is a binary index which measures whether the household had ever attended the weighing post. PERAT measures the percent attendance in the last 12 months. If the *balita* were younger than 12 months of age, PERAT was appropriately adjusted.

It was reasoned that K/S should be approximately the same as the percentage of *balita* in the sample that had ever attended the weighing post as measured by EVAT. Further, D/K is analogous to the mean rate of attendance for the community of those that have ever attended as measured by PERAT. Though the match is not an exact one due to the fact that the survey is based on a sample, where the SKDN statistics are based on all *balita* in the community, the two measures should be approximately equal.

The logic of the approach was to compare the survey statistics to the weighing post statistics, and use the discrepancy as a measure of quality of execution. In communities where

execution is poor, the SKDN statistics are likely inaccurate. The total discrepancy was calculated, and communities were split into two groups corresponding to relatively "good" execution (upper 50% of the communities) and relatively "poor" execution (lower 50%).

Immunization Coverage of Attenders -- Immunization coverage of ever attenders was also used as a measure of program execution. Immunization coverage was selected because immunization is one of the "tangible" benefits of program participation. In communities where a high percentage of the ever attenders had been immunized, the program was probably well-executed. The measure was determined by calculating the percentage of ever attenders who had been immunized within each community. Then, communities were classified in two groups of equal size corresponding to relatively "good" and "not good."

Rate of Attendance at Weighing Post -- The rate of attendance over the last 12 months was calculated, and adjustments made for *balita* younger than 12 months of age. If the *balita* had never attended the weighing post, his rate of attendance was designated to be 0. The same value was given to *balita* whose mothers said they had attended, but had not done so in the last 12 months.

3.2.4 Program Outcomes -- Knowledge

Health Knowledge -- This index was generated based on the respondent's knowledge of 1) vitamin A supplements; 2) immunizations; 3) symptoms of diarrhea and rehydration; and 4) the use of Oralite (oral rehydration solution).

Infant Nutrition Knowledge -- An index of knowledge of infant nutrition was calculated based on knowledge of program messages regarding nutrition. This index is made up of knowledge of 1) food groups; 2) breast feeding; 3) weaning; 4) feeding frequency.

Nutrition Knowledge -- This index was generated based on the respondent's knowledge of 1) the purpose of weighing; 2) age for immunization; and 3) the components of the infant nutrition knowledge index outlined above.

3.2.5 Program Outcomes -- Practice

Nutrition Practice -- An index of current nutrition practice was formed by evaluating the food eaten by the child the previous day, based on the age of the child.

Infant Nutrition Practice History -- The nutrition practice history index was formed on the basis of when the child was weaned.

Family Planning Practice -- This index was used because of the interest in seeing whether participation in growth monitoring affects family planning acceptor rates. The index is based on whether contraception had ever been used, the type of contraceptive and the number of children when family planning started.

3.2.6 Program Outcomes -- Nutritional Status

Nutritional Status (HAZ, WHZ, WAZ) -- Weight, height and age data from the survey were used to determine nutritional status by using NCHS/CDC standards to assign height for age, weight for age and weight for height expressed as z scores

These indicators are not accurate due to the fact that the measurement of age was difficult to obtain accurately (the sample distribution of ages shows severe heaping), despite the use of very reliable measurement protocol. Consequently, it is likely that tests of significance are affected. This inaccuracy and associated problems are well documented in the *KB-Gizi* evaluation.³

3.2.7 Contextual Factors

Analysis was conducted for five contextual factors: community modernization, government intervention, community organization, average education and community acceptance of modern medicine. These contextual factors were selected because they are different in several ways. First, the measures were created using different procedures. Modernization is measured using a composite of six survey questions which are combined. Communities are grouped using cluster analysis. The measures of government intervention and community organization are based on responses to a number of survey questions regarding the existence of particular programs or organizations in the community. Communities were then split into three groups of equal size. The measure of average education is actually based on household-level data. The average level of education in each community was calculated, and communities classified in three groups accordingly. The measure of acceptance of modern medicine is a direct assessment by the health post doctor.

A second difference in the contextual factors is the nature of the phenomenon each is measuring. Modernization is a social/development process considered very important in Third World planning. Government intervention is a measure of other program activities currently taking place in the community. This is a contextual factor that is technically manipulable at a macro

³National Family Planning Coordinating Board (BKKBN), et al., p. 59.

level. Community organization is a variable that can be influenced from the central level, but is more a measure of activity at the community level. One interesting comparison is that between government intervention (a "top-down" approach to development) and community organization (a "bottom-up" approach). Acceptance of modern medicine is a less easily observable phenomenon which is significantly different (according to a chi-square test) from modernization.

A third difference is the nature of the hypothesis to be tested. One would expect that the more modern and educated the community, the less need for, and better implementation of growth monitoring and the *KB-Gizi* program. In the case of government intervention and community organization, the question of interest is in synergism between the various programs. Finally, in the case of acceptance of modern medicine, it is expected that there is general support for the program where acceptance is high. To compare implementation and effect of the program under various levels of acceptance should give insight into its effectiveness according to acceptance.

Level of Community Modernization -- The measure of community modernization is made up of the following variables:

- Type/quality of roads
- Percentage of households with television sets
- Market activity
- Schools
- Recreational facilities
- Availability of electricity

A summary index was formed by weighting each of the above equally, and three groups corresponding to high, medium and low were formed using cluster analysis.

Government Intervention Activity in the Community -- The survey asked which of 22 types of programs currently or ever existed in the community. The "yes" answers were summed to obtain a measure of other program activity. The communities were then assigned to three groups of equal size corresponding to high, medium and low levels of intervention activity.

Other Community Organization Activity -- The survey asked which of sixteen community groups exist and meet regularly in the community. The "yes" answers were summed to obtain a measure of organization activity in the community. Communities were assigned to three groups of equal size corresponding to low, medium and high.

Average Level of Household Education in the Community -- Average level of education was determined by averaging the household education index (same as woman's education index, outlined above except values are summed for husband and wife) over the community.

Acceptance of Modern Medicine by the Community -- The survey asked the health center doctor to rate how the people of the community accept modern medicine -- low, medium or high. This variable was used directly.

3.3 Overview of Methodology

As mentioned above, communities were split into three groups corresponding to high, medium and low for each of the program design and contextual factors. To begin, analysis of variance is employed to test for significant differences in household-level and child-level factors. The Kruskal-Wallis nonparametric analysis of variance test was used. Though this is a relatively weak test, it is valid when used with ordinal data. In addition, cross tabulations and chi-square tests of significance were employed to test for relationships between design factors and contextual factors at the community level.

Subsequently, analysis was conducted to test for the effect of program design factors and contextual factors on household/child participation in growth monitoring. This was done first by employing a covariance structure model which describes growth monitoring participation. The model was tested using the structural equations program EQS. Data were then grouped according to program design and contextual factors, and the model run on each subset of data. Comparisons were then made between path coefficients in order to determine the effect of the community-level factor on the strength of relationships hypothesized in the model.

One goal of this study is to validate this approach with the household participation model. Consequently, the approach will be evaluated by comparing results to those obtained using ANOVA. Any severe contradictions would suggest that such an approach is not valid.

The structural modeling approach used in this study is really a variation of Multiple Classification Analysis (MCA). Instead of a multivariate regression model, a structural model is determined, then path coefficients (the equivalent of standardized regression coefficients) are determined for each group. Then, as in MCA, coefficients can be compared. The advantage of using structural models as opposed to regression models is that a more complex set of relationships can be specified and tested.

While these two approaches are powerful, they are limited in that they require the community-level variables to be defined as a limited number of categories. While this is appropriate in many cases, it limits what one can say about the influence of context, especially in the case where the community-level measure is interval scale. In this study, the community-level factors are not easily measured, and consequently this approach does yield useful results.

A final approach that was considered in this analysis is one where the researcher can utilize interval data at the community level, and generate regression coefficients for these variables

as well as those at the household level. This can be done by determining structural equations which partition the micro-level regression coefficient into effects of the various macro-level variables, and an additional term, which reflects the direct influence of the micro-level variable.⁴ Using this method the effect of an increase in one unit of a macro-level variable on the outcome, a micro-level variable, can be determined.

While this technique could be very useful in modeling the relationships of interest, especially where the community-level variable is continuous, there are some circumstances which restrict its application in this study. First, it requires very large data sets. Since the process is one of running regression simultaneously at the macro and micro levels, it is necessary to have enough contexts as well as enough cases within each context to determine a reliable regression equation. In this case, we have less than 27 household observations (on average) in each of the communities (not including missing values). Second, because the technique is regression based, it requires that all independent variables be treated as an interval scale. It would be difficult to measure the concept of modernization using an interval scale measure.

⁴William Mason, *Some Statistics and Methodology of Multi-level Analysis (DRAFT 1)*. Ann Arbor, The Population Studies Center of the University of Michigan, 1980. And, Barbara Entwisle and William M. Mason. *Multilevel Effects of Socioeconomic Development and Family Planning Programs on Children Ever Born*. Ann Arbor, The Population Studies Center of the University of Michigan, 1984.

CHAPTER IV

PRELIMINARY ANALYSIS

The findings from the analysis of Indonesia are reported in the following chapters. The technical documentation for these findings can be found in the second interim report of this project.¹

4.1 Differences in Outcome Indicators Between Attenders and Non-Attenders

The first question of interest is whether growth monitoring and the *KB-Gizi* program are meeting fundamental objectives at the household level. Given the model laid out earlier, there are three classes of household-level variables that can be considered measures of program success. Measures of knowledge, practice and nutritional status are examined as the rate of attendance increases.

In most cases the pattern is one where as attendance increases, so do levels of knowledge and practice. Furthermore, the differences remain consistent when family wealth and mother's education are used as controls. This finding is an encouraging one. It appears that the program may have a positive effect on knowledge and practice.

At the same time, one must consider this finding in light of another consideration. The attenders and non-attenders were not given the intervention as might be done in an experimental design (random assignment); rather the comparison is between those that choose to attend and those that do not. Those that choose to attend likely are predisposed to accept program messages, and adhere to practices suggested. While improving the knowledge and practice of those that choose to attend is indeed important, this analysis does not account for predisposition, and it should not be inferred that the act of attendance (outside of the desire to attend) is sufficient to improve knowledge and practice.

It is also true that the nutritional status of attenders is no better than that of non-attenders. As mentioned earlier, this finding is not unexpected for a number of reasons. First, a cursory examination of the age data indicates that they are not accurate. "Heaping" on seven- and twelve-

¹ *Interim Report #2* dated October 12, 1987.

month intervals provides evidence that, despite rigorous data collection protocol, inaccurate data were obtained. This inaccuracy, of course, has a significant effect on the accuracy of the anthropometry.² Second, this finding is also not surprising because there are many other factors that influence nutritional status that fall outside the domain of the *KB-Gizi* program. It is likely that these intervening variables mask the relationship between program attendance and nutritional status. Third, the prevalence of malnutrition is not particularly high in the Indonesian sample area (or Indonesia in general). As a result, the variance of the anthropometry is limited. One might expect to see more easily a relationship between program attendance and nutritional status in an environment where prevalence is high.

4.2 The Influence of Program Design on Success

Given that attenders have better knowledge and practice than non-attenders, it is of interest to know whether the difference varies according to program design. There are a limited number of design factors which are appropriate to this analysis. Analysis is performed here in order to determine which, if any, of these factors are related to program success.

Analysis found that there appears to be almost no relationship between design characteristics and program success. This is probably due to the fact that design characteristics are relatively standardized and generally adequate within the Indonesian program. In addition, communities were designated into groups corresponding to low, medium and high levels of each of the design elements in a more or less arbitrary way. If more general rules of adequate levels of each of these factors had been utilized in making the distinction, it is likely that significant findings would have emerged. However, given the adequate levels of these design elements in the vast majority of the communities, if this strategy had been utilized during the formation of the indices, the number of communities that fall into the "inadequate" group would be extremely small. This circumstance severely limits the power and reliability of statistical tests, and consequently the approach was not employed.

One significant relationship is that between staffing and quality of execution (as measured by accuracy of SKDN statistics and immunization coverage of attenders). The fact that medium to highly staffed programs are better executed than programs where staffing is low suggests that adequate levels of staffing are important to program execution.

Another significant finding is that as the number of *balita* for which the weighing post is responsible decreases, the percent that have ever attended and the average rate of attendance increases. This probably has to do with crowding at the weighing posts, which adds to the time it takes the mother to complete all activities.

² For a more complete discussion of this issue, see National Family Planning Coordinating Board, et al., p. 59.

4.3 The Effect of Quality of Program Execution on Success

Next the effect of quality of execution on attendance, knowledge, practice and nutritional status is examined. In general, analysis results support the idea that a well-run program results in good attendance, as well as better knowledge and practice of attenders. The model is less clear cut when the relationship between good program execution and nutritional status is examined.

Family wealth and mother's education confound the relationship between quality of execution and household-level outcome measures to some extent. At the same time it is clear that quality of execution is still significantly related to attendance variables. What is reassuring is that quality of execution remains a significant factor, even when these other factors are statistically controlled.

Further analysis found that immunization coverage of ever attenders is a stronger determinant of effectiveness (as measured by knowledge, practice and nutritional status indices) than accuracy of SKDN statistics. However, the strong findings in both cases indicate that well-executed growth monitoring and related programs have more impact on their communities.

4.4 The Effect of Context on Factors Outside the Domain of the Program

The need for the program can be assessed by describing the differences in household conditions according to the level of each contextual factor. Such information enables the program planner to target communities according to context. It is not surprising to find that there are significant differences in household background factors according to levels of each of the contextual factors.

Modernization, community organization, average education and acceptance of modern medicine all correspond to average levels of wealth and education. Given the objective of improving the nutritional status of the low-income children of Indonesia, it appears that a larger percentage of the target group resides in communities where the levels of these contextual factors are low.

There are also significant differences in education and wealth according to the level of government intervention. The average household wealth and level of woman's education is significantly lower in communities where the amount of government intervention is high. This may be due to the fact that poorer communities are targeted to receive government programs.

4.5 The Effect of Context on Factors Inside the Program Domain

When the influence of modernization and average education on knowledge and practice indicators is described, a clear and significant pattern emerges -- knowledge and practice are better in the more modern and better educated communities. On the other hand, these contextual factors have no relationship with infant nutrition knowledge and nutrition practice history. This may have to do with the tendency to bottle feed in more modern communities.

Analysis was also conducted to determine the effect of modernization and average education on nutritional status. Nutritional status, as measured by height for age and weight for height, is significantly better in more modern and better educated communities. This is to be expected given higher average levels of wealth and education in these communities. Weight for height is not significantly different. The relationship between level of modernization and nutritional status is an important one as previous analysis has shown that there is no significant difference in the nutritional status of attenders and non-attenders. This finding reinforces the notion that it is the low modernization/education communities that are most in need of the *KB-Gizi* program.

Analysis suggests that government intervention has little effect on knowledge and practice in general, though there may be some reinforcement of health messages in other programs. In general, we wouldn't expect that the level of intervention would have much impact on knowledge, practice or nutritional status indicators.

The effect of government intervention on nutritional status is also determined. There is no consistent pattern except that in the cases of weight for age and height for age, the communities where intervention is low have the lowest average nutritional status. This is surprising in that previous analysis has shown that communities where intervention is high have the lowest average wealth and education. This suggests the possibility that government interventions directly or indirectly improve nutritional status of children.

In the case of community organization, there is again a correspondence between context and knowledge, practice and nutritional status indicators. The strength of these relationships suggests that community organization is a key contextual factor. It may be that program messages are spread to non-attenders through existing community organizations, and that organizations like the PKK (mothers' group) go into the community to spread messages and encourage good practice.

Next, the impact of acceptance of modern medicine is examined. A strong positive relationship exists between acceptance of modern medicine and knowledge and practice indicators. The analysis verifies what one might expect. The effect of acceptance of modern medicine on nutritional status is also determined. In all cases the average nutritional status indicator is highest in communities where acceptance is high.

CHAPTER V

THE EFFECT OF CONTEXT ON PROGRAM SUCCESS

The objective of this chapter is to examine the effect of context on the operation of growth monitoring in the *KB-Gizi* program. An important premise of this chapter is that adequate levels of the design factors are necessary for successful program implementation. Descriptive statistics show that these design factors are indeed adequate in the vast majority of the communities under study. Consequently, the focus of this section will be on relative effectiveness of the program in relationship to context. This section is divided into three sections: 1) the relationship between context and implementation; 2) the relationship between context and attendance; and 3) the relationship between context and the magnitude of difference between attenders and non-attenders.

5.1 The Relationship Between Context and Program Implementation

In general, analysis finds little evidence that there is a relationship between any of the contextual factors tested and program design. At the same time, there are correspondences among community organization, average education and acceptance of modern medicine and quality of program execution. The fact that programs which are not better designed are better executed lends some support for the idea that context plays an important role in program execution outside of design characteristics.

It may be that this difference in execution can be explained by better education and ability of *kader* (health workers) in communities where these contextual factors are high. The reasons for this difference were discussed during the second phase site visit to Indonesia, where people active with the program confirmed that this was a likely explanation.

5.2 The Relationship Between Context and Program Attendance

Given what is now known about the relationship between program need and program execution, it is important to explore the number of people participating in the program according to context. A well-executed program that is not well attended is of little value.

Analysis shows that there is a correspondence between each of the contextual factors and attendance. It appears that the program is generally better attended where the contextual factor is high. One would expect attendance to be better in more developed communities.

In addition, the question of distance was explored. It has long been known that the further the family lives from the weighing post, the less likely it is to attend. Analysis here as well as in other reports suggests that families that live within 500 to 1000 meters of the post participate more fully in the program. But the magnitude of that negative relationship is influenced by the contextual factors to some extent.

In all cases, the worst attendance is found in communities where the contextual factor is low. However, education appears to mediate this negative effect to some extent. In other words, distance has less negative effect on attendance for families who are well educated.

One exception to the general findings stated above is modernization. While there is a significant difference in ever attendance related to modernization, there is no difference in the rate of attendance. Since regular attendance is crucial to program success, especially since one criterion for health post referral is no weight gain over three consecutive months, this finding suggests that there is no meaningful difference in attendance according to levels of modernization.

With respect to community organization and government intervention, there is a significant difference in both ever attendance and rate of attendance. This suggests that community organizations and government programs support *KB-Gizi*, or encourage attendance in some way. Discussions with Indonesian colleagues involved in the program suggest that much of this may be due to the PKK (mothers' group). If the PKK supports the *KB-Gizi* program, mothers (even those not involved in PKK) are more likely to attend. A report released after this analysis was conducted suggests that the PKK support is very important to attendance and successful implementation.¹

¹Wirawan, Dewa Nyoman. *Survei Perilaku Rumahtangga, Th. 1985: Propinsi Bali (Seri 2: Laporan Utama)*. December 1986.

5.3 The Effect of Context on Differences Between Attenders and Non-Attenders

Next, it is useful to know the magnitude of program impact according to context. Analysis has shown that attenders have higher levels of knowledge and practice than non-attenders. In addition, there is a correspondence between the level of each of the contextual factors and knowledge and practice. Additional information concerning the strength of this relationship can be obtained by examining the difference in knowledge and practice of attenders and non-attenders in each level of each context.

In general each of the contextual factors influenced the difference between attenders and non-attenders. First, in low modernization and low average education communities, attenders always show significantly better knowledge and practice. Where the contextual factor is medium, the difference is always significant, but not highly significant. In communities where modernization and average education are high, some of the differences are not significant. The pattern of significance suggests that the difference in knowledge and practice is greatest in communities where the level of modernization and average education is low.

This makes sense since the knowledge and practice in low modern/average education communities is lower regardless of the program. There is a correspondence between each contextual factor and average knowledge and practice for both attenders and non-attenders. Attenders, as discussed above, almost always score better within each group than non-attenders. At the same time, the difference in knowledge and practice between attenders and non-attenders is generally large where modernization/average education is low, moderate where context is medium, and small where context is high. This suggests that the program's effect is to bring attenders in communities where modernization/average education is low and medium to levels of knowledge and practice that approximate those of attenders in communities where modernization/average education is high.

On the other hand, in communities where government intervention is medium, the difference in knowledge and practice is always highly significant. In communities where intervention is low or high there are a few exceptions, but the impact is generally very positive. It appears that intervention has little effect on the difference between attenders and non-attenders. There is some synergism between government programs with respect to health messages. Otherwise, the level of intervention appears to have little impact on the magnitude of program effect.

In the case of community organization and acceptance of modern medicine, the biggest differences are in communities where levels are medium. Consistent highly significant differences appear in medium acceptance/community organization communities, and somewhat mixed differences in the low and high communities. In the case of acceptance of modern medicine, this finding may reflect a situation where in communities with low or high acceptance, people adhere to their beliefs regardless of the existence or quality of the program. The strong difference in knowledge and practice of attenders as compared to non-attenders in communities where

acceptance is medium may be a result of predisposition--that attenders are predisposed to good knowledge and practice, and that non-attenders are predisposed to traditional or other knowledge and practice. However, it appears that the program has the potential to be most effective in communities where acceptance is mixed, especially if attendance can be increased to include those not predisposed to accept program messages.

The same pattern appears to exist with respect to community organization. In communities where organization is low, the program does not succeed probably because of a lack of support and outreach that stems from community groups. Where organization is high, the social network is strong and knowledge is transmitted both within the program and without. In medium organization communities, the program has a stronger effect on attenders since the transferal of program messages is not as strong outside of the weighing post.

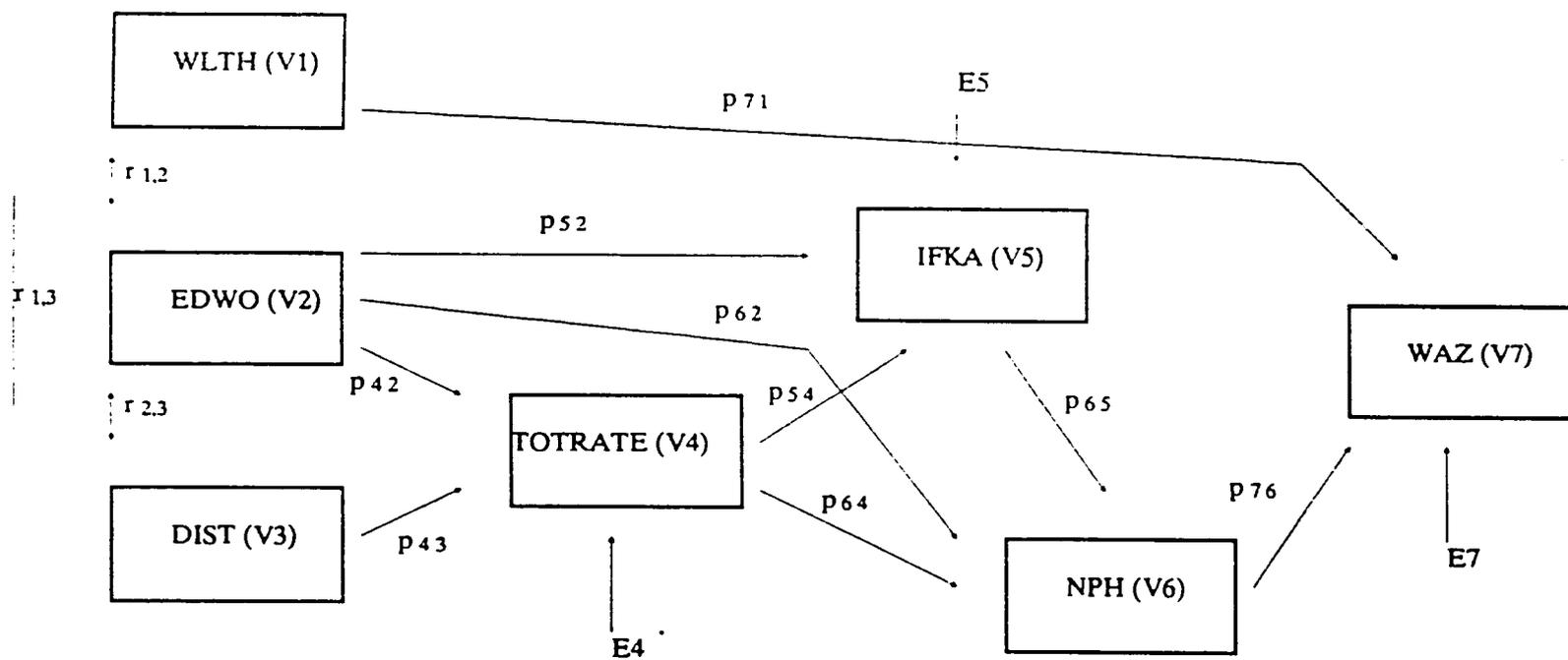
The relationships hypothesized earlier are also examined simultaneously. Doing so demands a more sophisticated methodology. The remainder of this section lays out analysis performed using covariance structure models estimated using maximum likelihood. This was done in order to determine the strengths of relationships in the models under the various contextual conditions. This methodology enables one to make statements about the relative impact of the program, with respect to other important factors. This analysis is meant to build on that which has been discussed previously.

5.4 The Household Participation Model Estimated Using a Covariance Structure Model

A path diagram of the household participation model discussed earlier is shown in Figure 5-1. Note that variables specific to the Indonesian program have been used as measures of the various elements of the model. Path analysis is used to estimate the parameters of the model using data from all households.

Justification for the model has been outlined earlier. The model presents household wealth and mother's education as being important background factors. Note however, that the hypothesis is that mother's education effects program participation (rate of attendance, infant nutrition knowledge, and infant nutrition practice history), while family wealth influences the nutritional status of the child. Single indices are selected to represent knowledge, practice and nutritional status so as to simplify the model.

Figure 5-1: PATH DIAGRAM OF HOUSEHOLD PARTICIPATION IN GROWTH MONITORING



WLTH - Household wealth index
 EDWO - Mother's education index
 DIST - Distance to Weighing Post
 TOTRATE - Total rate of attendance
 IFKA - Infant nutrition knowledge index
 NPH - Nutrition practice history index
 WAZ - Weight for age expressed as Z- Score

At the center of this model are the three important legs of the program: rate of attendance, infant nutrition knowledge and infant nutrition practice history. By using indices which reflect past activities (rate of attendance, nutrition practice history, and nutrition knowledge which is determined based on the mother's knowledge of when solid foods should be introduced, etc.) longitudinal information is introduced into the model. Finally, the relationship between nutrition practice history and nutritional status is depicted as the last link in the model. Analysis up to this point suggests that this final association will not be a strong one.

The path coefficients are determined on the basis of the covariance matrix of all variables included in the model. This model is over-identified, which means that when the structural equations, variances and covariances are used to determine the paths, there are more equations than unknowns. The model has 15 free parameters which must be estimated, and 21 degrees of freedom.

The model in Figure 5-1 can be expressed as the following structural equations:

$$V_4 = p_{42}V_2 + p_{43}V_3 + E_4$$

$$V_5 = p_{52}V_2 + p_{54}V_4 + E_5$$

$$V_6 = p_{62}V_2 + p_{64}V_4 + p_{65}V_5 + E_6$$

$$V_7 = p_{71}V_1 + p_{76}V_6 + E_7$$

The path coefficients (p_i), like standardized regression coefficients, can be thought of as a measure of the strength of a relationship (or the percent of variance in the dependent variable explained by the independent variable). When the model was tested, all path coefficients were found to be significantly different than zero, except p_{76} , the path between nutrition practice history (NPH) and nutritional status (WAZ). The result was expected given the large number of intervening variables in this relationship, and findings up to this point regarding the link between nutrition practice and nutritional status. This finding also lends support for the argument for using more immediate indicators of growth monitoring effectiveness such as knowledge and practice indices.

Table 5-1, which summarizes the total effects of each independent variable of interest is generated. While the path coefficients shown in the figures represent the direct effects of one variable on another, the total effects shown in table 5-1 represent both direct and indirect effects. For example, education has a direct effect on infant knowledge as depicted by the direct arrow between EDWO and IFKA. It also has an indirect effect through attendance (TOTRATE)--education influences attendance, which in turn affects infant knowledge. The total effect of education on infant knowledge is the sum of the direct and indirect effects.

TABLE 5-1
A Summary of Total Effects

INDEPENDENT INDICATORS	DEPENDENT INDICATORS			
	TOTRATE (Attend.)	IFKA (Knowledge)	NPH (Practice)	WAZ (Status)
Wealth	.07	.10	.07	.16
Mother's Education	.10	.19	.12	.09
Distance to Post	-.17	-.06	-.08	-.03
Rate of Attendance		.12	.29	.01

This table shows the relative influence of the various factors on the dependent indicators. Note that family wealth and education influence nutritional status much more than participation in the program. At the same time, program attendance has a relatively strong influence on knowledge and practice.

5.5 The Effect of Design on the Household Participation

To examine the influence of program design factors, this same analysis is performed, controlling for the program design factor under examination. The methodology employed was to compare the path coefficients generated by communities where the contextual factor is high to those generated where it is low. In all cases, rate of attendance has a stronger positive influence on knowledge in communities where design factors are high. This suggests that design has an effect on the education component of the *KB-Gizi* program. In other words, when the program is inadequately designed, it is the education component that suffers.

This finding makes sense as it is the design component that is most difficult to effectively implement. Other components such as child weighing, are more routine and require less understanding on the part of the *kader* in order to be successfully completed.

The opposite is true for the relationship between infant nutrition knowledge (IFKA) and nutrition practice history (NPH). That is, though the relationship is strong in all cases, it does not vary according to the program design factors. These two findings suggest that the relationship between knowledge and practice is a strong, positive one, but is not affected by the design of the program. The crucial link here appears to be that between attendance and knowledge.

Using this model, we can also examine the relationship between attendance and practice controlled for knowledge. Intuitively this path represents changes in nutrition practice history due to social pressure (deference to authority), or perhaps direct training (demonstration) with no educational component. This coefficient represents, in part, the synergistic relationship between knowledge and practice -- the notion that knowledge reinforces practice, which reinforces knowledge, etc. The total effect of the program on nutrition practice can thus be thought of as that practice explained by knowledge gained from attendance, and that practice explained by attendance controlled for knowledge.

If the network of relationships are examined with respect to each of the design factors, some interesting patterns emerge. When program support is high, variance in nutrition practice history is explained through both infant nutrition knowledge, and direct participation in the program. When support is low, on the other hand, all explained variance in practice is explained through direct participation in the program--none of the explanation occurs through knowledge. Surprisingly, however, the total effect of attendance on nutrition practice history is stronger in communities where support is low -- due to the much stronger direct effect (controlled for education) of attendance on practice. This last finding is a difficult one to explain, though it may be a consequence of only the most accepting people attending in communities where the level of staffing is low. Because as the ratio of attenders to staff goes up, the time, and therefore the cost of participation increases. It is likely that the greater cost discourages those that do not embrace the program from attending.

When staffing is high, variance in nutrition practice history is explained through both infant nutrition knowledge, and direct participation in the program. When staffing is low, on the other hand, explained variance in practice is explained only through direct participation in the program. Here it appears that programs that are not well staffed are not as effective at educating mothers. Overall, the total effect of attendance on nutritional practice history is stronger in communities where staffing is high.

When intensity is high, variance in nutrition practice history is explained through both infant nutrition knowledge, and direct participation in the program. When intensity is low, explained variance in practice is explained only through direct participation in the program. Here it appears that low intensity programs do not effectively educate participants. Overall, there is no significant difference in the relationship between attendance and practice according to crowding.

When crowding is low, variance in nutrition practice history is explained through both infant nutrition knowledge, and direct participation in the program. When crowding is high, all explained variance in practice is explained only through direct participation in the program. Here it appears that crowded programs do not do an effective job of education. Notice here that crowding has no effect on the direct relationship between attendance and practice (controlled for education). Overall, the total effect of attendance on nutritional practice history is slightly stronger in communities where staffing is high.

The findings that have come as a result of using the structural model are consistent with what are seen as a result of the simpler ANOVA tests. Furthermore, the structural model provides more information about the strength of each relationship in the model, relative to others.

5.6 The Effect of Context on Household Participation

Next, the model was run, controlled for each of the contextual factors. By comparing the coefficients generated under each level of a contextual factor, the effect of context on household participation can be determined.

Modernization

When modernization is examined, it appears that the relationship between knowledge and practice is less strong in more modern communities. This finding may seem surprising, but may be due to the tendency to bottle feed in more modern areas. It is, any rate, consistent with earlier findings. In addition, there appears to be no significant difference in program effect between high and low modernization communities, though the relationship is a strong one in both cases. Distance has a stronger negative effect on attendance in high modernization communities.

Government Intervention

When government intervention is analyzed, the relationship between attendance and knowledge is much stronger in communities where the level of intervention is low. Given that the levels of attendance and knowledge are not different according to level of intervention, this suggests that people that live in communities where the level of intervention is high are learning program messages outside the program. It may be that messages are diffused through interaction in other programs. Also, the relationship between knowledge and practice is consistent across levels of intervention and the effect of knowledge on practice is relatively strong in both cases.

Next, the relationship between attendance and practice (controlled for knowledge) is much higher in communities where the level of intervention is low. Apparently, more people practice program messages without knowing why in communities where the level of intervention is low. The negative effect of distance on attendance is greater in communities where the level of intervention is low.

Finally, the relative relationship between attendance and knowledge and practice is stronger where intervention is low. One way in which these findings might be interpreted is that the level of intervention has an impact on growth monitoring attendance. It appears that people are willing to make a greater effort to attend in communities where the level of intervention is high. At the same time, attenders of programs where intervention is high do not increase knowledge as a result of attendance, though some small gain in practice is made directly through attendance

(controlled for knowledge). On the other hand, people who live in communities where the level of intervention is low are less willing to make an effort to attend growth monitoring and related activities. But, attenders make significantly higher gains in knowledge and practice as a result of attendance. This may be due to a process of natural selection--those people willing to make the effort to attend in these communities are more willing to learn and change practices.

Community Organization

The negative effect of distance on attendance is much greater in communities where the level of community organization is low. This is consistent with previous findings, and discussions with Indonesian colleagues suggest that this is due to the influence of groups such as the PKK (mothers' group). Their support for the program, as well as outreach efforts that originate in these organizations, have a positive effect on attendance.

In addition, the relationship between attendance and practice is stronger in communities where the level of organization is low. This is probably due to the fact that program messages are disseminated outside the program in communities where organization is high.

Average Education

Surprisingly, the level of average education appears to have little effect on household participation in the program. The only real difference is that the relationship between knowledge and practice is stronger in communities where the level of average education is low. This is probably due to the tendency to bottle feed in communities where average education is high.

Acceptance of Modern Medicine

The overall impact of growth monitoring and related activities is highest by far in communities where the level of acceptance is medium. In fact, rate of attendance has no effect on knowledge or practice in communities where the level of acceptance is low, and no influence on knowledge where acceptance is low or high. This is consistent with what has been found in previous analysis.

Next, the relationship between knowledge and practice is stronger in communities where the level of acceptance is low. Since previous analysis has shown that levels of knowledge and practice are lower where acceptance is low, this suggests there is less variance in these communities. At any rate, this relationship is essentially independent of growth monitoring effect.

Third, the relationship between attendance and knowledge is not statistically significant in either the low or high intervention groups. One explanation is that growth monitoring attendance makes little impact on knowledge in low acceptance communities because everyone believes otherwise. It also makes little impact in high acceptance communities because everyone already accepts the messages, regardless of the program. Finally, the negative effect of distance on attendance is greater in communities where the level of acceptance is medium to low.

CHAPTER VI

CONCLUSIONS REGARDING INDONESIA ANALYSIS

6.1 Interpretation During Site Visit to Indonesia

The analysis reported up to this point was conducted at Community Systems Foundation in Ann Arbor. A detailed interim report on that analysis was submitted to AID in October of 1987. The interpretation of the analysis was at that point speculative. At the start of the second phase of this project, CSF staff visited Indonesia in order to discuss the analysis and speculative findings at length with Indonesian colleagues that have been working with the *KB-Gizi* over a period of many years. The insights gained through these discussions have been embedded into the findings reported up to this point. In addition, major points are summarized here.

The first topic of extensive discussion is that of community organization. People were very interested to see the extent to which this contextual factor influenced program implementation. It was decided that the reason for this influence was primarily the PKK (mother's group). The PKK actively supports the *KB-Gizi* program by raising money to finance its operation, by encouraging non-attenders to visit the weighing post, and by spreading program messages in other ways. Other groups are not involved in *KB-Gizi* in so direct a fashion, but probably help spread program messages, and remind mothers to attend the weighings.

A second group that is also of some importance to *KB-Gizi* is the teenagers group. It is an organization from which *KB-Gizi* recruits *kader*. The existence of such a group may allow capable *kader* to be identified more quickly and easily.

The fact that remote villages have the most trouble implementing growth monitoring and *KB-Gizi* well was also confirmed. Many factors were discussed as possible reasons for this fact. First, remote areas tend to be those with limited access to outside information. Inhabitants of these areas not exposed to newspapers, television and other forms of communication used by the government to promote the program and encourage modern health practices. Consequently, it is in the remote areas that people are less likely to accept modern medicine and program messages.

Second, remote villages tend to be poor villages, and the opportunity cost of attending the weighing post is higher. In addition, agricultural activities take high precedence in these areas which often conflict with weighing post attendance. These factors all contribute to limited interest in the program on the part of these people.

Execution of the weighing sessions is also difficult in these areas. Lack of literate people to serve as *kader* was cited as one reason for problematic implementation. A greater ongoing training effort is required in these areas in order to insure that the *kader* can properly interpret the KMS card, and effectively educate the mothers.

Indonesia is currently monitoring the development of its communities by periodically collecting data on various aspects of development, the majority of which have to do with sanitation. This information is used to target communities for various government programs (this explains why government intervention is higher in poor communities). Competitions are also held to encourage districts to help develop their poorest communities.

The fact that these data are collected is interesting for two reasons. First, it underscores the fact that the Government of Indonesia sees these health and development related factors as important. Second, it is an existing monitoring system that could provide the *KB-Gizi* program with information relevant to targeting.

Strategies successful implementation in poor and remote areas were discussed. In general, it was agreed that more central support for *KB-Gizi* in these communities may be appropriate, especially in terms of training and staffing. In addition, more active outreach programs in these areas may be appropriate. The additional costs of these programs may be prohibitive, however, and low- or no-cost strategies should be explored. One recommendation that was proposed was that an increased effort be made to increase interaction between social organizations such as PKK and the weighing post.

6.2 Findings and Policy Implications Related to the Indonesian Program

At a general level, analysis in this study has confirmed that there are differences in need, differences in implementation, and differences in program "success" according to context in Indonesia. Knowledge of these differences is important to effective program planning as it allows planners to target those communities that most need program services, as well as adjust program the design factors related to implementation according to context.

Analysis also suggests that growth monitoring and the *KB-Gizi* program are having a positive impact on knowledge and practice across contexts. Appropriate levels of design factors appear to maximize program effectiveness as measured by knowledge and practice. In fact, analysis shows that in communities where design factors are inadequate it is the educational component that suffers.

There is also a positive relationship between community modernization, and average levels of wealth, education and nutritional status. Consequently, low and medium modernization communities can most benefit from growth monitoring and *KB-Gizi* services. Additional analysis

shows in fact, that it is participants in low modernization communities that most benefit from the program. The greatest difference in knowledge and practice between attenders and non-attenders is found in these communities.

At the same time, though the program is somewhat better designed in low modernization areas, it is no better executed and less well attended than programs in high modernization areas. As a result, it is critical that the program be adequately supported in these areas. Due to the larger potential payoff, it would be wise to direct more resources to programs in medium to low modernization areas.

Analysis also reveals that Indonesia targets low income/education communities for various government interventions. It is noteworthy that there is no significant difference in average nutritional status according to level of intervention suggesting that these interventions are having the effect of bringing people in high intervention communities to the same level of nutritional status, despite lower levels of wealth and education.

With respect to growth monitoring and the *KB-Gizi* program, it appears that there is some synergism between it and other interventions and community organizations. The rate of attendance is somewhat higher in communities where these factors are high, despite the fact that these programs are somewhat less well staffed--probably due to competition for volunteers. This suggests that there is more need for outreach in communities where intervention and organization are low.

The powerful role that other organizations play in the success of *KB-Gizi* is one that might be explored in more depth. It seems that one way in which they help the program is that they encourage attendance. A second purpose they appear to serve is to spread program messages outside of the weighing session. This increases the benefit of the program by spreading its messages to non-attenders.

Finally, as one would expect, there is much greater need for growth monitoring and the *KB-Gizi* program in areas where acceptance of modern medicine is low. At the same time, it appears that the program is relatively unsuccessful in these areas--attendance is low, and the knowledge and practice of attenders is almost as poor as that of non-attenders. In communities where acceptance is high, there is less need for the program, but attendance is also high. Here, the knowledge and practice of attenders is somewhat better than that of non-attenders, though both are relatively high.

It is those areas where acceptance is mixed where the program appears to have the strongest impact. Here, attendance is moderate, but the knowledge and practice of attenders is consistently significantly higher than that of non-attenders. If the program can build a momentum such that people originally not accepting of modern medicine can be convinced to attend and embrace program messages and practices, it is in these areas where the program can be the most effective. This may be something that community organizations such as the PKK can influence.

This finding suggests a model of community acceptance and program implementation that would be of use in targeting resources. If one accepts the notion that a community evolves in its acceptance of modern medicine, then the implementation strategy might be adjusted as the community "evolves" in this respect. At the first stage the community does not accept the idea of modern medicine and implementation at this stage appears to have little direct benefit. At a (presumably) later time, the community begins to accept modern medicine, though people's knowledge of it is very limited. At this stage, the program has a very positive impact. Finally, the community accepts modern medicine and the majority have learned the messages through the program or other sources. At this point the program is successful in terms of attendance, but its effect is not as beneficial because general knowledge and practice is better.

If this model is a valid one, policy might be adjusted to concentrate resources on the communities that fall in the middle group. It is likely that the program will continue successfully in high acceptance communities with a minimum of support. However, the program's influence on acceptance of modern medicine in low acceptance communities should be better understood. If the program is a source of the community's evolution to greater acceptance, then the nature of this evolution should be understood. On the other hand, it may be that other factors influence this change, and that planners would do better to put *KB-Gizi* resources into social marketing or other types of educational efforts. This question is a very important one as currently the *KB-Gizi* program is only implemented in communities where the family planning acceptor rate is greater than 30%. Consequently, it is those communities that do not yet have the program where acceptance of modern medicine is likely very low.

6.3 Evaluation of Methodology

The methodology for this study was more or less defined by the nature of the data set--one which was collected for a different purpose. In general, some interesting findings resulted from the methodology employed. In addition, an assessment can be made of its usefulness in other inquiries depending on the research question and nature of available data.

The incremental approach was employed so as to test the application of structural modeling to problems of the type addressed here. The model that was developed and tested in the course of this analysis proved to be a reasonably good one. Perhaps the most important result in this regard is that the data fit the hypothesized model. The fact that the findings are consistent with findings from simpler analysis within this study, as well as with findings from other studies substantiates the legitimacy of the approach.

ANOVA tests allow one to look at specific links in the model individually, while the path analysis enables one to look at the entire model simultaneously. By doing so, the relative effect of elements both inside and outside the domain of the program were identified. This last step is an important one as it allows planners to see the relative magnitude of program effect. In addition,

because the relationships in a model such as the one proposed here are very complex, the structural modeling approach enables one to see relationships that are masked when bivariate techniques are used.

The structural modeling approach used here might have provided even more information had the data been longitudinal. The effect of program participation over time on the knowledge, practice and nutritional status of the household is a question of primary interest. By using cross-sectional data to test the model, the researcher does not have the ability to track changes over time. In this study, information about the past (e.g., weaning practices) was employed, but these measures are not as reliable as repeated observations on the same household.

Unfortunately, the structural modeling analysis is only feasible with very large data sets. Consequently, this type of analysis can only be performed when large surveys are conducted. A large, longitudinal study is very expensive, but would be the most appropriate to answering the questions raised in this study.

Finally, the problems mentioned above would be magnified if the multi-level techniques developed by Mason and others were employed. Unfortunately, the number of observations within each community in the Indonesian data set are not sufficient to employ this technique. If a study were designed in order to meet the requirements of the technique, its usefulness could be better tested.

49A

PART 2: ADDITIONAL SITES

CHAPTER VII

GROWTH MONITORING IN THAILAND

7.1 Program Description

7.1.1 Background

Growth monitoring in Thailand is a component of the larger "Rural Primary Health Care Programme," introduced in 1981 by the Ministry of Public Health (MOPH). The goal of the program is to improve the nutritional status of children under five years of age through educational activities as well as rehabilitative feeding of second and third degree malnourished using locally produced supplementary food. At the current time, the program is theoretically implemented in all of Thailand's villages.

The fundamental philosophy of the program is to increase community self-reliance in solving local problems. The centerpiece of this approach is the weighing session. Children under five are weighed every three months, and charted on a weighing card. Nutritional status is determined according to a Thai standard and Gomez classifications. Those identified as second and third degree malnourished are weighed every month. Furthermore, records are kept detailing attendance of children under five. In cases where families have not attended the weighing, a volunteer contacts the mother to arrange a home visit.

The weighing session serves as a forum for other activities. A fortified weaning food is usually prepared at the weighing as a nutritional supplement for participating children. A coupon system (to be detailed later in this report) is being tested in two districts, as a means of giving supplementary foods to at-risk children over the time between weighings. Children who have not regained growth over three months are referred to the health center and if necessary to the district hospital.

Two levels of village volunteers are trained and supported to carry out the weighing activity. Both are given free medical care at the MOPH's facilities and community recognition in return for service. The first of these, the Village Health Communicator (VHC), is given a 5-day training course in the collection and dissemination of health information. Each VHC is responsible

for 8-15 neighboring households, and is involved in the weighing of children, education of mothers, and in making referrals when appropriate.

The second level of village volunteer is the Village Health Volunteer (VHV). After six months of voluntary service, a VHC is selected from the original training group. The VHV takes an additional ten days of training in simple health care. The VHV also helps in weighing, education and referral activities.

Originally, these volunteers were trained through a "top-down" system. National trainers gave instruction to regional trainers, etc. until ultimately, the information was transferred to local volunteers. The strength of this system is that the program was spread rapidly throughout the country. At the same time, it was realized that the messages were convoluted by the time they reached the VHCs. Subsequently a program called Technical Cooperation among Developing Villages (TCSV) has been introduced. Under this system, communities with problems will visit successful communities (those with no problems) for training in the implementation of the program (among other things).

The village-level volunteers are coordinated and supervised by a trained and paid health worker. Two health workers operate out of a health center which is responsible for approximately 10 villages (or 500 children under five).¹ Currently there is a plan to increase the number of health workers per center to three as well as the level of health worker training.

The health worker has been identified as the key person in program implementation. It is this person who activates the weighing sessions and motivates the volunteers. Any unevenness in program implementation is said to be due primarily to the health worker.

7.1.2 Recent Developments

During the last year and a half Thailand has introduced several innovations which both impact the growth monitoring component of their primary health care system as well as build on the results of growth monitoring. In the following sections, each of these innovations will be briefly discussed and related to the context in which growth monitoring is implemented in Thailand.

¹ The numbers were calculated as follows, and are based on estimated averages:

- 1 Health Center : 2 Health Workers
- 1 Health Center : 10 Villages
- 50 children < 5 : 1 Village
- 1 VHV : 1 Village
- 1 VHV : 10 VHC
- 1 VHC : 10 children

Quality of Life Campaign

In 1985 the Quality of Life Campaign was launched which is intended to introduce the notion of meeting basic needs at the community level in virtually every sector of village life. Thirty-two indicators have been devised which measure life quality as shown in Table 1. The three indicators marked with asterisks are related to PHC.

TABLE 1
Basic Minimum Needs Indicators Utilized in the Quality of Life Mass Campaign Project²

BMN No. 1: Adequate Food Intake

BMN No. 2: Adequate Shelter and Good Environment

BMN No. 3: Basic Social Services Necessary for Daily Life and Occupation

BMN No. 4: Security in Life and Property

BMN No. 5: Efficient Food Production/Management

BMN No. 6: Child Spacing (Family Planning)

BMN No. 7: Community Participation in Well-Being, Development and Determining Its Own Lifestyle

BMN No. 8: Spiritual/Psychological Development

One of the primary purposes of the system is to encourage self reliance at the village level by providing feedback to the villages regarding those areas of village life which could most readily benefit from improvement in relation to national or regional norms.

According to the latest Thai Ministry of Public Health figures, there has been a remarkable improvement in several key health and family planning indicators. Using the Thai growth standard and Gomez classification cut points, the prevalence of grade II and III malnutrition of children under five years of age is 2.36%.³ The total fertility rate (TFR) has dropped from historic levels of over 6 to 3.3 in 1984, and the 1988 estimate is 2.1. The national plan calls for the population

² Adapted from trip report of Narintr Tima dated March 19, 1986.

³ Nutritional Status Report of the Ministry of Public Health for the period ending September 30, 1987. Report dated January 31, 1988.

growth rate to drop to 1.3 by 1991. Educational attainment in both rural and urban areas has also improved markedly.

It is difficult if not impossible to unambiguously attribute improvement in child nutrition to growth monitoring in Thailand. More important are the remarkable social and economic changes which have occurred in Thailand over the last few years. Food availability and electrical power have increased, especially in rural areas. In every village with electricity (approximately 90%) there is at least one television set watched, in group, by much of the village. Health related messages are now prepared and broadcast with the assistance of private sector funding.

These health related improvements in the quality of life provide the conditions for implementing growth monitoring as part of the primary health care system in Thailand. Lower numbers of children per family, relatively low prevalence of moderate and severe malnutrition and improving educational attainment will allow more intensive targeting to children at risk. One of these targeting schemes is the Coupon System.

The Coupon System

The Coupon System, introduced now at an experimental level, is intended to provide supplementary food to children identified at risk by growth monitoring. Mothers of children under five that fall into grade II or III using the Thailand standard are provided with a booklet of 30 coupons each worth 3 Baht (12 cents U.S.) which can be exchanged for foodstuff in the local market. Exhibit 7.1 is a copy of the coupon now being used in the two pilot provinces. The coupon provides for identification of foodstuffs such as eggs, meat, vegetables and/or rice. The VHV can therefore select those commodities deemed most useful to the particular family. At the present there are studies underway which will identify which commodities or combination of commodities most frequently reach the intended child. For instance, preliminary studies show that eggs more frequently reach the targeted child whereas meat is used by the entire family.

The program has been introduced as a pilot project during 1987 and will be extended to 4,000 villages by the end of the fiscal year. (Oct. 1, 1987 - Sept. 30, 1988). Plans call for extension to 11,000 villages by next year with full implementation in 19,000 villages by 1991. The remaining 41,000 villages are not scheduled to receive targeted supplementary food due to lower need levels.

Targeted villages manifest two to three cases of moderate or severe malnutrition on the average. Each targeted child receives food supplementation for a three month period. If the child has not shown improvement during this period he is referred to the community (district) hospital.

Thus, the supplementary food cost for full country-wide implementation is roughly one half million US dollars.⁴

While villages are targeted geographically based on village risk factors, household level targeting relies upon growth monitoring as it is implemented within the health care delivery system.

Technical Co-operation Among Developing Villages (TCDV)

Another recent development is a self help program of assistance called Technical Co-operation Among Developing Villages (TCDV). Villages without a low ranking in any of the 32 indicators act as advisors to villages deemed to be at risk. Representatives from the at-risk village visit villages without problems villages to learn from their success.

7.2 Growth Monitoring Management Information System

The management information system which organizes and presents growth monitoring information in Thailand is notable for its directness and clarity. The source document for the system is the child growth card shown as Exhibit 7.2. The growth standard employed in this card is based upon the 1975 national survey. Grade determination utilizes the Gomez cut points of 90%, 75% and 60%. Weight and age data are entered from the growth card into the village child register which is maintained by the Village Health Volunteers. This register has gone through several iterations of design and testing and now consists of a separate page for each child. Child age, weight and nutritional status data is organized on each sheet by month of the fiscal year. A child index on the register flysheet facilitates look up when recording child data. (Exhibit 7.3 shows a page from this register.)

One clear benefit of this organizational scheme is in follow-up of those children not showing up for weighing. By skimming the register focussed on a particular row, the village health worker can determine at a glance which children of the village were not recorded during the time period and are therefore candidates for follow-up. By noting the child's nutritional grade at the previous determination, the VHV can prioritize his/her activities.

Data from each village is transferred to a monthly progress report prepared by the Tambon health personnel at the health center. Each center covers an average of ten villages but there is provision on the form for up to 14 communities. Five copies are made with one kept by

⁴ 30 days * 3 months * 3 Baht * 2.5 children per village * 19,000 villages = 12,825,000 Baht (\$534,000 US)

the Health Worker and the other four going to 1) the Regional Nutrition Office; 2) the Provincial Health Office; 3) the District Health Office and 4) the District Agricultural Office. Exhibit 7.4 is a page from the Monthly Project Report.

On a quarterly basis these monthly reports are summarized into a national report organized by province and district. Program coverage, weighing coverage and nutritional status by grade is presented. The far right-hand column of each sheet presents the combined grade II and III malnutrition percentage for each district. This column is currently acting as a management flag for attention by Ministry of Public Health officials. (Exhibit 7.5 is a translated sheet from this report.)

The preparation of this national report is facilitated by computers and a rather detailed study of error rates and their sources conducted during 1985 and published in 1987 has been the basis for several system improvements.⁵ These improvements are still underway and it is not yet clear what impact they have had on system performance.

Problem Villages

The Ministry of Public Health has instituted a scheme for identifying villages most at risk from a child nutritional viewpoint. This management scheme selects villages based upon meeting any of the four criteria.

- 1) Villages which have not submitted their report for the prior period.
- 2) Villages in which coverage is less than 90% of children under 5 years of age.
- 3) Communities in which there exists any cases of third degree malnutrition.
- 4) Villages for which 2nd and 3rd degree malnutrition is greater than 2%.

Villages identified as falling into the problem category receive special attention from both the Ministry of Public Health as well as other government sectors.

⁵ Suntikitrungruang, Chawalit, et al. "Strengthening Growth Monitoring and Nutritional Surveillance Within Primary Health Care." Nutrition Division Research Report Series, 1987.

7.3 Findings with Respect to Contextual Analysis of Growth Monitoring

In general, the findings of the KB-Gizi analysis were confirmed in discussions with Thai program implementors. It was agreed that high risk communities are found in remote areas, and that high risk households are generally those furthest from village centers. In addition, low education, modernization and acceptance of modern medicine characterizes these high risk communities.

It is also true in both places that these are the same communities in which it is most difficult to implement growth monitoring. The Thai program is seeking to increase the mothers' understanding of the growth chart in such areas. A key issue in both programs is the involvement and meaningful participation of high risk families that live in remote areas.

Program design thresholds were also discussed. Little analysis of the type conducted with the KB-Gizi data has been performed in Thailand, though factors such as distance to weighing post and health worker supervision are recognized as important ones. Other influences on attendance and participation have been identified. For example, it is known that mothers are less likely to attend during the planting and harvest seasons in rural areas.

From a policy perspective, there has been an effort to maximize the staffing ratios as much as possible in Thailand and appropriate program goals have been set (see the discussion above). These ratios appear to be comparable to those in Indonesia.

Thailand also sees distance to post as an important factor. Home weighings are conducted as a way of reaching those that live a long distance from the post. In addition, communities are given the flexibility to develop additional ways of reaching these families.

One comparison of interest is the manner in which each of the two programs addresses the issue of program implementation in various contexts. In Indonesia, the community is given responsibility for the weighings, yet the format and many of the inputs come from the national level. In the Thai program, a greater emphasis is being given to allowing the community to determine the best way of implementing the program.

One way in which communities may exercise this control is by choosing the foods recommended to mothers as nutritional supplements. The Ministry of Public Health has generated a list of alternative foods, and the communities determine which are most appropriate (readily available) locally. A second example of community control is the weighing sessions themselves. The date, time and format of the session are determined by locally. Moreover, the method of outreach to non-attenders can be determined at this level as well. Community control is currently being exercised in various degrees, the variation due mainly to the health worker. Thailand's goal is to increase the level of community self-sufficiency over the next few years.

A manifestation of this difference in approach is shown when the level of government intervention is considered. In Indonesia, government programs are targeted to at-risk

communities, and provide synergistic support to participation in growth monitoring and the KB-Gizi program. In Thailand, government programs are seen as an obstacle to program success since they inhibit the community's ability to solve problems by itself.

At the same time, many of the strategies of dealing with high risk communities are similar. Both countries track communities and classify them according to level of development. In Indonesia, underdeveloped communities are given access to various government development programs. In Thailand, problems of underdevelopment are identified. Those that are within the capabilities of the community are solved at the local level while others are assigned to the regional development plan.

A second difference between the two programs has to do with environmental conditions outside of the domain of the program. In Indonesia it was found that community modernization was negatively related to average nutritional status. In Thailand, there is some evidence that there are villages that do not adhere to this pattern. One report suggests that inhabitants of remote Thai villages have access to more and better food because they can gather natural (uncultivated) foods.⁶ Those communities that have developed tend to be those that are near large population centers where the natural environment has been destroyed. Because the provinces studied in Indonesia are so densely populated, even the most remote villages do not have access to natural food.

⁶ Thailand Food Habits Project, Annual Report 1985/86.

EXHIBIT 7.1 - SUPPLEMENTARY FOOD COUPON

บัตรแลกอาหารแห้งที่มีโปรตีนและไขมันสูงในหมู่บ้าน

สำหรับเด็กขาดสารอาหารระดับ 2 และ 3

อาหารที่บริโภค

- | | | | |
|---|--|--|---|
| <input type="checkbox"/> ไข่เป็ด duck egg | <input type="checkbox"/> ไข่ไก่ chicken egg | <input type="checkbox"/> ถั่วเมล็ดแห้ง beans | <input type="checkbox"/> อาหารเสริม จ้า ง้า ง้า prepared supplementary food package |
| <input type="checkbox"/> เนื้อหมู pork | <input type="checkbox"/> เนื้อวัว beef | <input type="checkbox"/> เนื้อไก่ chicken | |
| <input type="checkbox"/> ตับไก่ chicken liver | <input type="checkbox"/> ตับหมู pig liver | <input type="checkbox"/> ตับวัว cows liver | |
| <input type="checkbox"/> ปลาแห้ง fish | <input type="checkbox"/> ปลาแห้ง salted fish | <input type="checkbox"/> ปลาแห้ง dried fish | |
| <input type="checkbox"/> อื่น ๆ | | | |

Date วัน... เดือน... พ.ศ.....
 ชื่อเด็ก Child Name
 ผู้รับอาหาร Mother's Name ผู้จ่ายอาหาร Distributor

กำหนดการสร้างเสริมภูมิคุ้มกันโรค

อายุที่ควรได้รับวัคซีน	ชนิดของวัคซีน	วัน เดือน ปีที่ได้รับวัคซีน	ชื่อผู้ให้วัคซีน
แรกเกิด-1 เดือน	- วัคซีน (บี ซี ดี)		
2-3 เดือน	- คอตีบ ไอกรน บาดทะยัก (ดีพีที) และโปลิโอ (ไอพีวี) ครั้งที่ 1		
4-5 เดือน	- คอตีบ ไอกรน บาดทะยัก (ดีพีที) และโปลิโอ (ไอพีวี) ครั้งที่ 2		
6-7 เดือน	- คอตีบ ไอกรน บาดทะยัก (ดีพีที) และโปลิโอ (ไอพีวี) ครั้งที่ 3		
9-14 เดือน	- หัด		
1 ปีครึ่ง-2 ปี	- คอตีบ ไอกรน บาดทะยัก (ดีพีที) และโปลิโอ (ไอพีวี) กระตุ้น		

อาหารทารก

แรกเกิด  **8 เดือน** + 

3 เดือน  **7 เดือน** + 

4 เดือน +  **8 เดือน** + 

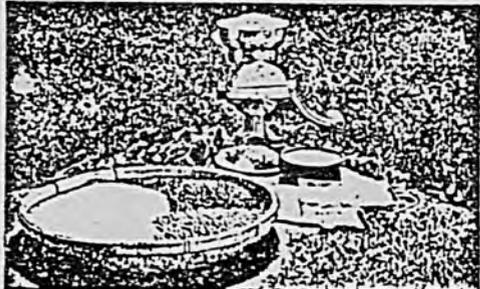
5 เดือน +  **10 เดือน** + 

EXHIBIT 12 GROWTH CHART (FRONT)



อาหารเด็กวัยก่อนเรียน

อายุตั้งแต่ 1 ปีขึ้นไป จนถึงเข้าโรงเรียน
รับประทานอาหาร 3 มื้อ เช่นเดียวกับ
อาหารทารกอายุ 12 เดือน แต่เพิ่มปริมาณ
อาหาร และไม่ต้องบดมากเหมือนอาหาร
ทารก พร้อมทั้งพยายามรับประทาน
ให้ครบทั้ง 5 หมู่ ทุกวัน



อาหารเสริมผลิตเองในหมู่บ้าน

อาหารเสริมผลิตเองในหมู่บ้าน สามารถทำได้
ง่าย ๆ จากวัตถุดิบที่มีอยู่ทั่วไป เช่น ข้าว ถั่ว งา
เหมาะสำหรับใช้เป็นอาหารเสริมสำหรับเด็ก
อายุ 6 เดือน ถึง 5 ปี ที่ขาดสารอาหาร และยัง
ใช้ได้สำหรับเด็กทั่วไป หญิงมีครรภ์ หญิงแม่
ลูกอ่อน และบุคคลอื่น ๆ

บันทึกเลขที่ _____

บันทึกการเจริญเติบโตของเด็ก

ชื่อ _____ วัน เดือน ปีเกิด _____ น้าหนักแรกเกิด _____ กก.
 ชื่อบิดา _____ ชื่อมารดา _____
 บ้านเลขที่ _____ หมู่ที่ _____ ตำบล _____ อำเภอ _____ จังหวัด _____



ลูกน้อยเติบโตใหญ่



unicef สุขกาย สบายใจ ปลอดภัยเพราะนมแม่

กรมอนามัย
กระทรวงสาธารณสุข

แบบสรุปผลภาวะโภชนาการเด็กอายุ 0 - 4 ปี (60 เดือน)

รหัส ก. 102
เก็บ ณ. สถานีอนามัย

HEALTH SUBDISTRICT
CENTER (TAMBON) อำเภอ DISTRICT จังหวัด PROVINCE
ประจำงวดที่ QUARTER ปีงบประมาณ YEAR

EXHIBIT 7A - MONTHLY PROGRESS REPORT

หมู่ที่	ชื่อหมู่บ้าน VILLAGE NAME	จำนวนเด็ก 0 - 4 ปี (60 เดือน)		NUTRITIONAL STATUS ภาวะโภชนาการ (NOW COMBINED)									
		ทั้งหมดในหมู่บ้าน # CHILD < 5	ที่ได้รับการ ชั่งน้ำหนัก # WE < 5	อายุ 0 - 1 ปี (0 - 11 เดือน)				อายุ 1 - 4 ปี (12 - 60 เดือน)					
				ปกติ (คน)	1 (คน)	2 (คน)	3 (คน)	ปกติ (คน)	1 (คน)	2 (คน)	3 (คน)		
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
รวม													

หมายเหตุ

1. ให้หัวหน้าสถานีอนามัยหรือหัวหน้าฝ่ายส่งเสริมฯ รพช. จัดทำแบบสรุปนี้เป็รายงวด ๆ ละ 1 ชุด (ชุดละ 5 ฉบับ ๆ ละสี่)
2. ให้เด็กฉบับสี่เหลือง เขียน นำเงิน ชมพู ส่งสาธารณสุขอำเภอ
3. สาธารณสุขอำเภอเก็บฉบับสี่นำเงินไว้ รวบรวมฉบับสี่เหลือง เขียน ส่งสำนักงานสาธารณสุขจังหวัด และส่งฉบับสี่ชมพูให้เกษตรอำเภอ
4. สำนักงานสาธารณสุขจังหวัด รวบรวมฉบับสี่เหลืองส่งศูนย์โภชนาการเขต
5. รายงานงวดที่ 1 (ค.ค. - ธ.ค.) งวดที่ 2 (ม.ค. - มิ.ค.) งวดที่ 3 (เม.ย. - มิ.ย.) งวดที่ 4 (ก.ค. - ก.ย.) ให้กำกับจัดส่งส่งภายในวันที่ 15 ของเดือนแรกของงวดถัดไป
6. หากมีหมู่บ้านที่รับผิดชอบมากกว่า 14 หมู่ ให้รายงานเพิ่มเติมในชุดถัดไป

EXHIBIT 7.5 - QUARTERLY REPORT

PROVINCE	TOTAL # OF VILLAGES	# OF VILLAGES WEIGHING	COVERAGE CHILD POPULATION	COVERAGE CHILD POPULATION	NUMBER WEIGHED	NUTRITIONAL STATUS (COUNTS)				NUTRITIONAL STATUS (%)				2. GRADE 2 + GRADE 3	
	מוזכרות	מאזנות	אחוז (%)	אחוז (%)	מספר	פרמטרים: נורמל, כבדה, קשה, קשה מאוד				פרמטרים: נורמל, כבדה, קשה, קשה מאוד				מספר	
	מספר	מספר	מספר	מספר	מספר	N	1	2	3	N	1	2	3	מספר	
מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	מספר	
8. אשכול	1772	1703	97.8	92003	82.91	76204	52209	21149	2801	45	60.55	27.72	3.67	0.06	3.73
9. טמ	710	707	98.47	40968	92.04	37707	28014	9307	383	3	74.29	24.60	1.02	0.01	1.03
10. טרמא	2065	1903	92.15	194500	45.8	89131	66815	20022	2257	27	74.36	22.46	2.53	0.04	2.57
11. נרמט	1030	1000	97.3	53950	85.29	46021	32751	11454	1757	59	71.17	24.80	3.02	0.15	3.95
12. אטמא	1116	1092	97.85	81545	86.56	70582	47107	21642	1735	18	60.05	30.66	3.46	0.03	3.49
13. אטמא	859	853	99.3	46464	90.41	42006	28745	11920	1215	10	60.42	29.42	3.13	0.02	3.15
14. נרמט	444	443	99.77	20834	94.44	19675	12094	6021	747	12	65.53	20.6	3.8	0.07	3.07
15. טמא	1170	1170	100	62900	87.9	55364	43859	10167	1323	15	70.22	10.36	2.33	0.03	2.42
16. נרמט	1399	1305	93	56126	94.07	52799	37482	14201	1112	4	70.99	26.9	2.11	0.01	2.12
17. אטמא	1905	1902	99.84	79537	89.99	71577	52799	16739	2026	13	73.76	23.39	2.83	0.02	2.85
4. אטמא	12404	12196	97.69	729013	76.97	561146	402835	142640	15454	217	71.79	25.42	2.75	0.04	2.79
הפעולות															
מספר	25037	24320	96.9	1274153	81.15	1115137	790629	280386	35466	626	70.9	25.06	3.18	0.06	3.24

CHAPTER VIII

GROWTH MONITORING IN THE DOMINICAN REPUBLIC

8.1 Program Description

8.1.1 Background

Growth monitoring in the Dominican Republic is a component of the **Applied Nutrition Education Program (ANEP)** implemented by CARITAS/Dominicana and Catholic Relief Services. ANEP has been in operation since 1972, though in 1983 the focus of the program was changed significantly. The primary goal of the program throughout its existence has been to reduce malnutrition in the Dominican Republic.

Prior to 1983, ANEP was implemented through CARITAS, and program components included "nutrition education, nutrition and health monitoring and surveillance, agriculture and animal husbandry, income generation and improved health care and sanitation."¹ ANEP promoters were trained by CARITAS specifically to 1) provide education in nutrition, health and agriculture; 2) help in the diagnosis of community problems; and 3) assist in various community development efforts, specifically agricultural and health interventions. In addition to ANEP, CRS and CARITAS were involved in a number of food distribution and child feeding activities.

A 1982 ANEP evaluation failed to consistently show significant improvement in nutritional status among program participants. Partly as a result of this finding, the program was redesigned to emphasize education and self reliance, and to exclude food distribution.² Specifically, emphasis was placed on home-based growth monitoring and nutrition education activities.

¹ Jose O. Mora, Nancy Pielemeier, Patricia Avila de Halls and Maricela Ramirez, External Evaluation of the Applied Nutrition Education Program (ANEP) of CRS/CARITAS in the Dominican Republic. Draft Final Report dated September, 1987.

² Funding for this redesign was provided by USAID/Santo Domingo and CARITAS/NETHERLANDS with in-kind contributions from CARITAS and CRS.

8.1.2 ANEP Implementation

In the fall of 1983, twenty-seven communities were enrolled in the new ANEP. Since a primary goal of the program is to reduce malnutrition by strengthening community organization and awareness, communities were selected for enrollment according to pre-established criteria, including a relatively high prevalence of malnutrition and the existence of an active community organization. This community organization was required to demonstrate an interest in organized group activity on which ANEP could build its education and motivation programs.

As of September 1987, ANEP was operating in approximately 90 rural communities in the Dominican Republic, though only 70 communities are formally covered. 72 voluntary community promoters are supervised by seven area supervisors. Each promoter is responsible for an average of 60 to 70 children under five years of age.

ANEP utilizes an ongoing system for training and retraining area supervisors and promoters. Area supervisors meet monthly and, during these sessions, a full day is devoted to training on a specific topic. Specifically, area supervisors are responsible for training promoters in their field work activities (i.e., techniques for weighing and recording) and in the nutrition education associated with the growth monitoring sessions. In addition, area supervisors receive training in cleaning and tabulating data for the internal surveillance system, and other aspects of community education and making home visits. Supervisors are paid a small salary of DR \$385 to \$585 per month (approximately US \$60 to \$90).

Promoters are also trained and periodically re-trained. This occurs through monthly meetings conducted by the area supervisor. Promoters are trained to conduct growth monitoring sessions, including techniques of weighing and charting, assessment and referral. In addition, promoters are trained to transmit nutrition messages according to the age and nutritional status of the child. Third, they are trained to interact with local community groups, and to give mothers training on topics such as the prevention of diarrheal disease and preparation of oral rehydration solution. Promoters work on a volunteer basis, though some are given a small stipend for transportation and minor expenses.

Growth monitoring is one of three components in ANEP. The primary goal of the growth monitoring component is to "improve the child's growth through immediate action, particularly through direct feedback, appropriate education and advice on household practices to the mother, and appropriate referral to health services."³

All enrolled children up to five years of age are weighed at home every six months by the promoter for the purposes of identifying those at risk, and for on-going surveillance of the

³ Growth Monitoring and Nutrition Education: Impact Evaluation of an Effective Applied Nutrition Program in the Dominican Republic. International Nutrition Unit, LTS Corporation. Draft Report dated February, 1988.

nutritional status of the community. High risk children are those under two years of age, and those 3 to 5 years who suffer from second or third degree malnutrition (less than 75% of standard weight for age). High risk children are weighed at home on a monthly basis for closer monitoring, and to provide appropriate messages and advice.

The second component of ANEP is nutrition education. Education is, of course, provided during the home growth monitoring session. ANEP has developed a set of 12 card drawings which contain nutrition messages. These cards (or *laminas*) are used by the promoters in providing appropriate advice during home visits. The messages are intended to reinforce good existing behavior, or to encourage the adoption of new behaviors by the mother. The one-on-one sessions are considered key in improving nutritional practices.

Nutrition education is also provided in group settings, including meetings of the community group identified by ANEP at the time of program start-up. Promoters use flip charts complemented by program audio cassettes to promote and reinforce the messages depicted in the *laminas*. In addition, a set of program promotional materials have been developed that the promoters use to raise awareness about the program.

Community projects are the third component of ANEP. During ANEP's redesign, it was decided that community projects could be economically supported through a rotating fund financed by CARITAS, CRS and USAID. The program intended to fund small scale agriculture projects in order to increase availability of local food, and to generate additional income for members of the community. Only a few of these projects have been funded and implemented, and it is generally felt that this ANEP component is the weakest and least active of the three.

Finally, an ongoing surveillance and internal evaluation system has been incrementally developed and implemented since 1983. The data source for the system is the record book (*libreta*), in which the promoter records information from the weighings. These data are aggregated each month by the area supervisor in a monthly report. The monthly reports provide a basis for discussions at the periodic meetings of promoters and supervisors.

8.1.3 Contextual Conditions

As mentioned earlier, ANEP formally covers 70 communities, totalling 3,735 families and 6,035 children under five years of age. Most of the communities are rural, and socio-economic conditions are very low. Half of the families are landless, and many of them work for land-owners. As one might expect, morbidity and mortality rates are relatively high and nutritional status is low. A nutrition survey carried out in old ANEP communities during 1982 and 1983 found that 11 percent of the 3,066 children under five suffered from moderate to severe malnutrition. A similar prevalence (12.1%) was found among children entering ANEP at any time between 1983 and 1986.

As mentioned earlier, a selection criterion for program implementation was that there be an active community organization. At the time of ANEP enrollment, 27.2% of mothers and 23.3% of fathers were active in an organized community group. However, as a result of this implementation policy, communities where active community groups do not exist are not eligible for ANEP.

8.1.4 Program Impact

In 1987, the "new" ANEP was evaluated after three years of operation. This evaluation was based on pre-post comparisons of health and nutrition knowledge and practice as well as nutritional status of children. The same comparisons were made between program and non-program communities.

In general, the evaluation provides evidence that ANEP has significantly reduced the prevalence of malnutrition by improving nutrition and health knowledge and practices. First, the evaluation found that the overall prevalence of moderate to severe malnutrition was reduced by more than one-half in ANEP communities in the three years of the program's existence. Second, there were consistent improvements in nutritional status over time among program children, and program children were found to have significantly better nutritional status than non-program children. Finally, evaluators found a relationship between the length of exposure to the program and improvement in nutritional status.

8.2 Comparison of Findings

8.2.1 Related Findings

The Dominican ANEP can be compared and contrasted to the Indonesian *KB-Gizi* program. It is interesting to first note that both programs put a strong emphasis on nutrition education. The promoters in the Dominican Republic and the *kader* in Indonesia are explicitly trained to perform nutrition education in the context of the monitoring session. Participating households in both settings show superior KAP to non-attenders.

A second interesting comparison is between the home weighing strategy carried out in the Dominican Republic, and the weighing post approach used in Indonesia. Perhaps as a result of the home weighing approach, coverage in the Dominican Republic is very high. At the same time, the programs are sufficiently different that comparing "coverage" in the two programs is not

meaningful.⁴ The fact that the *KB-Gizi* program strives for monthly weighing of all children under five may further limit participation there. Yet, it is probably fair to surmise that malnourished children are better covered in the Dominican case due to the home weighing approach.

One question that this raises is the commitment of the health volunteers. One reason that Indonesia has not implemented a home weighing strategy is that planners feel that the effort necessary to conduct home weighings would be greater than the *kader* would be willing to make. The problem of relatively low participation in some communities in Indonesia may be solved using the home weighing approach used in the Dominican Republic.

There does not appear to be much difference in context between program communities in the Dominican Republic. All are rural farming communities with active community organizations, and high rates of malnutrition. The extent to which the communities are homogeneous affects the degree to which the effect of context can be studied. Since differences are few and small in magnitude, it is difficult to see the effect of contextual factors.

Given contextual homogeneity, comparisons must be made with Indonesia on the basis of the relative position of the Dominican Republic on the contextual scales. Consequently, it appears that all Dominican communities must be classified as rural and non-modern, and treated as homogeneous as far as the modernization dimension is concerned. Though some analysis has been performed concerning the affect of community factors on growth monitoring within the Dominican Republic, it should be recognized that these communities do not reflect the scope of context found in Indonesia.

The effect of community organization is an issue addressed analytically in Indonesia and in other ways in the ANEP evaluation. As mentioned earlier, ANEP uses the existence of an active organization as a prerequisite for program implementation. The Indonesia study found that the existence of community organizations, especially the women's group, had a powerful effect on attendance and the successful transfer of nutrition and health messages.

Two points are worth considering with respect to community organization. First, both settings appear to confirm the importance of community organization as a determinant of program success. This raises the second question which pertains to successful implementation in communities where such organizations do not exist. Additional consideration might be given to a program strategy which starts and builds community organization outside of the nutrition program. Such strategies are seen in the Iringa Nutrition program in Tanzania, and to a lesser extent, in the ICDS program in India.

⁴ Coverage in the Dominican Republic is reported to be 85% of high risk children under five, and 70% of all under fives. Indonesian coverage, as measured by ever attendance, was found to be greater than 80%. Yet, meaningful participation in the Indonesian program requires that child attend more than 50% of the time.

The ANEP evaluation also found that program impact was greatest among mothers with 3 to 5 years of education, less among mothers with 0 to 2 years, and least among mothers with more than 5 years. This is analogous to the finding regarding the effect of average education and the acceptance of modern medicine at a community level on program success in Indonesia. There it was found that the program has the greatest effect in those communities where acceptance is mixed, or average education is moderate. Because this finding has significant policy implications, additional analysis was undertaken using the Dominican data. This additional analysis confirmed the findings at the community level in the Dominican Republic (see 8.2.3 below).

Both findings support the notion that communities and individuals both benefit most from growth monitoring when they have some background or willingness to accept or both. In cases where acceptance or education is high, there is little need for growth monitoring because the messages are already understood and practiced. In cases where acceptance or education is low, there is either not a willingness, or people do not have the ability to effectively understand and implement good practice. This process needs to be fully understood in the local context so that a strategy of differential implementation can be employed in low acceptance/education settings.

8.2.2 Additional Analysis -- Methodology

Since data were collected as part of the ANEP evaluation, and those data were made available to CSF, additional analysis was performed.⁵ The data set is quite large, containing more than 8000 households surveyed across 72 communities. Unfortunately, no information was available at the community level, so an analysis of the type performed with respect to *KB-Gizi* was impossible. Instead, a surrogate was created for a community-level variable by aggregating household-level data to the community level. In this case, the percent of mothers with formal schooling was calculated for each community.

The goal of this analysis was to test the same growth monitoring model utilized in the *KB-Gizi* analysis. Specific relationships in the model were identified according to data available in the Dominican data set. The following measures were used:

Years of Education - Mother: This household level variable was used to calculate the percentage of mothers in the community who have some formal education. Communities were then split into three groups (high, medium and low).

Program Attendance: The number of times a child had been weighed was adjusted for his/her age to generate a percentage attendance measure. This measure is not precise because there is no way of knowing the number of times a given child should have been weighed. If a

⁵ Our thanks to Dr. Alfred Zerfas of LTS for his assistance in preparing the data set.

child is found to have lost weight, that child is directed to be weighed monthly rather than quarterly, and the data set does not contain this information. But, **percent attendance** was used as a rough measure, even though it is recognized that the denominator is not always accurate.

Nutritional Status: Weight for age raw score is used as an interval level measure of nutritional status. In addition, grade (normal, first to fourth degree malnourished) was used as an ordinal level measure. Finally, grade was aggregated to the community level to determine the percentage at last weighing who fell below first degree malnourished.

Crosstabulations were used at the community level, and ANOVA and t-tests at the household level were used to evaluate the model. The hypothesis in the analysis is that the percent with formal education in the community has an effect on the relationship between mother's education, participation in the program and nutritional status of the child.

8.2.3 Additional Analysis – Findings

First, ANOVA was used to test the relationship between the percentage of people in the community with formal education, and attendance, but no significant relationship was found. Though this result is not consistent with what was seen in Indonesia, we might expect such an outcome because of the strong outreach (home weighing) component in ANEP. In a situation where participation does not depend on the mother's initiative, there should not be a relationship between education and attendance. Furthermore, this is a positive finding for the ANEP program—it shows that the program is not less well implemented in low education communities than in high education communities.

Second, there is no positive relationship between the percent of residents with formal education and the average level of nutritional status. On the surface, this finding is inconsistent with what was found in the Indonesia analysis, and suggests that context has less of an effect on nutritional status in the Dominican Republic. On the other hand, communities selected for ANEP are relatively homogeneous as compared to Indonesia, and there may not be sufficient variance in community education to influence nutritional status.

Third, the relationship between participation in ANEP and nutritional status is relatively strong. The correlation between attendance and nutritional status is .57 (significant at .001). This, too, is in marked contrast with Indonesia, where participation in *KB-Gizi* appeared to have little direct impact on nutritional status. This can probably be attributed to higher prevalence of malnutrition in program areas as well as the vigorous outreach component in ANEP.

The effect of the percent of people in the community with formal education on the relationship between participation and nutritional status was then examined.

Percent with formal education	Correlation between attendance and nutritional status
Low	.55
Medium	.63
High	.53

Here we see a confirmation of the Indonesia analysis. It is the medium group where the effect of the program is the strongest. As mentioned above, this suggests that in communities where education is moderate, residents have both the capacity and the need to implement and participate in a growth monitoring/nutrition program.

CHAPTER IX
**GROWTH MONITORING IN THE INTEGRATED CHILD DEVELOPMENT SERVICES
PROGRAM IN INDIA:**

9.1 Program Description

9.1.1 Background

In 1975, the Government of India started the Integrated Child Development Services (ICDS) scheme to battle problems of "infant mortality, morbidity, malnutrition and stagnation in schools." ¹ The program began in 33 pilot projects, and by 1986 had been expanded to 1,300 projects.

The aim of the ICDS program is to deliver an integrated package of basic services to children under six years of age, to pregnant women, and to nursing mothers. The objectives of the ICDS scheme are to 1) improve the health/nutritional status of children; 2) lay the foundation for the proper psychological, physical and social development of the child; 3) to reduce the incidence of mortality, morbidity, malnutrition and school drop-out; 4) to coordinate the efforts of various government departments promoting child health and development; and 5) to increase the mother's capability with respect to the nutrition and health needs of her child through appropriate nutrition and health education.

¹ A Manual on the Integrated Management Information System for the Integrated Child Development Services Programme, 1986.

9.1.2 ICDS Program Implementation

The administrative unit for an ICDS project is a community development block in rural areas, a tribal development block in tribal areas, and a group of slums in urban areas. In the selection of projects, priority is given to areas predominantly inhabited by scheduled tribes and scheduled castes², to backward and drought-prone areas, to areas where prevalence of malnutrition is high, and to areas lacking in the development of social services.

ICDS services are delivered at the *anganwadi* (community) level. An *anganwadi* is made up of a population of approximately 1000 in urban and rural areas, and 700 in tribal areas. The ICDS program is run by a woman selected from the community called an *anganwadi worker* and a helper. Both the *anganwadi worker* and her helper are paid a small honorarium.

The following services are provided in the ICDS project areas: 1) supplementary nutrition; 2) immunization; 3) health examinations; 4) referral services; 5) nutrition/health education; and 6) nonformal pre-school education. The *anganwadi worker* and her assistant are responsible for organizing and implementing these services, though certain of them are performed in conjunction with the health center. In addition, they maintain records on the program and submit monthly progress reports.

An important part of the program is provision of supplementary food. Moderately and severely malnourished children, children under six years of age attending preschool activities and other children at-risk are eligible to receive supplementary food. Pregnant and nursing mothers from the lower socio-economic group are also eligible to receive food from the last trimester of pregnancy through the first six months of nursing. These eligibility criteria are not strictly enforced so that essentially all program participants receive supplementary food.

Food is served on-site at the *anganwadi* six days a week (300 days per year). The growth monitoring component of the ICDS program is used to identify children suffering from moderate to severe malnutrition, so that they can be given food supplements and be referred to the PHC for special care. Growth monitoring is also being used as a forum for counseling mothers.

Because ICDS is community-based (as opposed to home-based), coverage of children under three years and pregnant/lactating women is not high. A survey of various case studies of specific ICDS sites found enrollment varied considerably, and that few children had been weighed consistently every month.³ Moreover, it is likely that the primary reasons that people participate in ICDS are to receive supplementary food and preschool education. Consequently, growth

² A "scheduled" tribe or caste group is one that has been identified by the Government of India as disadvantaged.

³ Gopalan, C. and Meera Chatterjee. Use of Growth Charts for Promoting Child Nutrition: A Global Review. Nutrition Foundation of India, 1984.

monitoring and the related educational activities and services to the mother take a "back seat" to these anganwadi-based activities which require less outreach.

The importance of supplementary food to the ICDS scheme is not surprising in that food availability is generally inadequate among lower income groups in India. In addition, as mentioned earlier, the ICDS program is targeted to disadvantaged and backward communities, where the prevalence of malnutrition is especially high. Literacy is generally low, and traditional (sometimes ill-suited) nutrition-related practices are prevalent. Consequently, one would expect that the growth monitoring and nutrition education components would be implemented with some difficulty.

The *anganwadi workers* are supervised by *mukhya sevikas*. The ratio of *mukhya sevikas* to *anganwadi workers* is 1:25 in urban projects, 1:20 in rural projects, and 1:17 in tribal projects. The responsibility of the *mukhya sevika* is to support the *anganwadi workers* through training activities, and by acting as a liaison between the anganwadi workers and the PHC staff, and the Community Development Project Officer who heads the ICDS staff at the block level. It should also be noted that in the AID supported ICDS projects, that the staffing ratio has been deliberately reduced to ten anganwadi workers to one *mukhya sevika* to see if it will increase the frequency and effectiveness of supervisory visits to the *anganwadi*.

The Child Development Project Officer (CDPO) coordinates and implements an ICDS project. The CDPO manages and supervises the entire project team through site visits and periodic meetings with *mukhya sevikas*, and occasional meetings with *anganwadi workers*. An ICDS project covers 100,000 population, approximately 100 Anganwadis.

9.2 Contextual Issues in ICDS

9.2.1 Comparison of Findings

The conditions in India are much more severe than in Indonesia. If communities in Indonesia and India are compared with respect to modernization, education, literacy or other related factors, little overlap is apparent. In Indonesia, the majority of women are literate. In the AID supported project areas in the Indian states of Maharashtra and Gujarat, literacy rates of 25% and 10% respectively are found. If modernization is compared, India as a whole appears to fall well behind Indonesia.

This fact influences this study in two ways. First, it makes it impossible to directly confirm the applicability of the Indonesian findings since there is little overlap. Instead, it makes it possible to look further on the continuum than was available in Indonesia. Second, it makes it necessary to remind the reader that the role of the program and expected outcomes are somewhat different in the two cases. This adds breadth, as opposed to depth to the study.

One symptom of this difference is the fact that ICDS has a strong supplementary nutrition component, whereas in Indonesia, relatively little energy is put into the corresponding component. The fact that prevalence of malnutrition is so much higher, provides a rationale for the importance of supplementary nutrition in ICDS. The relationship between program attendance and nutritional status is much stronger in ICDS, especially among those children 18 to 36 months, because the need is so dire and daily food supplementation can significantly affect a child's nutritional status.

At the same time, nutrition education plays a relatively strong role in the *KB-Gizi* program, as compared to ICDS. While this area is considered important in ICDS, it is generally recognized that more work must be done before it can be effectively implemented. According to Mary Ann Anderson, growth monitoring in the ICDS project is behind Indonesia in the sense that the program is only now beginning to focus on training health workers to correctly weigh, record, interpret and counsel mothers. As a result, efforts are underway in AID supported areas to increase supervision and training of *anganwadi workers*, and to introduce new training materials and a social marketing campaign. It is too early to know whether these efforts will have any positive impact on program implementation or impact.

One way to interpret the above is to say that the objective of growth monitoring in the two countries is somewhat different in the two countries as a result of the conditions. It is perhaps appropriate in a country where the prevalence of malnutrition is high to use growth monitoring as a means of identifying at-risk children, and administering supplementary nutrition accordingly. In a country like Indonesia where prevalence is relatively low, implementors can focus growth monitoring sessions on nutrition education for mothers.

However, there is a second part to this interpretation that is equally important. Where illiteracy is high, it may be more difficult to properly implement the education component of growth monitoring. The health worker must first understand the concept of weighing and charting children, and the relationship between these charts and nutritional status. This is congruent with the relationship between average education and growth monitoring implementation found in Indonesia.

However, ICDS is beginning to increase the attention given to the nutrition education component growth monitoring. Initial study has shown that a high percentage (69% in Maharashtra, 54% in Gujarat) of mothers with children who are less than 70% of weight for age (second, third and fourth-degree malnourished according to the India Academy of Pediatrics) do not know their children are malnourished. This points to a desperate need for growth monitoring as a means of making mothers aware of their child's nutritional status, giving them an incentive to act.

Another consequence of the severity of conditions in India is that other contextual factors appear to have little effect on program performance. There is no relationship between socio-economic status, and level of program participation in ICDS. In addition, it appears to people involved with the program that there is little difference in program performance according to prevalence of literacy. This might be explained by the program having a generally positive impact, and the difference in education in communities not being great enough to affect program performance. Moreover, as mentioned earlier, all Indian communities where ICDS is being implemented have high illiteracy rates. Also, literacy and economic status in a community are more likely to affect the successfulness of a program as measured by changes in knowledge and attitudes. In the case of ICDS, program performance is generally measured in terms of changes in nutritional status, which presumably come about as the result of the supplementary feeding activities.

A final contextual factor worthy of comment is community organization. ICDS strives to build women's groups called *mahila mandals*. Unfortunately, community organizations such as these are not part of the culture in many areas, and consequently these groups do not form. The exception to this rule is in Kerala state where community groups are strong, and apparently support and enhance the ICDS program. This information supports the notion that community organization can be a great boon to growth monitoring implementation, though cultural barriers must be recognized.

CHAPTER X

GROWTH MONITORING IN THE JOINT NUTRITION SUPPORT PROJECT IN TANZANIA

10.1 Program Description

Over ten years ago, the Tanzanian Food and Nutrition Center (TFNC) developed a food and nutrition policy for Tanzania. This policy has become the cornerstone for an area-based nutrition program initiated as part of the Joint WHO/UNICEF Nutrition Support Program (JNSP). With funds provided by the government of Italy, the JNSP project team began implementing TFNC policy in the Iringa region of Tanzania in 1983.

10.1.1 Background

The Iringa region was selected as the area in which the JNSP program would be targeted for three reasons. First, Iringa Region was one of the few in which recent nutrition surveys had been conducted and the frequency of malnutrition had been found to be relatively high. Malnutrition measured as growth retardation affected 40 to 70% of the under-five population, and 4 to 19% were found to be severely underweight. Second, Iringa Region includes a range of agri-economic and ecological zones which are also found in many other areas in Tanzania, and it was felt that this could facilitate replicability. Seven divisions were selected to represent this variation. Third, the institutional infrastructure for training and nutrition work was comparatively well-developed.

A nutrition campaign was used to initiate JNSP activities. During this campaign, a survey was conducted which confirmed the prevalence levels reported in earlier surveys. In addition, the baseline survey also showed that there were very small differences in nutritional status between divisions of the program area, despite large agri-ecological variations. The total population of children under five years of age in the program area is approximately 46,000.

The JNSP supported program begins with the assumption that effective nutrition intervention evolves through a learning process rather than complete definition at the onset. This process is described as the "Triple-A Cycle." The Triple-A cycle starts with problem assessment during which the key problems are defined. This is followed by an analysis of the problem to better understand their causes, which, in turn, is used to determine strategies for intervention.

Finally, strategies are translated into actions aimed at alleviating the problems. The cycle is closed when, following the action, the problems are re-assessed and re-analyzed to determine the degree to which the actions were successful, and how they might be modified.

Several interesting features of the application of the cycle should be mentioned at this point. First, the application of the cycle takes place at all levels of society. Thus, household, village and higher governmental levels all use the Triple-A cycle to identify actions to be taken at their respective level. Second, the need to develop a capability to interpret information at the lower levels was recognized. As a result, "indicators" have been introduced slowly and carefully into the system. Third, the emphasis throughout the project has been on strengthening the implementation of the Triple-A cycle at the various levels as opposed to the implementation of specific interventions.

This system clearly represents an alternative approach to conventional health/nutrition interventions. A fundamental premise of the approach is that nutritional status is the result of a set of complex and constantly changing social conditions. The Triple-A cycle, when applied repeatedly, provides the mechanism by which a dynamic response to changing conditions can be implemented.

The primary objective of the Iringa Nutrition Program and the Triple-A cycle in Tanzania is really nutrition surveillance. Information gathered regarding nutritional status, food stocks and distribution, and other factors which influence nutritional status is used through the Triple-A cycle to make decisions. Growth monitoring fits in to this system as one technique in a repertoire used to identify children suffering from malnutrition. Of course, once a child's nutritional status is identified, that information can be used for education, treatment and referral. The overall objectives of the Iringa Nutrition Program are the following:

1. Reduction of infant and young child mortality and morbidity.
2. Better child growth and development
3. Improvement of maternal health and nutrition.
4. Improvement of the capabilities at all levels of society to assess and to analyze nutrition problems and to design appropriate action.

A mid-term project evaluation found that the program is having a positive impact with respect to these objectives. During 1987, it was decided that the Iringa Nutrition Program should be expanded to cover the entire region. This was on request from the regional leaders as a result of the demand from the population in Iringa living outside the original program areas. The regional and district authorities expressed a preparedness to use their own resources to cover the cost for this expansion. UNICEF then agreed to provide support from their general resource funds, and the JNSP Global Steering Committee has provided JNSP funds for this purpose as well.

10.1.2 Growth Monitoring Implementation

Through the JNSP, a growth monitoring system has been introduced at the village level. This system has been operating in 168 villages for four full years. In 1987, the system was introduced into another 460 villages. The nutritional status monitoring system is based on the weighing of individual children carried out under the auspices of the Village Health Committee with support from Village Health Workers.

The Iringa Nutrition Program has developed an information management system. The source document for the system is a one page report filled out in each community. Although child weighing sessions are conducted every month, data are forwarded to the information management system on a quarterly schedule.

Exhibit 10.1 is the growth card used in Tanzania. There are three nutritional categories; normal, moderate and severe. The Harvard standard is employed with cut points of 80% of standard separating normal from moderate and 60% between moderate and severe malnutrition.

The card is kept by the mother and brought to the monthly weighing sessions on health day, to special immunization sessions, or on any visit to the local dispensary. Child weights and the day of weighing is recorded on the back of the card and the data point entered on the chart, usually at the time of weighing. The village health worker both records the observations and advises the mother at the time of weighing. The VHW also records the child's nutritional status in a village register which is organized by ten cell leaders. This provides both a permanent record in the village and facilitates follow-up by the ten cell leaders if the need should arise. Exhibit 10.2 is an example of this register. There is a separate sheet for each child in the ten cell leaders group.

At the end of each quarter data are transferred to the village quarterly report. (Exhibit 10.3). This report provides for the nutritional status of children weighed during the last health day. Data is organized by child age (0-12, 13-36, 37-59 months) and nutritional status category (normal, moderate and severe). In addition to nutritional status, child deaths organized by age and cause is also provided. Categories of cause are fever, measles, diarrhoea, chest infection and other while the age categories are the same as those for nutrition. This quarterly report also records the total number of children under five in the entire community. The ratio of children weighed to the total children under five is used as a measure of participation in the program for the last month of the quarter.

Copies of this village quarterly report are sent up the government organizational structure; ward to division to district and finally to the region where they are entered into a data base management system (INFORMIX). Quarterly reports are prepared in both tabular and graphic forms. Exhibits 10.4, 10.5 and 10.6 show tabular reports currently generated and Exhibit 10.7, 10.8 and 10.9 are graphs produced using Lotus 1-2-3. While the system is currently under development it is interesting to note that most reports provide for comparisons between

geographic areas. Exhibit 10.7 is especially noteworthy in that it provides a longitudinal comparison of a given village with all villages in its division and region.

10.2 Comparison of Findings

Conditions in Tanzania are harsh compared to those in Indonesia. Local droughts are relatively common in the Iringa region, where most people are farmers. Electricity, and other signs of modernization are scarce. A symptom of the harsh conditions are comparatively high rates of morbidity and mortality.

The Iringa Program is different than *KB-Gizi* in the sense that it concentrates on the idea that interdependent social processes are the causes of malnutrition. In Tanzania, disease and inadequate food intake are seen as the immediate causes, inadequate provision of and access to essential commodities and services are seen as the underlying causes, and socio-economic, political and cultural factors are accepted as the basic causes. Consequently, the Iringa program has a much broader scope because it embraces (to some extent) all these causes simultaneously.

The Iringa Program also takes the approach that various levels of society should be given the responsibility of identifying the cause and developing appropriate response at that level. As a result, the village is expected to identify causes of malnutrition (in the village), and implement a community-level response. The same expectation is held at each level of society: division, district, region and nation.

By using this approach, the Iringa program has accepted the fact that malnutrition may be the result of different contextual conditions in different communities. Consequently, it has allowed (and, in fact, expected) that the strategy devised to combat malnutrition be different in different places. In a sense, this is a confirmation of the influence of context on program implementation in Tanzania.

Because of the philosophical difference between the Iringa Program and others, it is difficult to make direct comparisons. Since all levels of Tanzanian society are in some way involved in the Nutrition Program through the Triple-A cycle, it doesn't really make sense to compare coverage rates or other aspects of implementation. At the same time, the Iringa Nutrition Program should be considered an effective alternative model.

10.3 Misclassification of Nutritional Status in Iringa

Over the past several years many evaluations of nutrition and health programs have been conducted using impact indicators such as malnutrition or disease prevalence. Often, these studies measure prevalence at two points in time: usually before and after the intervention was introduced. This information is then used to determine whether the program has had a positive effect on health/nutritional status, and, if so, the magnitude of that effect.

In the case of nutrition programs, anthropometry is often used to determine the nutritional status of children. An individual child's anthropometric score is compared to some predetermined standard, and if the score falls below some percentage of that standard, the individual is judged to be malnourished. Our objective in this section is to discuss the effect of incorrectly classifying children on statistical techniques typically used in the type of evaluation outlined above.

10.3.1 Measuring the Effect of Classification Errors

To discuss the effect of misclassification, it is necessary to first present some definitions.¹

Prevalence (P) is the proportion of cases having a disease or condition in the population at a given time. Thus, the "prevalence" at any point is a proportion with a value ranging from 0 to 1.

Sensitivity (U) is the probability that a diagnostic test will be positive when applied to an individual who has the condition. In the case of anthropometric classification, this is the probability that a malnourished child is diagnosed as malnourished.

Specificity (V) is the probability that a diagnostic test will be negative when applied to a person who does not have the condition. In the case of anthropometric classification, this is the probability that a healthy child is diagnosed as healthy.

¹ These definitions and the subsequent discussion of misclassification is taken from: Drake, William D., Roy I. Miller and Robert J. Timmons. *Effect of Classification Errors Upon Evaluation Outcomes: Nutrition Programs Revisited*. Community System Foundation, Michigan, 1984.

In most cases, misclassification of individuals due to imperfect sensitivity and/or specificity results in a bias when observed prevalence is treated as though it were true prevalence. Previous research has shown that, given reasonable assumptions concerning the rate of misclassification, the comparisons of observed prevalence rates in two populations (or the same population at two points in time) most often **understates** the difference in true prevalence rates. In fact, it is generally true that the lower specificity and sensitivity are, the greater this bias towards understatement.

The issue of misclassification is addressed in this report for two reasons. First, in general, the impact of health/nutrition programs is undervalued as a result of misclassification. Unless efforts are made to estimate and correct for sensitivity and specificity, it is likely that changes in the nutritional status of the population(s) will be substantially understated. Policy makers should recognize this bias and interpret results accordingly.

Second, contextual factors are likely to influence the rate of misclassification. For example, in the Indonesian province of Bali, the age of a person is not regarded as important. Consequently, despite very rigorous data collection protocol carried out by medical students, there was strong evidence that age was incorrectly given in a large number of cases.² In the Dominican Republic, on the other hand, age data appears to be more accurate -- probably a result of cultural/religious interest in age (the Catholic Church registers all children at birth in the Dominican Republic).

Errors made in nutritional status classification do not **necessarily** negatively influence the **actual** effect of a program. Many activities related to growth monitoring are effective despite some level of error. For example, the growth monitoring sessions frequently serve as a forum for nutrition education, immunization and other health-related activities. Clearly it is preferable that children be classified correctly, but it is not essential for the program as a whole to have a positive effect.

At the same time, misclassification can influence the performance of the program as well as its evaluation. If a health worker classifies a malnourished child as normal, the mother will presumably not receive the appropriate nutrition messages, nor be referred for additional attention. Thus, in cases where sensitivity is low, growth monitoring will be less effective.

² See National Family Planning Coordinating Board (BKKBN), the Universities of Udayana, Brawijaya and Airlangga and Community Systems Foundation, *KB-Gizi--An Indonesian Integrated Family Planning, Nutrition and Health Program: The Evaluation of the First Five Years of Program Implementation in West Java and Bali*. October 1986.

10.3.2 Estimating Misclassification in the Iringa Nutrition Program

While in Tanzania, a study was conducted to estimate the level of misclassification of nutritional status data. This study was not conducted for the purpose of evaluating the program, but rather as an example of typical error rates found in a well-run growth monitoring program. In general, the field protocol observed in Tanzania was excellent, and the nutritional status classification therefore is probably more accurate than in many other programs. Misclassification can result from either improperly classifying a well child as malnourished, or a malnourished child as well. It always exists at some level in any real system even under controlled conditions.

The amount of misclassification determines, in large measure, the amount of impact which will be reported by any analysis of data. In general, the greater the misclassification, the less the true program impact will be reflected in the analysis. This phenomenon is especially important when there are only a few categories of nutritional status being reported such as is the case in the Iringa Nutrition Program.

Misclassification of nutritional status can be due to many causes including (1) the imperfection of the indicator itself (weight-for-age) (2) age determination errors (3) weight recording errors (4) weight measuring errors and (5) sources of errors related to processing and analysis of the data once it has been collected. It would be a diversion to dwell upon the detailed aspects of this phenomenon here except insofar as it affects the *interpretation* of the results of analysis of programs.

In order to estimate misclassification in the Iringa Nutrition Program, one aspect of the field work involved an inquiry into some of the above-mentioned sources -- namely age determination errors, weight recording errors and weight measurement errors. Practical field-level procedures for determining these estimates are in their infancy and because it was necessary to balance the need for determining misclassification against other field demands, realistic compromises between the "ideal" and practical field protocol were required. The next section of this report presents a synopsis of the details of the field procedures employed and provides the implications for interpreting nutritional status impact findings.

10.3.2.1 Age Determination

The first source of misclassification of nutritional status in the field arises from errors in the child's age. Age errors can be caused by (1) improper birth date determination, (2) improper birth date recording on the growth card, and (3) improper recording of the month along the horizontal axis of the growth card and (4) improper plotting of the weight on the growth chart. In this study error source (1) and (2) above were impossible to verify but sources (3) and (4) were verifiable using empirical estimation.

The procedure followed was to utilize a table which provided the correct age of the child in months, given his recorded birth date (See exhibit 10.1 side A). This "correct" value was then compared against the child age as shown by the horizontal axis of the growth chart (see exhibit 10.1 side B). Where an error was found it was highlighted so that a later determination could be made regarding the effect this error would have upon the classification of the child's nutritional status. Several causes of this error became apparent in the sample of growth charts.

First, the month during which the weighing day occurred was recorded on the horizontal axis. Thus, a child who was born near the first of the month was treated the same as one born near the end of the month. Second, whenever the child missed the monthly health day weighing, there was the chance that a space was not provided for the missed month but rather the next weighing recorded in the adjacent position. Third, sometimes a child was weighed more than one time in the same month because of a visit to the dispensary as well as attendance on the health day weighing.

Under these circumstances, two data points could be recorded consecutively rather than selecting one of the weights for the month's recording. Finally, some of the growth charts exhibited a gap of an entire year introduced when an earlier error caused the month labelling to become out of sequence. Some of the above errors caused an understatement of the child's age and some caused an overstatement. In the sample taken they resulted in roughly an equal chance of under or over statement.

10.3.2.2 Weight Determination

Misclassification arising from weight determination can be caused by (1) errors due to the way the child is weighed (2) rounding to the nearest digit or digit fraction and (3) simple transcription errors. In this study only the effects of rounding or digit preference was analyzed. On the front of the growth and (exhibit 10.1 side A) there is provision for recording the date of weighing and the child weight. Thus, it was possible to determine digit preference by observing whether weights were recorded to the nearest kilogram or fraction thereof. Because change in misclassification over time is important, digit preference was observed both at the beginning of the list of weights and at the end.

10.3.3 The Sample of Observations

A sample of 118 growth cards was selected from two different villages; 71 from Wanging'ombe and 47 from Mayale. For each growth card age errors were determined with the aid of a date/age table and weight rounding was recorded at both the beginning and ending of the lists of weights. In addition to these errors, the proximity of the last growth chart plot to a nutritional cut point was recorded. With this set of information it was possible to classify the most recent observation on each growth card into one of three categories: 1) no apparent change in nutritional classification 2) a definite change in grade and 3) a probable change in nutritional grade. In order to provide a conservative estimate of misclassification, only one half of those observations which were probable changes were recorded as a change in grade. Table 1 presents the results of the sample.

Village Name	N	Definite Changes	Probable Changes	Definite Changes + 1/2 Probable Changes	Percent Misclassification
Wanging'ombe (incl 7 obs)	71	12	16	20	28.1%
Mayale	47	7	9	11.5	24.4%
Total	118	19	25	31.5	26.7%

Although the sample is relatively small and is taken from only two villages it is clear that there is substantial misclassification of nutritional status of children in the Iringa Nutrition Program. The sample mean of 26.7 percent is in fact a lower estimate because it includes only some of the possible sources of error. Nevertheless, the small field procedures used in the program are quite good and when compared with other programs throughout the world are way above the norm. That a seemingly high misclassification rate was observed is not indicative of program performance but rather is a reflection of the magnitude of this phenomenon in virtually all growth monitoring programs.

10.3.4 Effect of Misclassification Upon Reported Child Malnutrition

In order to estimate the effect of misclassification upon the reported child malnutrition in the Iringa Nutrition Program, some assumptions must be made. First, it must be assumed that misclassification remains constant over time. Although there are arguments for both improvement and regression in misclassification, the only evidence which we have is that it remains constant. (Rounding error was observed in the sample to be the same at the beginning and at the ending observations.)

The other assumption is that the sample is a reasonable estimate of overall program misclassification. We have argued earlier that the sample estimate while approximate, captures only some of the sources of possible misclassification and therefore is a conservative estimate.

Applying the appropriate correction formulas given the above assumptions, shows that the actual reduction in child malnutrition went from 83 to 33 percent rather than the reported change of 66 to 42 percent. In other words, for the program as a whole, a 24 percent drop in malnutrition was reported when in fact the drop was 50 percent.

EXHIBIT 103

VILLAGE QUARTERLY REPORT FOR NUTRITIONAL STATUS AND DEATHS OF <5s

A

NAME OF VILLAGE.....NAME OF WARD.....

QUARTER OF REPORTING 1,2,3, 4. DATE OF REPORTING

NAME OF REPORTER AND TITLE.....

NUMBER OF PEOPLE IN VILLAGE NUMBER OF <5s.....

B

NUTRITIONAL STATUS

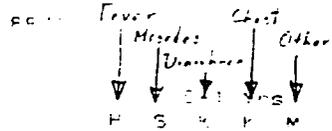
POSITION ON GROWTH CHART								
age months	GREEN no.	%	GREY no.	%	RED no.	%	TOTAL	%
0 - 12								
13 - 36								
37 - 59								
TOTAL								

C

DEATHS AND CAUSES

CAUSES OF DEATHS					
age months	FEVERS	MEASLES	DIARRHOEA	CHEST INFECTION	OTHERS
0 - 12					
13 - 36					
37 - 59					
TOTAL					

Report for 1 Year/Quarter



		Fever					1-3 Yrs					3-5 Yrs					Over 5					
		H	S	K	K	M	H	S	K	K	M	H	S	K	K	M	H	S	K	K	M	
Kihwere																						
Mfyome																						
Kitapilwa							2					2										
Itagutu										1												
Mqongo																						
Maena																						
Kalenga																						
Tosamaganga																						
WARD TOTAL	Kalenga	3		3			2		1	1		2										
Nzini																						
Kibebe																				2	1	1
Magupike																						
Nvamihul										1												
Mangala																						
Ibengamoyo																						
WARD TOTAL	Nzini	2	1	1		1	4		2	1	2	2							2	1	1	
Magulilwa																						
Ndiwili																						
Nyabula																						
Kitayawa																						
Mlanda																						
Tagamenda																						
Ngenza																						
Ikuvilo																						
Wangama																						
WARD TOTAL	Magulilwa		1	1		4			3		2								2			
Mgama																						
Manduta																						
Malagos																						
Ibumila																						
Jyangungwe																						
Kikombwa																						
Ihemi																						
Lup/senge																						
WARD TOTAL	Mgama						3		1		1								1			
Ilolo																						
Mkombilenga																						
Luganga Ilolo																						
WARD TOTAL	Ilolo		1			1																

EXHIBIT 10.5

May 24 1988

JNRP Nutrition Status Report

Page 1

Current Year/Quarter is: 88/1 Previous: 87/4 Compared to: 87/3

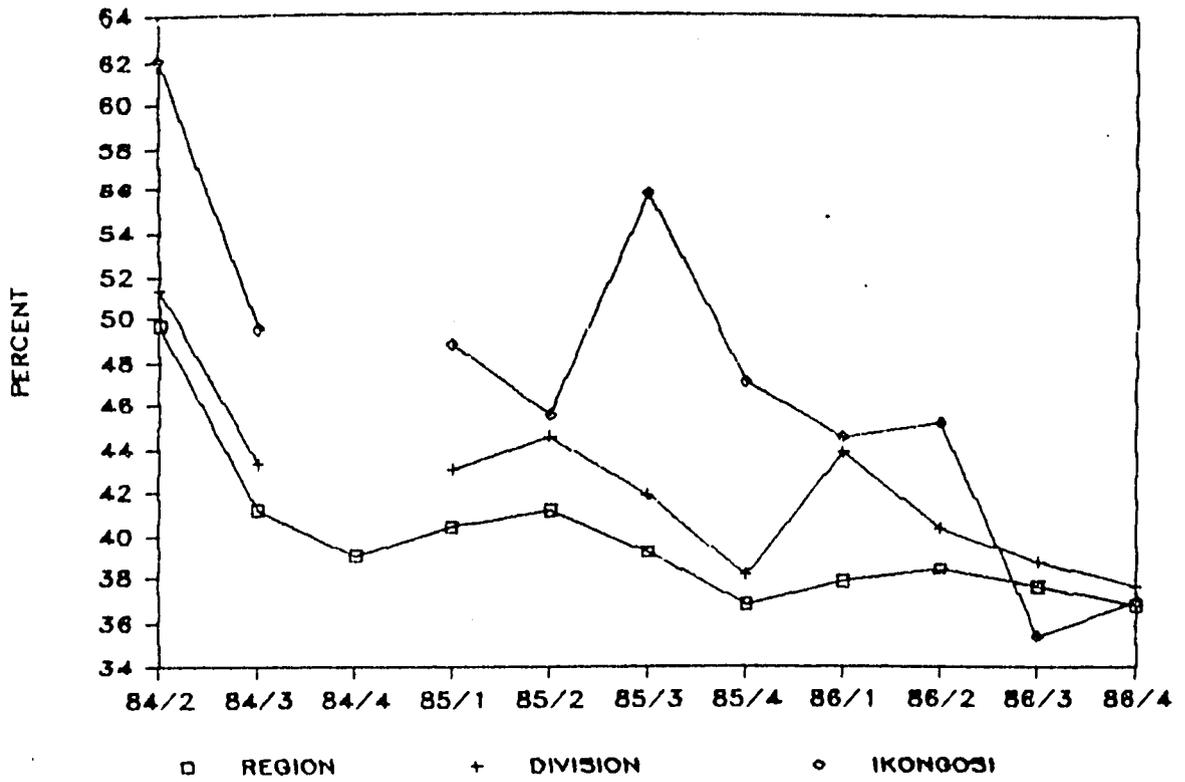
Region: Ininga		(11)													
District: Ininga		(10)													
Division	Cd	Popn	Child	Ch Wd	% Wd	% Ot	% Yr	UWt	% UWt	% Ot	% Yr	SUWt	% SUW	% Ot	% Yr
Kalenga	00	24708	3330	2938	88.2	84.2	92.4	1190	40.5	40.1	43.3	70	2.4	1.9	2.7
Mioio	00	33129	6905	5746	97.7	93.0	95.1	2385	35.4	39.2	39.2	36	1.5	1.2	1.1
Pawaga	00	10092	1724	1417	82.2	99.2	99.1	510	36.0	30.1	30.2	43	3.0	1.6	1.0
District: Ludewa		(04)													
Division	Cd	Popn	Child	Ch Wd	% Wd	% Ot	% Yr	UWt	% UWt	% Ot	% Yr	SUWt	% SUW	% Ot	% Yr
Mlangali	00				100	88.5	96.5		100	38.5	38.5		100	2.0	1.3
District: Makete		(00)													
Division	Cd	Popn	Child	Ch Wd	% Wd	% Ot	% Yr	UWt	% UWt	% Ot	% Yr	SUWt	% SUW	% Ot	% Yr
Lupatilo	00	23857	3463	3303	95.4	89.9	100	1411	42.7	43.2	100	50	1.5	1.7	100
District: Mufindi		(02)													
Division	Cd	Popn	Child	Ch Wd	% Wd	% Ot	% Yr	UWt	% UWt	% Ot	% Yr	SUWt	% SUW	% Ot	% Yr
Ifwagi	00				100	89.8	92.8		100	39.9	41.5		100	2.2	2.3
District: Njombe		(03)													
Division	Cd	Popn	Child	Ch Wd	% Wd	% Ot	% Yr	UWt	% UWt	% Ot	% Yr	SUWt	% SUW	% Ot	% Yr
Wangingombe	00				100	93.3	94.6		100	35.8	34.4		100	2.0	1.7

334 Records were selected
 62 Records in current quarter
 142 Records in previous quarter
 130 Records in comparison quarter

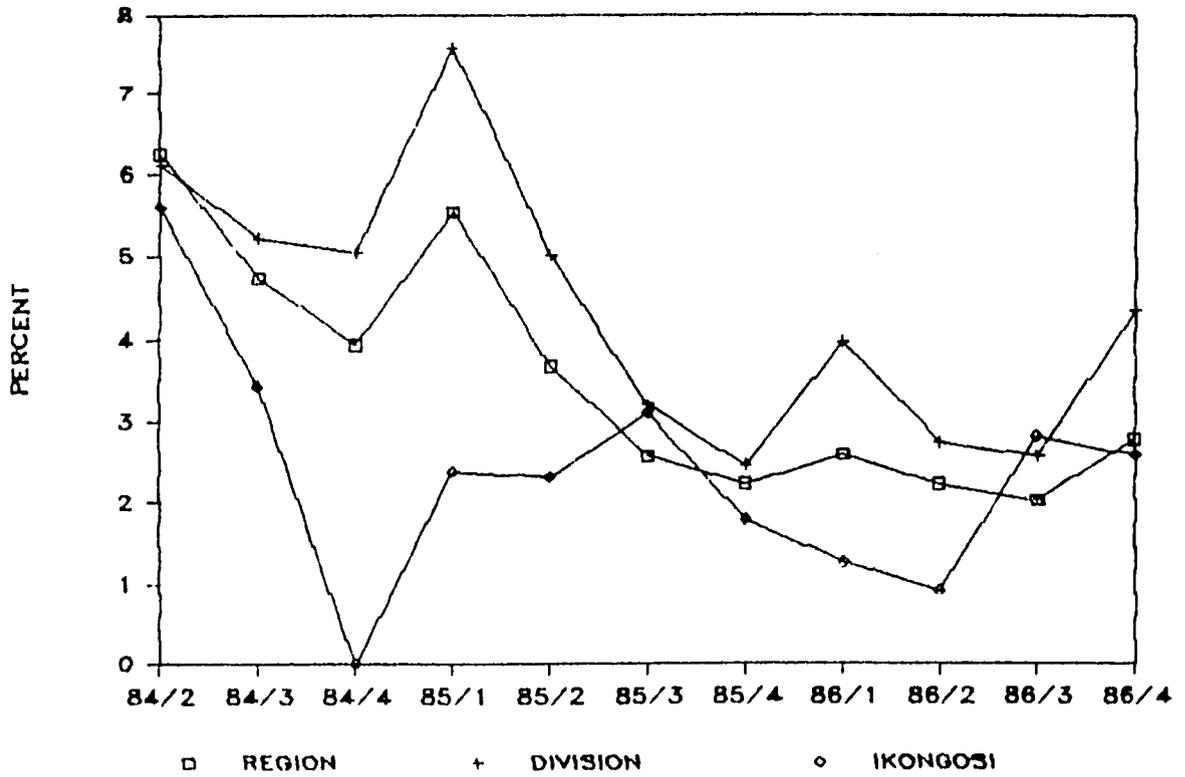
Report for (Year/Quarter): 87/3

	Normal			Moderate			Severe			0-12 Mths			13-36 Mths			37-60 Mths			% 0-12 Mths			% 13-36 Mths			% 37-60 Mths											
	0-12 Mths			13-36 Mths			37-60 Mths			N			UW			SUW			N			UW			SUW			N			UW			SUW		
	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW	N	UW	SUW						
Kihwere	41	7		39	30	1	25	21		85.4	14.6	.0	55.7	42.9	1.4	54.3	45.7	.0																		
Mtyome	20	7	2	28	19		18	18	1	69.0	24.1	6.9	59.6	40.4	.0	48.6	48.6	2.7																		
Mgongo	17	3		15	34	4	9	4		85.0	15.0	.0	28.3	64.2	7.5	69.2	30.8	.0																		
Mgera	43	14	3	46	31	3	19	40	1	71.7	23.2	5.0	57.5	38.7	3.8	31.7	66.7	1.7																		
Iosamaganga	37	8		38	40	1	39	31	2	82.2	17.8	.0	48.1	50.6	1.3	52.7	41.9	5.4																		
WARD TOTAL Kalenga	158	39	5	156	154	9	110	114	6	78.2	19.3	2.5	50.5	46.8	2.7	47.8	49.6	2.6																		
Nzihi	102	53	5	68	72	5	36	28	4	63.7	33.1	3.1	46.9	49.7	3.4	52.9	41.2	5.9																		
Kibebe	13	17	5	25	51	6	15	37	5	37.1	48.6	14.3	30.5	62.2	7.3	26.3	64.9	8.8																		
Weru	27	15	5	28	37	3	8	24		57.4	31.9	10.6	41.2	54.4	4.4	25.0	75.0	.0																		
Nyamihuu	52	1	1	90	44	1	55	24	1	96.3	1.9	1.9	66.7	32.6	.7	68.8	30.0	1.3																		
Kipera	75	39	2	48	34	1	36	27	3	64.7	33.6	1.7	57.8	41.0	1.2	54.5	40.9	4.5																		
Mangalali	18	10	1	41	46		15			62.1	34.5	3.4	47.1	52.9	.0	100.0	.0	.0																		
Ibangamoyo	25	20		47	49	2	64	53		55.6	44.4	.0	48.0	50.0	2.0	54.7	45.3	.0																		
WARD TOTAL Nzihi	312	155	15	347	333	18	229	193	13	64.2	31.9	3.9	49.7	47.7	2.6	52.6	44.4	3.0																		
DIVISION Kalenga	470	194	24	513	487	27	339	307	19	68.3	28.2	3.5	50.0	47.4	2.6	51.0	46.2	2.9																		
Magulilwa	291	110	1	83	149	1	79	43		72.4	27.4	.2	35.6	63.9	.4	64.8	35.2	.0																		
Ndiwili	69	61		94	90		81	91		53.1	46.9	.0	51.1	48.9	.0	47.1	52.9	.0																		
Nyabula	90	55	3	124	129		112	99		60.8	37.2	2.0	49.0	51.0	.0	53.1	46.9	.0																		
Kitayawa	95	33		108	96		134	53		74.2	25.8	.0	52.9	47.1	.0	71.7	28.3	.0																		
Iagamenda	51	19	1	122	61	2	96	60		71.8	26.8	1.4	65.9	33.0	1.1	61.5	38.5	.0																		
Ngenza	59	20	2	63	56		57	48	1	72.8	24.7	2.5	52.9	47.1	.0	53.8	45.3	.9																		
Milolo	83	57		134	118			67	1	59.3	40.7	.0	52.8	46.5	.8	58.5	40.9	.6																		
WARD TOTAL Magulilwa	753	365	9	745	715	8	671	477	7	55.8	32.4	.8	50.7	48.7	.5	58.1	41.3	.6																		
Mgama	91	25	1	80	50	1	13	31	3	77.8	21.4	.9	61.1	38.2	.8	27.7	66.0	6.4																		
Ilandutwa	150			280	45		175	30		100.0	.0	.0	86.2	13.8	.0	85.4	14.6	.0																		
Malagosi	63	15		55	40	3	19	37	1	80.8	19.2	.0	56.1	40.8	3.1	33.3	64.9	1.8																		
Ibumila	47	29	1	91	37	2	26	42		61.0	37.7	1.3	70.0	28.5	1.5	38.2	61.8	.0																		
Kikombwe	60	92	3	72	70	2	60	44	3	38.7	59.4	1.9	50.0	48.6	1.4	56.1	41.1	2.8																		
Inemi	84	42	2	38	83	1	26	32	2	65.5	32.8	1.6	31.1	68.0	.8	43.3	53.3	3.3																		
Lup/senga	89	42	5	103	31	8	42	29	2	65.4	30.9	3.7	72.5	21.8	5.6	57.5	39.7	2.7																		
WARD TOTAL Mgama	584	245	12	719	356	17	361	245	11	69.4	29.1	1.4	65.8	32.6	1.6	58.5	39.7	1.8																		
Ianangozi	136	52	1	118	33	2	114	21		72.0	27.5	.5	77.1	21.6	1.3	84.4	15.6	.0																		
Ugwachanya	100	39	1	130	61	1	90	56		71.4	27.9	.7	67.7	31.8	.5	61.6	38.4	.0																		
Wenda	44	13		63	50		42	47		77.2	22.8	.0	55.8	44.2	.0	47.2	52.8	.0																		
Kaningombe	59	51	1	63	134	13	36	71	3	53.2	45.9	.9	30.0	63.8	6.2	32.7	64.5	2.7																		
WARD TOTAL Mseke	339	155	3	374	278	16	282	195	3	68.2	31.2	.6	56.0	41.6	2.4	58.7	40.6	.6																		
DIVISION Milolo	1676	765	24	1838	1349	41	1314	917	21	68.0	31.0	1.0	56.9	41.8	1.3	58.3	40.7	.9																		
Mkombilunga	24	13		18	15	1	10	7		64.9	35.1	.0	52.9	44.1	2.9	58.8	41.2	.0																		
WARD TOTAL Milolo	24	13		18	15	1	10	7		64.9	35.1	.0	52.9	44.1	2.9	58.8	41.2	.0																		
Kimande	132	54	1	86	58	4	62	43		70.5	28.9	.5	58.1	39.2	2.7	59.0	41.0	.0																		
Itunundu	78	30	2	65	51	1	57	20		70.9	27.3	1.8	55.6	43.6	.9	74.0	26.0	.0																		
Isele	14	15	1	26	22		36	41		46.7	50.0	3.3	54.2	45.8	.0	46.8	53.2	.0																		
Mbelimboli	120	5		100	10	2	61	2		96.0	4.0	.0	89.3	8.9	1.8	96.8	3.2	.0																		

97



SEVERE UNDERWEIGHT



NUTRITIONAL STATUS OF <5s IN INP

SEVERE MALNUTRITION

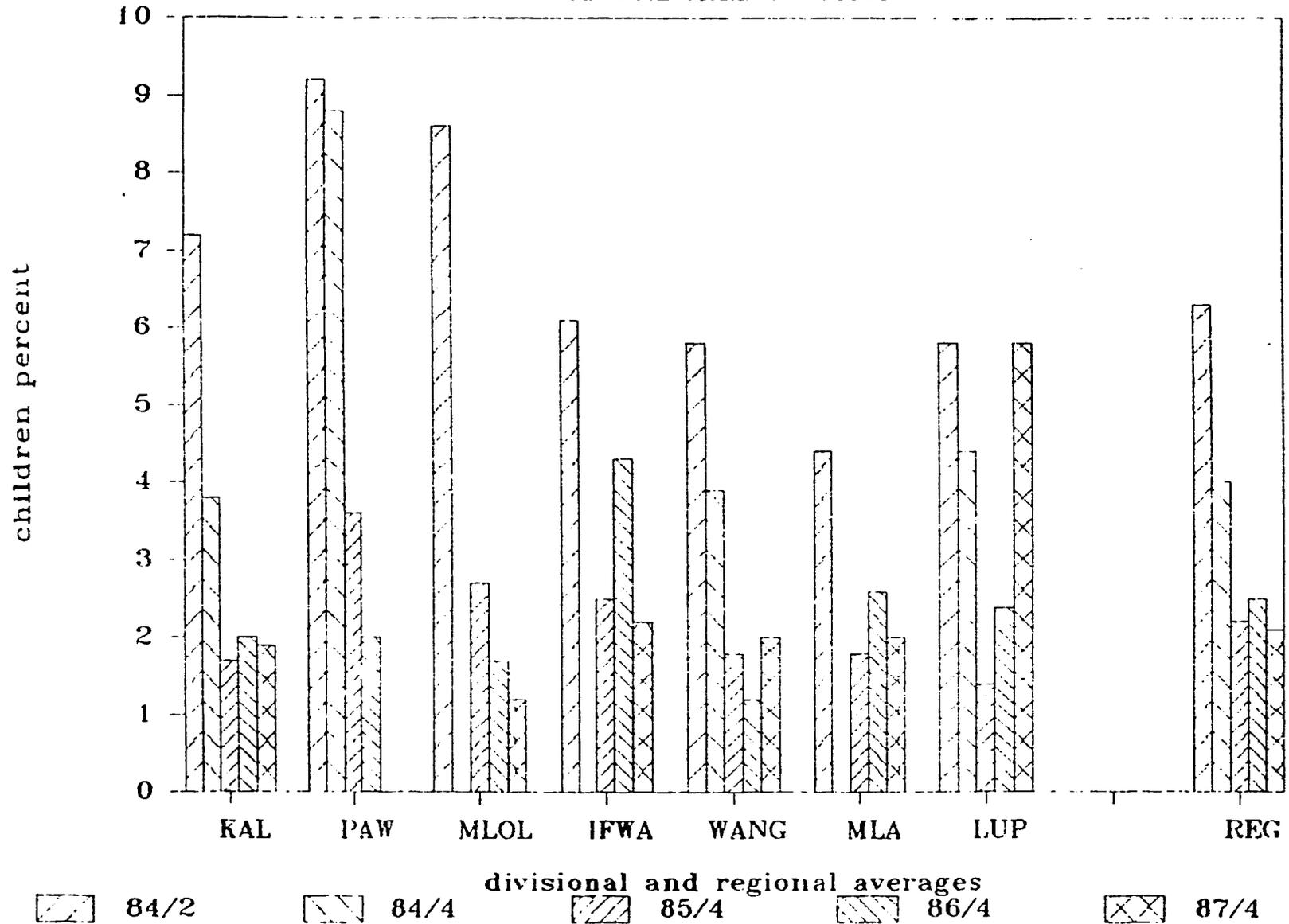


Exhibit 10.8

67

HALI YA LISHE YA WATOTO KIJIJINI

KALENGA-MWAKA 1987

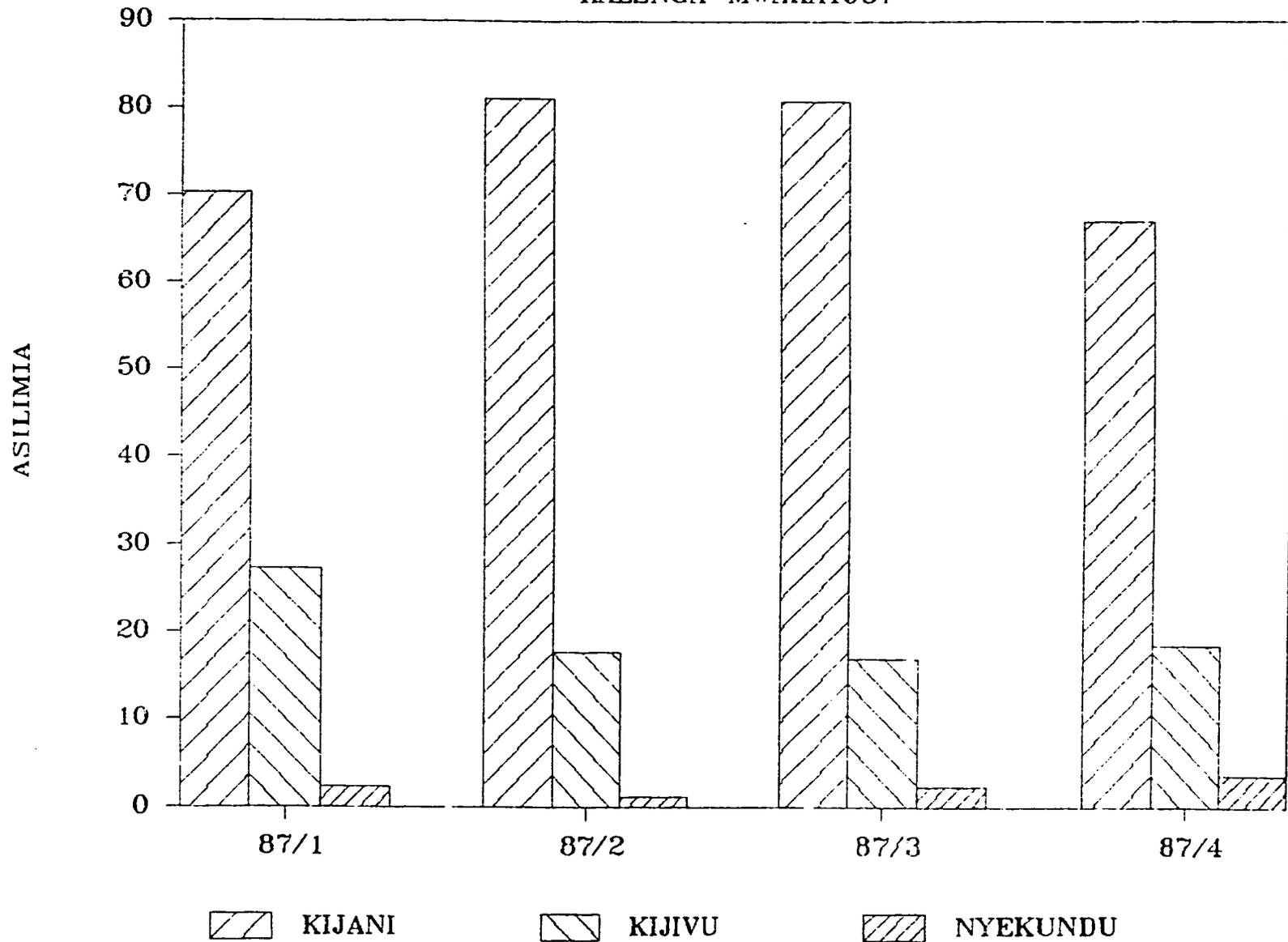


Exhibit 10.9

9/18

PART 3: CONCLUSIONS

CHAPTER XI

GENERAL FINDINGS AND IMPLICATIONS

Comparing different nutrition programs with growth monitoring components in different settings is difficult at best. Political, social and environmental conditions under which activities are undertaken vary greatly, as do goals, objectives and strategies of the programs themselves. The purpose of this section is to compare and generalize findings across settings.

11.1 Context and Successful Implementation

We can first discuss the relationship between contextual factors and successful growth monitoring implementation. It is clear that growth monitoring is not an easy activity to successfully implement. Health workers must understand how to weigh, how to record weights on the growth chart, and how to interpret the result. Weighing and recording must be conducted accurately, and the child's nutritional status properly classified. Once that is done, an appropriate set of nutrition/health messages must be communicated to the mother. The mother then must accept the messages and advice of the health worker, and have the capacity to perform appropriate practices.

Community level factors affect, or are related to, the community's capacity to successfully implement growth monitoring. It is also clear that program inputs can help increase the community's capacity to implement growth monitoring. Some communities, at the time of program start-up, have the capacity to implement growth monitoring with a minimum of program inputs. Other communities will require a great deal in the form of program preparations. Moreover, in some communities, growth monitoring must be started with an expectation that a significant impact will not be seen for a period of time.

The issue of capacity at the point of program start-up is a critical one. Though a program may legitimately attempt over a period of months or years to build a community's capacity to successfully implement growth monitoring, if a sufficient level of capacity does not exist at the onset, the program is likely to fail. Nutrition programs which do not provide significant tangible benefits immediately will lose early participants, and will be required to overcome a community perception of ineffectiveness.

Consequently, it is essential that a community ultimately have the capacity to successfully implement growth monitoring to be effective. There is a threshold of capacity that must be achieved in every community, and if the program does not have the means of increasing the community's capacity to implement growth monitoring to this threshold level, growth monitoring will have little, if any, positive effect.

The communities which tend to have the greatest capacity to successfully implement growth monitoring are those where literacy is high, modern medicine is accepted, community organizations are active, and connections with the modern world are relatively strong. Literacy and education, of course, enable people to better understand program messages. A general acceptance of modern medicine fosters a positive attitude with respect to believing in the benefits of program messages. Community organizations strengthen the social fabric of the community, and often provide support for weighing post activities. Where these factors are low, the capacity to implement growth monitoring will be low as well.

11.2 Context and Need

There is also a relationship between contextual factors and the need for growth monitoring services. The idea of need is an important one, because it defines the potential benefits a nutrition/growth monitoring program can have. In the extreme case, where there is no need, growth monitoring can have no effect. Consequently, the two ways that contextual factors influence growth monitoring effectiveness are through their relationship with community capacity, and their relationship with need.

Nutritional status in a community is related, in part, to the level of literacy and education, acceptance of modern medicine, level of community organization and level of development/modernization. As one would expect, where these factors are low, the level of nutritional status is low as well. Moreover, when the previous section is considered, we see a negative relationship between the capacity to implement growth monitoring, and need for its services. In other words, in general, the greater the need for growth monitoring, the more difficult it is to implement successfully.

Moreover, given the relationship between capacity and program effort, there also exists a relationship between need and necessary expenditure. In other words, the more a community needs growth monitoring, the more difficult it will be to successfully implement. The more difficult it is to successfully implement, the greater the resource expenditure required for successful implementation. And, to complete the loop, the greater the need the greater the potential effectiveness.

The implication of these relationships is that, in most cases, a national (or regional) program will be faced with a "window" where successful implementation will occur. Given limited

resources, it may see a group of communities for which successful implementation is not practical given the expenditures required for success. It will also see a group of communities for which growth monitoring implementation will have minimal effect due to minimal need. The issue is essentially one of resource allocation among communities.

11.3 Implications for Implementation

In those places where these contextual factors are low and, consequently, the capacity to implement growth monitoring is limited, program planners must develop an appropriate strategy. First, it is possible to expand the community's capacity to implement growth monitoring by increasing the resources put into the program. In the ICDS program in India, an effort is being made to increase the supervision and training of *anganwadi workers* in AID-supported areas to see if it will improve program effectiveness. Though it is too early to know the results of these efforts, preliminary indications are positive. In Tanzania, despite harsh contextual conditions, the government has made a very strong commitment to the health program. In this case, it is human resources that are utilized. Strong pressure is put on the communities to work with families of failing children. This program, too, is effective.

A second implementation strategy is to consider the goals of the growth monitoring component and focus initially on those growth monitoring functions which are most easily implemented. Accurate weighing and charting, and simple nutritional messages might constitute a first step. For example, in ICDS in India it is reported that in AID assisted areas, more than half of the mothers of malnourished children do not know that their children are malnourished. If *anganwadi workers* successfully classify a child and report his/her condition to the mother, a great deal is accomplished. Once these initial activities are mastered, and the community's capacity to implement growth monitoring is thus expanded, the growth monitoring component can be amplified to include other messages and activities.

Note also that the program itself can affect conditions outside its immediate domain. In many cases, a successfully implemented program, by virtue of bringing mothers together on a regular basis, can build community organization. Acceptance of modern medicine can increase as mothers see improvements come as a result of adhering to program messages. In addition, programs such as ICDS have an explicit goal of building and supporting mothers' groups. In Tanzania, this support goes so far as teaching people a process by which problems can be identified, and responses formulated.

A third, more general, implication is that of differential implementation. Given context, different communities have different requirements with respect to capacity. Though administratively difficult, this implies that resources be spent differentially according to capacity in areas where differences in capacities exist. In the Dominican Republic and India, there appears to

be little need for differential implementation because communities conditions are relatively homogeneous.

In Indonesia, differential implementation of programs outside of *KB-Gizi* is accomplished by classifying communities on a scale of development. Classification is performed by determining whether a community has various public health facilities. Those communities which do not are targeted to receive supplementary development funds. In addition, an annual competition takes place where all regions are compared on the basis of their lowest score community. This gives regions an incentive to upgrade their poorest communities.

In Thailand, community self-reliance is promoted. Communities are given the flexibility to implement the program as they feel is appropriate. Though many of the program functions are standardized, the central government is playing less of a watch-dog role, and allowing communities to make decisions as to the details of program implementation.

Finally, Tanzania gives its communities the most flexibility in implementation. Though conditions are harsh, communities are asked to develop an appropriate intervention given its conditions. At the same time, there is extremely strong central pressure to reduce malnutrition to an acceptable level through (almost) any means. This pressure is translated, in some communities, to persistent monitoring of the households of malnourished children.

11.4 Issues Pertinent to the Evaluation of Growth Monitoring Programs

Finally, in the course of conducting this study, issues arose relating to the measurement of program effectiveness. We present these issues here not because they are necessarily related to contextual factors within a community, but because they affect the way nutrition programs are generally evaluated.

First, though a complicated, multi-variate model of the *KB-Gizi* program was proposed, bi-variate analysis conducted failed to reveal many significant relationships. Subsequent analysis showed that this was not because the relationships do not exist, but rather because bi-variate models cannot reflect the complexity of the setting within which a nutrition program is implemented. Therefore, it was only when all the relationships in a multi-variate model are tested simultaneously, that the magnitude of the relationships can be seen and understood. This suggests analyses performed on nutrition program data which only make use of bi-variate tests may fail to show the extent of program impact.

Second, previous work done by Community Systems Foundation has shown that when a dichotomous classification scheme is used by a program (or evaluation) to measure the prevalence of malnutrition, and aggregated prevalence data are compared at two points in time to measure program impact, that there is a high likelihood that the effect of the program will be

understated.¹ An inquiry in Tanzania performed during this study found that, despite rigorous measurement and recording protocol, that over 20% of the growth cards examined had made classification errors. This is not to condemn the Iringa program, but rather to show the extent to which misclassification exists, and to suggest that there is probably significant undervaluing of nutrition programs in general due to misclassification.

Finally, this study shows that nutrition programs and growth monitoring are more effective in some communities than in others. In addition, it is known that growth monitoring is more effective for some people than for others. Evaluating a program by looking at its effect on all participants will show less impact than when only those that need the program service are examined. Program evaluators must focus on target populations in particular if the true impact of the program is to be seen.

¹ Drake, William D., Roy I. Miller and Robert J. Timmons. *Effect of Classification Errors Upon Evaluation Outcomes: Nutrition Programs Revisited*. Community System Foundation, Michigan, 1984.

BIBLIOGRAPHY

- Al-Hassani, Dr. Abdel Karim. *Growth Monitoring in the Yemen Arab Republic*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Alwin, Duane F. and Robert M. Hauser. *The Decomposition of Effects in Path Analysis*. American Sociological Review 40 (February 1975):37-47.
- Asher, Herbert B. Causal Modeling. Sage University Paper series on Quantitative Applications in the Social Sciences. Sage Publications, Beverly Hills and London, 1983.
- Basic Minimum Needs of People as an Approach for Social Development*. Thailand: National Social Development Project, National Economic and Social Development Board, October 1983.
- Bentler, P.M. *Multivariate Analysis with Latent Variables: Causal Modeling*. Annual Review of Psychology 31 (1980): 419-56.
- Bentler, P.M. Theory and Implementation of EQS -- A Structural Equations Program. Los Angeles: BMDP Statistical Software, August 1985.
- Berry, William D. Nonrecursive Causal Models. Sage University Paper series on Quantitative Applications in the Social Sciences. Sage Publications, Beverly Hills and London, 1984.
- "Better Nutrition Program and the National Nutrition Policy in the 6th National Economic and Social Development Plan (1987-1991)." Thai Department of Health, August 1986.
- Bhan, M. K. , Dr. Shanti Ghosh, Dr. N.K. Arora and Dr. V.K. Paul. Successful Growth Monitoring: Some Lessons from India. New Delhi: UNICEF, 1986.
- Bhargava, Professor Indra. *Growth Monitoring--Reality or Dream*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Chon, Soohyun. *Regional Population Stress and Internal Migration in Mexico*. PhD Dissertation, University of Michigan, 1984.
- Drake, William D. and Robert J. Timmons. Combating Malnutrition: Program Characteristics that Improve Chances for Success. Ann Arbor: Community Systems Foundation, April 1984.
- Drake, William D., Roy I. Miller and Donald A. Schon. *The Study of Community-level Nutrition Interventions: An Argument for Reflection-in-Action*. Human Systems Management 4 (1983), 82-97.

- Drake, William D., Roy I. Miller and Robert J. Timmons. *Effect of Classification Errors Upon Evaluation Outcomes: Nutrition Programs Revisited*. Community System Foundation, Michigan, 1984.
- Duncan, Otis Dudley. Introduction to Structural Equation Models. New York: Academic Press, 1975.
- Entwisle, Barbara and William M. Mason. Multilevel Effects of Socioeconomic Development and Family Planning Programs on Children Ever Born. Ann Arbor: Population Studies Center of the University of Michigan, 1984.
- Fajans, Peter and Herman Sudiman. The Indonesian National Family Nutrition Improvement Programme (UPGK): A Case Study of Seven Villages. Jakarta: UNICEF, September 1983.
- Ghassemi, Hossein. The Growth Factor in Child Survival and Development: Seven Strategies to Improve Growth of Young Children. New York: UNICEF, July 1986.
- Gopalan, C. *Growth Monitoring--Some Basic Issues*. NFI Bulletin, Nutrition Foundation of India, April 1987.
- Gopalan, C. and Meera Chatterjee. Use of Growth Charts for Promoting Child Nutrition: A Global Review. Nutrition Foundation of India, 1984.
- Griffiths, Marcia. Growth Monitoring of Preschool Children: Practical Considerations for Primary Health Care Projects. Washington, D.C.: American Public Health Association, International Health Programs, October 1981.
- Griffiths, Marcia. *Growth Monitoring: Making it a Tool for Education*. Forthcoming: Indian Journal of Pediatrics, 1987.
- Growth Monitoring and Nutrition Education: Impact Evaluation of an Effective Applied Nutrition Program in the Dominican Republic*. International Nutrition Unit, LTS Corporation. Draft Report dated February, 1988.
- Growth Monitoring as Nutrition Education Strategy: The Indonesian Experience*. Directorate of Nutrition, Ministry of Health, Indonesia. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Growth Monitoring: Intermediate Technology or Expensive Luxury*: The Lancet. December 14, 1985.
- Growth of Children: Strategies for Monitoring and Promotion. New York: UNICEF, April 1986.
- Heise, David R. *Employing Nominal Variables, Induced Variables and Block Variables in Path Analyses*. Sociological Methods and Research 1, (November 1972).
- Hendratta, Dr. Lucas. *Growth Monitoring: Basic Concepts and Operational Issues*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Hendratta, Lucas and John Rhode. *The Pitfalls of Growth Monitoring and Promotion*. Forthcoming: Indian Journal of Pediatrics, 1987.

- Huss-Ashmore, Rebecca and Francis E. Johnson. *Bioanthropological Research in Developing Countries*. Annual Review of Anthropology 14 (1985): 475-528.
- Jeffalyn Johnson & Associates, Inc. Recommendations for Improved HPN Program Implementation Within the Bureau for Asia. Prepared at Asia Bureau Health Population and Nutrition Officers Conference, U.S. Agency for International Development, May 1984.
- Johnson, Francis E., Theresea O. Scholl, Bruce Newman, Joaquin Cravioto and Elsa R. De Licardie. *An Analysis of Environmental Variables and Factors Associated with Growth Failure in a Mexican Village*. Human Biology 52 (December 1980): 627-637.
- Junadi, Purnawan. *The Effect of Village Modernization and the Family Planning and Nutrition Program on Household Knowledge and Behavior in East Java and Bali, Indonesia*. PhD Dissertation, University of Michigan, 1987.
- Kenny, David A. Correlation and Causality. New York: John Wiley and Sons, 1979.
- Long, J. Scott. Covariance Structure Models. Sage University Paper series on Quantitative Applications in the Social Sciences. Sage Publications, Beverly Hills and London, 1983.
- A Manual on the Integrated Management Information System for the Integrated Child Development Services Programme*, 1986.
- Mason, William M. and Barbara Entwisle. *A Better Way to do Contextual Analysis*. (DRAFT). Ann Arbor: Population Studies Center, University of Michigan, 1982.
- Mason, William. *Some Statistics and Methodology of Multi-level Analysis (DRAFT 1)*. Ann Arbor: Population Studies Center of the University of Michigan, 1980.
- Mathurospas, Wichit, et al. "Rural Primary Health Care Project: Final Evaluation Report." Prepared for USAID/Thailand, September 1986.
- Mora, Jose O., Nancy Pielemeier, Patricia Avila de Hails and Maricela Ramirez, External Evaluation of the Applied Nutrition Education Program (ANEP) of CRS/CARITAS in the Dominican Republic. Draft Final Report dated September, 1987.
- Mukarji, Dr. Daleep. *Growth Monitoring--Some Field Problems*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Murthy, Dr. Nirmala. *Growth Monitoring in Tamil Nadu Integrated Nutrition Project (TINP)*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Nath, L.M. S.K. Kapoor, and S. Chowdhury. *Growth Monitoring--The Ballabgarh Experience*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- National Family Planning Coordinating Board (BKKBN), the Universities of Udayana, Brawijaya and Airlangga and Community Systems Foundation. KB-Gizi--An Indonesian Integrated Family Planning, Nutrition and Health Program: The Evaluation of the First Five Years of Program Implementation in West Java and Bali. Ann Arbor: Community Systems Foundation, October 1986.

- Neter, John, William Wasserman and Michael H. Kutner. Applied Linear Statistical Models. Homewood, IL: Richard D. Irwin, Inc., 1985.
- Norusis, Marija J. SPSS/PC+ For the IBM PC/XT/AT. Chicago: SPSS, Inc., 1986.
- Porter, Phillip W. *Environmental Potentials and Economic Opportunities--A Background for Cultural Adaptation*. American Anthropologist 67, 409-420.
- Porter, Phillip W. *Food and Development in the Semi-Arid Zone of East Africa*. Foreign and Comparative Studies/African Series XXXII, Syracuse: Maxwell School of Citizenship and Public Affairs, 1979.
- Rohde, Jon E. *Feeding, Feedback and Sustenance of Primary Health Care*. Keynote Lecture delivered at XIII International Congress of Nutrition, August 1985.
- Rohde, Jon E. *Growth Monitoring: The Basic Tool of Primary Health Care*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Sahn, David E. and Robert M. Pestronk. A Review of Issues in Nutrition Program Evaluation. Washington D.C.: Office of Nutrition Bureau for Development Support and the Office for Evaluation, Bureau for Program and Policy Coordination, U.S. Agency for International Development, July 1981.
- Solon, Mercedes A. *Growth Monitoring in the Philippines*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Suliman, Dr. Gaafar Ibn Auf. *Growth Chart: An Important Tool in Comprehensive Child Health Care: Sudan's Experience*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Suntikitrungruang, Dr. Chawalit. *Growth Monitoring: Thailand's Experience*. Paper presented at the Workshop on Growth Monitoring as a Primary Health Care Activity. Yogyakarta, 20-24 August, 1984.
- Suntikitrungruang, Chawalit, et al. "Strengthening Growth Monitoring and Nutritional Surveillance Within Primary Health Care." Nutrition Division Research Report Series, 1987.
- Teller, Charles H. "Community Involvement in Primary Health Care Nutrition Program: Assessing Social Mechanisms in the Growth Monitoring Process." Thailand Trip Report dated April 23-May 4, 1985.
- Teller, C., V. Yee and J.O. Mora. *Growth Monitoring as a Useful Primary Health Care Management Tool*. Paper Presented at the 12th Annual International Health Conference of the National Council for International Health. Washington, D.C. June 3-5, 1985.
- Teller, Charles H. *Strengthening Growth Monitoring and Nutritional Surveillance Within PHC: Operations Research Within the Nutrition Division of the MOH*. Thailand Trip Report, January-February 1986. Office of International Health, Public Health Service, U.S. Department of Health and Human Services, Rockville, ML.
- Thailand Food Habits Project, Annual Report 1985/86.

- Waterlow, J.C., R. Buzina, W. Keller, J.M. Lane, M.Z. Nichaman and J.M. Tanner. *The Presentation and Use of Height and Weight Data for Comparing Nutritional Status of Groups of Children Under the Age of 10 Years*. Bulletin of the World Health Organization 55 (1977): 489-498.
- Yee, Virginia and A. Zervas. Issues in Growth Monitoring and Promotion. Washington D.C.: U.S. Agency for International Development, May 1987.
- Zervas, Alfred. "Strengthening Community-Based Growth Monitoring in Thailand: Analysis of Phase I Operations Research and Preparations for Phase II." Thailand Trip Report dated October 2-30, 1986.
- Zervas, Alfred. "Strengthening Community-Based Growth Monitoring in Thailand: Phase II Analysis and Implications for Program development." Thailand Trip Report dated August 14 - September 4, 1987.
- Zinn, Frank D., William D. Drake, Roy I. Miller and Robert J. Timmons. *Growth Monitoring: Social, Environmental and Institutional Factors which Influence Successful Implementation (A Report on an Analysis of Indonesia)*. Interim Report #2, Ann Arbor: Community Systems Foundation, October 12, 1987.