A STATISTICAL ANALYSIS OF A HAITIAN MOTHERCRAFT CENTER

by

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Thesis submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

Statistics

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March, 1974

Blacksburg, Virginia

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I INTRODUCTION

Theoretically, a national program of Mothercraft Centers should be beneficial to the people of Haiti. Haiti's extreme poverty is compounded by the dismal health status of the majority of its population. Although morbidity and mortality data are incomplete, Beamer, Gangloff, and Gauldfeldt (1972) indicate that tuberculosis, malaria, and intestinal parasites affect large portions of the population. They further note that the entire population is more susceptible to the common diseases because of their poor nutritional status. They state (1972; p.7):

> Recommended daily caloric intake for adults is 2,200 to 3,200 calories and 75 grams of protein. The average daily caloric intake in Haiti is estimated at 1,850 calories, with reported community averages ranging between 1,100 to 2,300. Daily protein consumption averages 45 grams. These are among the lowest levels in the world and there is abundant evidence of malnutrition in both children and adults.

Since severe malnutrition in the very young child can harm both physical and mental development, malnutrition in the population under age five is generally considered a more serious threat to the individual and society than malnutrition at an older age. So, although malnutrition exists in all age groups in Haiti, the largest benefit for future Haitian socioeconomic development should come from combating malnutrition specifically in the very young child.

According to a 1968 survey cited by Beamer et al. (1972),

69 per cent of the Haitian population under five years of age suffered from malnutrition. Using the Gomez classification, children who weigh from 75 per cent to 90 per cent of the standard weight for their age are first degree malnourished; from 60 per cent to 75 per cent of standard weight are second degree malnourished; and below 60 per cent of standard weight are third degree malnourished. Therefore, in the 1968 survey, 42 per cent of said population was suffering from first degree malnutrition, 20 per cent from second degree and 7 per cent from third degree.

The idea of a Mothercraft, or Nutritional Rehabilitation, Center was developed as a method of eliminating malnutrition in children by educating their mothers. Special attention was given to the reality that the mothers were always poor and often illiterate. Basically, a Center is run by a local, or at least national, young woman, who has received some nutritional training. A Center accepts groups of children for approximately four months each. These children consist of the most malnourished in the community. Depending on the situation, a few other children will be added to the group to keep Center participation from becoming a stigma.

The children are fed in the Center for six days a week. They receive the most nutritious diet that can be developed from the locally available foods that are within their families' expense range. The food is prepared using the same

facilities and utensils that are available to the mothers. Charts are kept of a child's progress in weight gain and/or other clinical signs of improved health status. The children receive a variable degree of medical attention depending on the Center.

During this time, small groups of mothers are in attendance at the Center. They receive instruction in basic nutrition, and sometimes sanitation. They also help prepare the food for their children. The amount of instruction and participation of the mothers, again, depends on the Center.

The theoretical benefits of a Center depend upon a mother being impressed by the improved health of her child during Center attendance. This should then give a mother the added impetus to apply her new nutrition knowledge to the feeding of her children at home. Hopefully, then, the Center child will continue to improve after returning home, while his younger siblings never become as badly malnourished as he had been.

This concept of Mothercraft Centers was first proposed by Jose Maria Bengoa in 1955. His ideas were shaped by earlier experiences as a physician in rural Venezuela. The Centers were to be a source of nutritional education for mothers, and, secondly, a very inexpensive mode of rehabilitation for severly malnourished children. Since 1955, Centers have been established throughout Latin America, and in Africa, India, and the Philippines.

A Haitian program of Mothercraft Centers was begun in 1964 under Haitian government and international sponsorship. One of the first Centers opened was in the rural community of Fond Parisien. Here an effort was made to maintain health records of the Center, and of the community for the duration of the Center's functioning as a means of evaluating the Center's impact. During the first two years of the Center's existence, health records were also kept of a similar neighboring community without a Center for comparison. Since then the Center program has expanded nationwide.

The Haitian Mothercraft Center program is within the Department of Public Health's Bureau of Nutrition. With international financial and research support, the Bureau developed in 1964 a nutritious food combination based upon locally available foods. Starting with this food combination, the Bureau's dieticians then planned menus to be followed by a Center supervisor, for a food-fuel cost of only nine cents a day per child.

A supervisor receives approximately twenty to thirty lectures on nutrition and one month of supervised training before she begins her work. Each supervisor is assisted by one household servant in running a Center. The Centers themselves are village homes, provided by the villagers or rented by the Bureau, and equipped as all of the local homes. The kitchen has an open fire, but no running water, or baking equipment.

Each year, a nutritional survey of children under six years of age is taken in the community. The most malnourished children are then chosen to participate in a Center group. Each group consists of approximately thirty children. A group attends the Center six days a week for four months. All of the mothers are expected to attend a class held once a week. Also, a small group of mothers stays each day to help the supervisor and to gain practical training in nutrition. Ideally, each mother spends one day a week working with the supervisor besides attending the class once a week. The maximum cost of operating the Centers is about 2,500 dollars per Center per year.

In Fond Parisien specifically, there was no available health facility, so each Center group was initially examined by a touring physician. The Center was then visited by either a physician or a dietician once a week. No comprehensive health care, such as de-worming, was undertaken for the Center children. However, it is assumed by this author, that any child dangerously ill with a disease other than malnutrition was sent to a hospital. The rationale for this policy was that in this manner, a mother would definitely attribute all improvements in her child's health to the improved diet he was receiving. (King et al., 1968)

Yet, considering the amount of money and manpower that has been invested in Mothercraft Centers around the world, very

little objective evaluation of the principles and methodology involved has been done. Understandably, applying limited resources to such an immediate and tangible problem as malnourished children has led to neglect of long-range evaluation. This lack of evaluation is not specific to Mothercraft Centers. No other method of nutrition education has been evaluated either. However, no other nutrition education program has been so widely implemented.

Mothercraft Centers do some obvious good. The large majority (seventy to eighty per cent - Beghin and Viteri, 1971) of children gain three or four percentage points in their per cent standard weight, PSW, while at the Center. A severely malnourished child, then, can be treated successfully in a Mothercraft Center. The only alternative treatment to date has been hospitalization, which is usually prohibitively expensive, and gives no chance for maternal education. According to many authors (Beaudry-Darisme and Latham, 1971; Beghin and Viteri, 1971; Berggren, 1971), comparative death rates and recuperation rates show Mothercraft Centers to be at least as effective as hospitalization for the treatment of a severely malnourished child not suffering from any complicating diseases, and definitely much more efficient in operation. That this secondary goal of Mothercraft Centers is being achieved should be reason enough to establish Centers, but it is no guarantee that the primary goal of maternal education is being, or will be, achieved.

II EVALUATIVE PROBLEMS

The few efforts that have been made to assess and improve a Mothercraft Center's impact on the nutritional habits of the families involved have been complicated by a number of problems in the evaluative methods available. One of these is the controversy over the best method of determining improved health in a malnourished child. Beghin and Viteri (1971) state that while a low PSW of a child usually signifies that he is, or has previously suffered from malnutrition, the reliability of PSW as an index of progress depends greatly on the prevalent form of protein-calorie malnutrition in the area under consideration. In some forms of malnutrition, a weight gain does not necessarily indicate recuperation, while in other forms, it is essential to it. This particular problem, however, does not affect the Haitian data, but another does.

A child who has been severely malnourished very early in life may be stunted physically. Later recuperation may help him achieve a normal weight for his height. But if his height has been previously stunted, he will probably never achieve a normal height for his age. This may result in a currently healthy child who still has a low PSW for his age, due to his smaller stature. Such a child could not be expected to greatly improve his PSW. Normal PSW would necessarily indicate an overweight status for this child. This problem definitely affects Haitian data. Two surveys mentioned by

Beamer et al. (1972) showed that the mean heights of adult Haitians were sixty-six and sixty-five inches for men, and sixty-two and sixty-two inches for women. These are three or four inches shorter for men and two inches shorter for women than the United States means. Moreover, another study, cited by Beamer et al. (1972), implemented to calculate Haitian weight-for-height and weight-for-age standards, showed that children from wealthy Haitian families grew at the same rates in height and weight as United States children, while the children from poor, particularly rural, families fared much worse in both height and weight. (This study was the basis for using United States standards for the Haitian children. - Webb; 1973)

A study in Guatemala, cited by Beghin and Viteri (1971), illustrates the operation of this problem in a specific Center. Out of thirty Center children, fifteen did not improve their PSW during a short period of time. Within these fifteen children, eight had normal weight-for-height, while only two of the recuperating fifteen children had normal weight-for-height. Beghin and Viteri suggest that weight-for-height is a better index of progress than weight-for-age though it cannot account for the influence of age. And since biochemical evaluation is often too complex to be used, their final suggestion is development of a weight-for-height-and-age scale. Though this would be slightly more complicated to use, it would definitely give a truer picture of a child's health

progress.

Other problems in evaluation of children's progress in a Center involve recording improvement for edematous children and quantifying psychological benefits of a Center experience. General belief is that edematous children will lose weight for approximately two weeks, and then gain weight after that. Their weights should probably be analyzed weekly rather than monthly. And perhaps their gains should be charted from their lowest weight rather than from their weight at entrance. (Berggren; 1971) With regard to psychological benefits, both Berggren (1971) and Beghin and Viteri (1971) note that subjective observations indicate that soon after starting attendance at a Center, the generally apathetic children become much more communicative and social. Some quantifying study could substantiate whether these observations indeed indicate a general benefit of the Centers.

The mobility of the population, large seasonal variations in diet and shortages of census personnel further affect evaluation by complicating nutritional censuses and long-range follow-up of Center children. Beghin and Viteri (1971) suggest that follow-up (and census) attendance could be improved by associating the follow-up weighing of the child with a health clinic for children or with supervised supplementary feeding. This seems to be a very reasonable suggestion where lack of personnel means that only children brought to the census station or Center will be weighed. The complications

in gathering these data are great, but they are quite important in evaluating a Center.

There are still other problems in evaluating Centers, some of which stem from confusion of evaluation methods. In many countries a child is not allowed to repeat his Center experience once his group has graduated. This is in line with the idea that the Center's main duty is educating the mother. It is felt that if the Center fails to help the mother the first time, a repeat experience won't help. But it is difficult to simply give up completely on a severely malnourished child, and in Haiti, children may repeat their Center stay indefinitely. In Fond Parisien, some children were in two to four separate Center groups. Since it is obvious that the Center has failed these children in their first experience it seems unfair to include their subsequent attendances in any evaluations. This would inflate the proportion and importance of a Center's failing. Still, due to restricted data, in the study by Beaudry-Darisme and Latham (1971), the experiences of repeating and non-repeating children were evaluated together, which may well have affected their results negatively.

Needless to say, a separate study of these repeaters might yield valuable information on the shortcomings of the Centers. King, in 1967, pondered the cause(s) of repeating, while Fougere, in 1968, suggested repeaters were predominantly from families that had no father and were in greater

need of economic help than most families. Both reports were unpublished, and no study of the phenomenon has yet been made.

Another confusion in using an evaluation method can occur with the Gomez classification of malnutrition. Though the three classes of malnutrition are helpful to initially assess the health status of a community, they are too few and thus too large to generally be of use in evaluating dynamic data. Since first degree and second degree malnutrition each encompass fifteen percentile points on the standard weight-for-age scale, and third degree even more, it is quite possible for a child who was at the bottom of a class to make a great weight improvement and still remain in the same class. Likewise, a child at the top of a class may make a very small weight gain and yet advance into a new class. Beghin and Viteri (1971) acknowledge this problem and insist that the Gomez classification should "never" be used to evaluate a Center. This author would further suggest that the use of the Gomez classification can be a source of confusion whenever dealing with dynamic rather than static comparisons. Its usefulness in evaluating change in any community is questionable.

Beaudry-Darisme and Latham (1971) acknowledge yet another source of confusion in obtaining follow-up data. They were careful to only observe children who had left the Center at least one year before. This was done in order to avoid recording any temporary effects of the Center diet on the

child, since they were actually concerned with the long-range effects of the mother's education on the child. Unfortunately, most of the other follow-up data reviewed by Berggren (1971) and Beghin and Viteri (1971) had not been so carefully collected. In a number of these reports, temporary effects probably were recorded with, and evaluated as long-term effects. Moreover, Beghin and Viteri (1971) mention that there are possible permanent effects of the short-term recuperation in the Center. But these would be very difficult to evaluate, and haven't been as yet. Consequently, they cannot be separated out from any follow-up data intended to show long-range educational benefits. The theory of waiting one year after Center graduation for follow-up data on Center children and their siblings to avoid recording temporary effects of the Center stay on both seems reasonable, but it also has never been tested. Perhaps one year is more than enough or not enough time for the temporary effects to disappear. A similar unanswered question concerns the time it takes for the temporary effects of a Center's operation on the community health to disappear, after the Center closes.

A final confusing factor in evaluation methods that seems to have escaped notice thus far is the fallacy that a child who maintains the same PSW is making a one hundred per cent standard weight gain, PSWG, so that a child who has improved his PSW is making a greater than one hundred PSWG. In his review, Berggren (1971) states this erroneous assumption as

fact, and in many other studies it appears that it has been similarly accepted. But this is not necessarily true. Though some positive mathematical relationship exists between the two measures, it is most certainly not that simple.

The PSWG is defined as the ratio of the weight gain of a child to the weight gain of the standard, or the gain expected of a normal child of that age. So, for a child who is maintaining a 100 PSW, he will be making a 100 PSWG. But the PSWG is a velocity measure, dependent upon the slope of the curve which describes the normal, or one hundred per cent standard, child's weight by his age. Thus for a child other than the one hundred per cent standard one, his weight gain for any period of time will be a 100 PSWG only if the slope of the curve describing his weight by his age is equal to the slope of the curve of the normal child. This phenomenon occasionally even causes a child who registers a positive gain in his PSW to register a PSWG of less than one hundred, which is generally interpreted as a negative score.

But for growing children, the slopes of the curves described by each percentile standard weight based on age decrease with the decreasing percentile of standard being followed. Therefore the slope of the curve of the sixtieth percentile of weight by age is less than the slope of the curve of the seventieth percentile. This is because all of the curves involved have positive slopes, never intersect, and maintain their relative position, while the difference

between the positions increases as long as the standard weight increases. Presumably, when maturity is reached and the expected weight remains relatively stable with increasing age, the slopes of the curves of the percentiles should all be approximately zero, and thus equal. Still, this is not so for children.

By way of demonstration, three hypothetical children, a boy twelve months of age with sixty PSW, a boy forty-eight months of age with seventy PSW, and a girl twenty-six months of age with eighty PSW, will be given various gains in their PSW within the range of those expected of children who have attended a Center for four months. Gains of 0, 2. 3. and 5 percentile over a four month period will be used.

For a male twelve months old, the standard weight is 10.07 kg., at sixteen months it is 10.98 kg., giving a 100 PSWG of .91 kg. over the four month period. A boy at 60 PSW and twelve months old has a weight of 6.04 kg. If at sixteen months, he has maintained 60 PSW, he then weighs 6.59 kg.; a gain of .55 kg. which is only a 60.4 PSWG. If at sixteen months, he has acheived a two percentile gain, at 62 PSW, he weighs 6.81 kg.; a gain of .77 kg., or 84.6 PSWG. If at sixteen months, he is 65 PSW, he weighs 7.14 kg.; a gain of 1.10 kg. or 120.9 PSWG.

The male standard weight at forty-eight months is 16.51 kg.; at fifty-two months, it is 17.24 kg. 100 PSWG for this age and time period is therefore .73 kg. For a boy of forty-

eight months, at 70 PSW, he weighs 11.56 kg. If at fifty-two months, he has maintained a 70 PSW, he weighs 12.07 kg., and has made a 69.9 PSWG. If he has acheived 75 PSW, he weighs 12.93 kg., and has made a 187.7 PSWG.

Finally, the female standard weight for twenty-six months is 12.66 kg.; for thirty months it is 13.43 kg. The 100 PSWG for this age and time period is .77 kg. A girl who has 80 PSW at twenty-six months, weighs 10.13 kg. If at thirty months, she is still 80 PSW, she weighs 10.74 kg., and has made a 79.2 PSWG. If she has a 83 PSW, she weighs 11.15 kg., and has made a 132.5 PSWG. Or, if she has a 85 PSW, she weighs 11.42 kg., and has made a 167.5 PSWG.

So, by maintaining the same PSW the three children registered PSWG's of 60.4, 69.9, and 79.2, respectively, not 100. A gain of five percentile in their standard weights meant PSWG's of 120.9, 187.7, and 167.5. If each child was to make a 150 PSWG, the first boy would have had to improve more than five percentile in his standard weight, while the others would have had to improve less than five percentile. Moreover, for the first boy, a gain of two percentile in his standard weight gave him a PSWG of 84.6.

Though not interchangeable, both change in PSW and PSWG are useful measurements. Since PSWG varies so much according to age, sex, and initial PSW, it should not be recommended for comparing progress in children where the ages, sexes, and initial weights are not all equal. Similarly, it should not

be recommended for assessing the progress of a Center. However, to determine whether one child is recuperating at a rate which, if maintained, could return him to normal weight-for-age status, the PSWG must be used. Admittedly, if a child is permanently stunted, a normal weight-for-age can never be acheived, and his PSWG may be an overly pessimistic assessment. Again, a weight-for-height-and-age standard would yield more realistic SWG's for the stunted children. But until another standard is available, PSWG can reflect a child's progress toward normalacy, provided that child is not badly stunted. And for assessing Center progress and comparing children's progress, change in PSW is the better measurement.

In spite of the short-comings of the evaluation methods presently available, two studies have been made that indicate possible permanent benefits from a Center. In the study of Beaudry-Darisme and Latham (1971), they observed, in both Haiti and Guatemala, a group of Center children and a control group. As this was a retrospective study, in Haiti repeaters were used along with non-repeating Center children in order to obtain a large enough sample. In both countries, when the children were observed one year after leaving the Center, the Center children's mean PSW had not changed from the final mean PSW at the Center. The majority of the children had not regressed since leaving the Center. These follow-up PSW's were significantly higher in the Haitian children than in

their control group, but no such difference was found in the weights of the children in Guatemala. In both countries, the mortality of the Center children was much lower than the mortality in the control groups. However, the difference was not significant because the numbers involved were very small. That the majority of the children did not regress may reflect maternal education. But the lowered mortality and the difference in weights between Center and control children may have been due totally to Center feeding. Nevertheless, they were of semi-permanent benefit to the children.

In his report on the Center functioning in connection with the Albert Schweitzer Hospital in Haiti, Berggren (1971) has followed the entire zero to six year old population within a ten square mile census tract, and has also followed one entire Center group and their siblings. He notes (1971; p.10) that during the observation period, which was greater than two years, "the prevalence of nutritional edema fell to zero as did the death rate due to malnutrition."

These results are to be reasonably expected of any well-run Center which has been operating for more than one or two years. After the first Center groups have been treated, subsequent groups of children will probably be taken to the Center before they are as drastically malnourished as the children in the earlier groups may have been. With the children in the area being censused at one and three-month intervals, and repeating allowed in the Center, the edema frequency and

malnutrition death rate should be expected to approach zero for the duration of the Center's functioning. However, if the absence of edema and deaths due to malnutrition persists three to four years after the Center has closed, it could more obviously be termed a permanent benefit of the Center.

More encouraging is Berggren's (1971) two-and-one-half year follow-up on a complete Center class of thirty-six. In the follow-up, one child had died, presumably of malnutrition, and one suffered from severe malnutrition with edema. Twenty-four children had maintained or improved their PSW. At the time of follow-up, thirty-one younger siblings of the Center children were at least as old as the Center sibling had been at entrance. Of these younger siblings, seventy-three per cent (twenty-three children) had a higher PSW than their respective Center siblings had had upon Center entrance. Unfortunately not recorded were the amount of the differences, whether any of the younger siblings had attended a Center, and whether there was a similar trend in the community at large. But in another follow-up by Berggren (1971), the siblings showed no such difference. The Center children involved in this follow-up had shown very poor recuperation while in the Center, compared to the first group studied.

The studies of both Beaudry-Darisme and Latham (1971) and Berggren (1971) indicate that some permanent benefits may be gained from the Centers. However, they also indicate that there is room for improvement both in evaluation and in the

Centers themselves.

III FOND PARISIEN - THE COMMUNITY

Since 1964, a concerted effort of the Haitian government and international agencies has been directed at the community of Fond Parisien in an attempt to arrest the downward trend of its economic and nutritional status. During the 1960's, while the Haitian population increased, farm production in general decreased. The Departments of Agriculture and Public Health, therefore, started a combined program to help the rural areas. Fond Parisien was one of the first communities chosen because the economic situation there was among the worst. In fact, prior to 1964, the population of Fond Parisien had been declining as families left the community hoping to find better lives in the cities.

So, in 1964, a Mothercraft Center, an irrigation project, and an agricultural improvement program were all started in Fond Parisien. The Mothercraft Center operated continuously until it was closed in 1969. Some time before 1967, a program of immunization was added to the Center after a high incidence of whooping cough was noted among the Center children. The first irrigation project was completed, and others were instituted in 1967 and 1968. The agricultural program was still active in 1971. During this same period various international agencies also carried out other projects, such as well-digging to provide more water for irrigation.

Although such a diversified program was probably quite

beneficial to the community, this diversity makes it very difficult to analyze the effects of each separate program. Therefore, any improvements seen in the community could be attributed to any combination of these programs. If an educational benefit was observed in a family, it could have been passed on to the father by an agronomist, or to the mother by the Center supervisor. Another problem worth noting in any analysis is the varying crop success during the years of the Center's operation, especially that due to the long, serious drought of 1968.

Since the Mothercraft Center in Fond Parisien was one of the first in Haiti, the Bureau of Nutrition made an effort to collect as much pertinent data as possible during the period 1964 to 1971. As previously mentioned, during 1964 through 1966 the same data was collected in a neighboring village which served as a statistical control. This was done only through 1966, as the control village was obviously also in need of help. A Center was later instituted in this control village, but was soon closed due to lack of community support. The main drawback to the control as chosen, was that it was not a control for the most important outside influences, those of the irrigation and agricultural programs. The control village was as poor as Fond Parisien, and in a very similar locale, but it had no agricultural enrichment programs of any kind at this time.

The data that were collected annually, in July and August,

were a nutritional survey of the families and a health survey of the children under six. The nutritional survey was performed by the same personnel each time, using the methods developed by the Institute of Nutrition of Central America and Panama, INCAP. This involves a rather detailed study of the food being consumed by a fairly small sample of demographically typical families of the community. The survey is based on raw foods, and doesn't indicate whether the typical method of preparation may lower the nutrient content of the food when it is actually eaten.

Though the survey methods may be very good, some problems arise in analyzing the results from Fond Parisien. It has never been definitely shown that the mothers not educated at the Center profited educationally from it. Since not all mothers in the community received Center education, one might suspect a difference in the nutritional status of exposed and unexposed households. Similarly, not all households were affected by the agricultural and irrigation projects which may have influenced the nutritional status of the families involved. Because the sample concerned was fairly small, a disproportionate representation in it of families involved, or not involved, in any of the three programs definitely affects the conclusions that can be drawn from the survey. Since the same personnel administered every survey, any sampling bias regarding the three programs may be assumed to be constant. Therefore, any trends shown are most likely reliable.

But, not knowing the representation of the three programs in the sample, conclusions about the effects of the different programs upon the nutritional status of the community are uncertain.

The health survey of the children was also subject to sampling bias. Again, it is assumed that it was a stable bias. Each year, the community leader, who was the same man throughout the period, was asked to be certain that all children under six years of age were brought to the Center to be weighed. (In 1970, all children under age twelve were surveyed.) King (1967) in his unpublished report, estimated that the population in Fond Parisien under six years of age was approximately eight hundred. Yet, the largest survey sample was 405, while most were between 250 and 380. It must be assumed that the children who were brought to be weighed were typical of the children of the entire community. This assumption, though not negating any trends shown, necessarily weakens any inferences that might be drawn from the sample about the population involved. The smaller control community had an even lower number of children recorded in the surveys.

This necessity of estimating the population with which the survey and the Center were concerned illustrates some important data that were never regularly collected. Probably due to lack of personnel, a full census was never carried out. Since a yearly census would have been required to obtain accurate morbidity and mortality data, they are lacking.

A. Bordes, the physician responsible for the Fond Parisien Center, recorded total deaths, deaths of children up to six years old, and births for the years 1966, 1967, and 1968. These figures are most likely complete. Yet the three years are not sufficient for comparisons and they demonstrate no trends in mortality. Annual morbidity and mortality data on the children might well have demonstrated temporary and, perhaps permanent, benefits from the Center's operation.

In translating the actual weights of the children into PSW's, a version of the United States standard was used, as previously noted. This standard is generally based on two extensive surveys of middle-class children; one of Boston children up to, and including, age five, taken by the Harvard School of Public Health; the other of Midwestern children starting at age five, taken by H. V. Meredith of the State University of Iowa. Percentiles of weight and height were given for sex and age, at six month intervals. The standard used is the fiftieth percentile of these weights. Standards for age in months are usually obtained by linear interpolation. Because the means are from different sample populations, it is not surprising that where the two surveys overlap, at age five, there is a small discrepancy. In fact, the Harvard weights for a five year old boy and girl are 18.37 kg. and 18.37 kg., respectively, while the Iowa ones are 19.41 kg. and 18.78 kg. The simplest, and statistically safest, method of ameliorating the situation is to average the two values,

assuming that they were based on similarly large samples. This would not affect the rest of the values of monthly expected weights, which are already mostly interpolated. This author assumes that this is what is generally done.

However, the data analyzed in this paper were standardized by Ryland E. Webb, using an adaption of the above combined standards. Instead of averaging the two scores for five years of age, he employed a method of "curve-fitting" on the plotted combined standards. In this manner, the standards for four-and-one-half years and five-and-one-half years for males and for five-and-one-half years for females differ from those of the original combined standards, while for both sexes at five years this standard is the average of the combined standards' scores. Though it was felt that this would affect the analysis of the data very little, the different standard must be noted when comparing this with other data. Specifically, it is assumed that the data in reports by the Bureau of Nutrition and in the study by King et al. (1968) on Fond Parisien were standardized by the first mentioned method, not the second. The standard weights used for this study are listed in Table I, on the following page.

In 1968, a preliminary study of the effect of the Center on Fond Parisien was published by King et al. based on the nutritional and child health surveys of both Fond Parisien and the control community from 1964 through 1966. The

TABLE I

STANDARD WEIGHTS FOR AGES 0 MONTHS TO 72 MONTHS[1]

Age in mos.	Weight in kg. Males	Females	Age in mos.	Weight in kg. Males	Females
0	3.40	3.36	36	14.61	14.42
1	4.17	4.17	37	14.79	14.61
2	4.94	4.90	38	14.92	14.72
3	5.72	5.62	39	15.10	14.92
4	6.39	6.17	40	15.24	15.06
5	6.98	6.76	41	15.38	15.24
6	7.58	7.26	42	15.56	15.38
7	8.07	7.76	43	15.74	15.56
8	8.57	8.21	44	15.88	15.74
9	9.07	8.71	45	16.06	15.88
10	9.43	9.07	46	16.19	16.06
11	9.75	9.39	47	16.33	16.24
12	10.07	9.52	48	16.51	16.42
13	10.30	9.98	49	16.69	16.60
14	10.52	10.21	50	16.87	16.78
15	10.75	10.43	51	17.06	16.96
16	10.98	10.66	52	17.24	17.10
17	11.20	10.89	53	17.46	17.28
18	11.43	11.11	54	17.64	17.46
19	11.61	11.29	55	17.87	17.64
20	11.79	11.52	56	18.10	17.83
21	12.02	11.70	57	18.33	18.01
22	12.20	11.88	58	18.55	18.19
23	12.38	12.11	59	18.78	18.37
24	12.56	12.29	60	19.01	18.55
25	12.75	12.47	61	19.23	18.73
26	12.93	12.66	62	19.46	18.96
27	13.11	12.88	63	19.73	19.14
28	13.29	13.02	64	19.96	19.32
29	13.43	13.24	65	20.18	19.50
30	13.61	13.43	66	20.41	19.73
31	13.79	13.61	67	20.64	19.96
32	13.93	13.74	68	20.91	20.18
33	14.11	13.93	69	21.14	20.41
34	14.29	14.11	70	21.41	20.64
35	14.47	14.24	71	21.64	20.87
			72	21.91	21.09

[1]Adapted by R. E. Webb from Nelson, Vaughan and McKay; Textbook of Pediatrics, 9th Edition, p. 42-46; 1969.

comparison could not be made over a longer period of time as a Center was then instituted in the control village. Two years is a very short time in which to discover any effects of the Center on the community or the younger siblings of the Center children, though effects upon the Center children themselves should be apparent.

King et al. (1968) demonstrated that after four months of Center feeding the first group of Center children improved their mean PSW by 3.4, while a paired control group had regressed by 1.5 in their mean PSW. So the children had significantly benefited from the Center feeding. When their PSW's and clinical signs of malnutrition for the two year period were compared, it was found that the Center children had definitely fared better than the non-Center children of Fond Parisien during this period. But approximately two-fifths of the Center children surveyed had graduated from the Center less than one year before the 1966 survey. (King; 1967) These children and their younger siblings probably still showed the temporary effects stemming from the Center child having been fed away from the home for four months. The difference in the PSW status of Center and non-Center children was not large enough to rule out the possibility that the entire difference was due to the temporary effects of the Center.

When the health surveys of the children of the two villages were compared, these same authors noted that the survey

results generally showed that the Fond Parisien children had fared better as a community. Though edema dropped in the Fond Parisien survey, as might be expected, angular lesions increased, while in the control survey, edema increased and angular lesions decreased. Unfortunately, when the non-Center children of Fond Parisien are compared to the control community, it doesn't appear that the entire community fared better than the control community. In PSW and all clinical signs of malnutrition, the non-Center children of Fond Parisien performed exactly as, or slightly worse than, the control village. One cannot conclude, therefore, from this data, that any but the Center children had benefited from the Center after two years.

The nutritional surveys of the two villages did show that the Center villagers had increased their protein and calorie intake. This was due to increased consumption of fish, dried beans, goats' milk, and corn with no increased expenditure for food. The control villagers maintained basically their same diet during this period. This does show that some definite new nutrition knowledge was being utilized by the people of Fond Parisien. But as mentioned previously, this knowledge cannot simply be attributed to the Mothercraft Center while agricultural improvement and irrigation projects were also influencing the habits of the people. In the absence of other supporting data, it cannot conclusively be infered that the Center had affected the community nutritional status at that

time.

So, in 1966, there was no indication that the Center was benefiting anyone but the children attending. Yet, the children attending were definitely benefiting from their Center experience.

The nutritional survey was continued in Fond Parisien until 1970, while the child health survey was continued there until 1971. In the annual nutritional surveys, increases in calories, total protein, animal protein, carbohydrates, fat, and most vitamins and minerals consumed were seen each year, with the exception of the drought year of 1968. The amount of the specific foods eaten each year fluctuated greatly, depending upon crops and other factors. Yet, when consumption of one source of protein dropped, there was a concurrent gain in consumption of the other sources. In 1969 and 1970 there were dramatic increases in nutrient consumption although accompanied by slightly increased daily food-fuel expenditures.

It is obvious that some new nutritional knowledge was being applied by the population of Fond Parisien to their dietary habits. The benefit to them was real, but the question of origin(s) of the new knowledge remains unanswered by this data. Some of the knowledge may be due to each of the three programs functioning in Fond Parisien at that time, including the Mothercraft Center. Though education was

responsible for increased consumption of fish, the increased consumption of certain crops, meat, and milk was due at least partly to increased availability through the agricultural improvement programs. The nutritional survey itself had some impact by influencing the emphasis of the agricultural improvement program. The nutritional survey, then, showed an improvement in community nutrition, due, at least in part, to education. It did not, however, directly demonstrate any benefit of the Mothercraft Center.

Although the child health survey was performed annually in Fond Parisien, only the first survey in 1964, two of the last surveys in 1969 and 1970, and, due to a loss of data, approximately one-half of the full 1967 survey were available for this analysis. All surveys were performed in July, except the 1967 survey, which was delayed until December. Any seasonal variation in nutritional status should have been reflected in slightly higher PSW's in December than in July. (Webb; 1974)

The survey data presented in this analysis are not precisely the same as those found in the annual reports of the Haitian Bureau of Nutrition. For this analysis, Webb (1973) re-organized the original data, and recomputed the PSW's involved. This resulted in slightly different total numbers, and some different PSW's than those recorded in the annual reports on Fond Parisien.

In dealing with the survey data of Fond Parisien, data on children who were surveyed in more than one survey are analyzed with, and as, the data on children who were only surveyed once. When one child has been recorded more than once, these records are then actually growth data on that child which should not be treated as independent sample points from a population over time. Only sixty-one children who had not attended the Center were in both the 1964 and the 1969 or 1970 survey, and thirty-eight children who had attended the Center also fell into this category. As the population of Fond Parisien is fairly mobile, the statistical drawbacks of including a small amount of growth data in presumably independent samples were judged less important than the need to include in the samples all children who probably had resided in Fond Parisien during the entire period of the Center's functioning. Furthermore, the weights of these children will only affect the five year old and above averages in 1969, and the over five year old average in 1970. For all of these reasons, these children were included in the samples.

In analyzing these child health surveys as representative of the progress of the population of children of Fond Parisien from 1964 through 1970, the survey samples are assumed to contain few very recent new-comers to the community, who would not yet have had the opportunity to benefit from the Center, or any other programs. Further, children who had lived in Fond Parisien for more than a year are assumed to

reflect the health status of the children of the community fairly accurately. The proportion of very new, relatively new, and relatively old inhabitants of Fond Parisien in the child health surveys is unknown, however.

Even with its many short-comings, the child health survey still remains the only record available of the children of Fond Parisien during this period. The means, standard deviations (s.d.), and sample sizes for all four surveys available are reported in Table II by one year age groups, excluding children who attended the Center. The Center children were excluded because their temporary benefits would probably exaggerate any progress of the community children in general. Though this may reflect more accurately the progress of the community children in general, it may not draw an accurate picture of the community children at any one time, since the Center children were generally the most malnourished of all before entering the Center, and still had relatively low PSW's after graduation. Therefore these means are usually higher, in all four surveys, than the means which would include the Center children surveyed.

Also, children who were recorded both in 1969 and in 1970 are here reported only in 1970. This was done so that the 1969 and 1970 surveys could be combined to present a more accurate picture of the community at the end of the Center's functioning, by minimizing the occasionally large fluctuations seen in the annual survey means. So, in an attempt to compare

the community children at the opening and closing of the Center, the means for the 1964 and combined 1969 and 1970 surveys are here reported after the means for each separate survey are given, all in Table II. Both sets of means are graphed on the following pages, in Figures 1 and 2. And, as the data for 1967 was only a part of the total survey, and was performed in a different season than the others were, little importance will be given to it.

The generally low means of the 1967 survey are probably due to the higher PSW's of that survey being in the portion of the survey data which has been misplaced. But, even so, it seems obvious that the young population not directly affected by the Center, not only did not improve in weight, but in general, regressed. The only positive change recorded was in the six year old and above mean for 1969, which was based on only seven children. Only one age group, the one year olds, remained basically stable. The two, three, and four year olds showed the greatest negative change. It is these younger children that would be expected to show the greatest improvement if their mothers had been receiving new nutritional knowledge by word of mouth during the last few years, for they probably would have been fed almost entirely under the new nutritional regime. Unfortunately, however, these surveys give no substantiation at all to this occurrence.

Since the surveys were, as noted before, not very sound statistically, a definite conclusion that the nutritional

TABLE II

FOND PARISIEN PSW SURVEY RESULTS EXCLUDING CENTER CHILDREN

Age in mo.	1964 Mean	s.d.	N	1967 Mean	s.d.	N
0-11	91.96	13.44	28	87.18	0.0	1
12-23	83.47	11.09	49	83.09	18.40	19
24-35	85.07	8.07	42	75.00	10.10	19
36-47	82.93	10.11	41	77.78	10.81	24
48-59	82.76	9.00	33	71.39	10.7	10
60-71	78.29	10.59	24	69.82	14.50	9
72 & over	74.06	9.17	16	72.29	10.7	12

Age in mo.	1969 Mean	s.d.	N	1970 Mean	s.d.	N
0-11				89.05	13.5	38
12-23	83.40	15.6	42	82.27	15.3	51
24-35	76.16	13.8	43	78.81	10.6	62
36-47	79.97	15.4	36	77.78	13.4	64
48-59	72.83	13.0	18	76.79	15.3	67
60-71	75.55	13.3	38	73.23	12.2	38
72 & over	74.57	9.1	7	71.30	16.7	182

Age in mo.	1964 Mean	s.d.	N	1969-1970 Mean	s.d.	N
0-11	91.96	13.44	28	89.05	13.52	38
12-23	83.47	11.09	49	82.78	15.40	93
24-35	85.07	8.07	42	77.72	11.92	105
36-47	82.93	10.11	41	78.57	14.13	100
48-59	82.76	9.00	33	75.95	14.85	85
60-71	78.29	10.59	24	74.39	12.75	76
72 & over	74.06	9.17	16	71.42	16.49	189

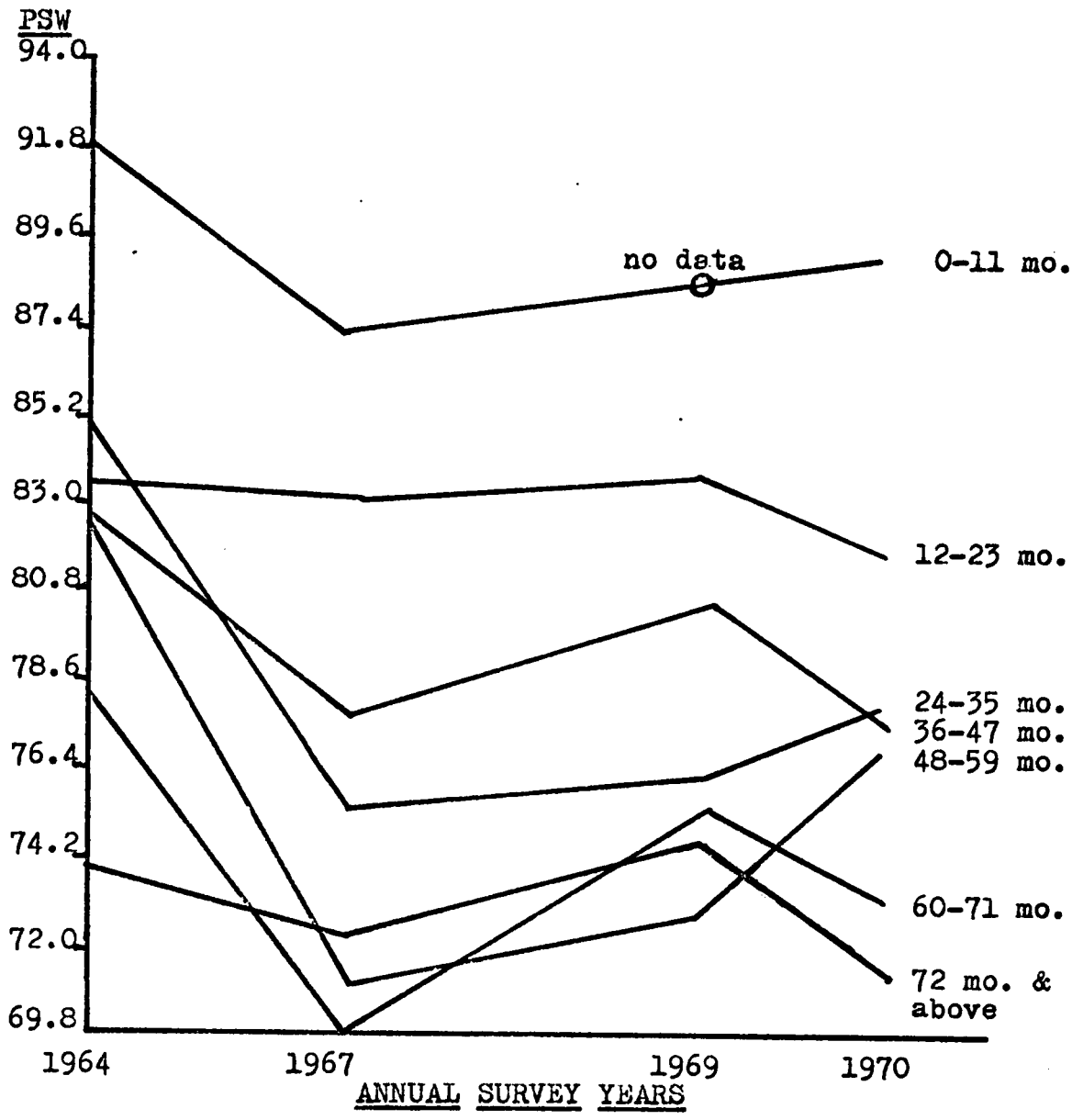

FIGURE 1

MEAN PSW'S OF NON-CENTER CHILDREN IN ANNUAL SURVEYS

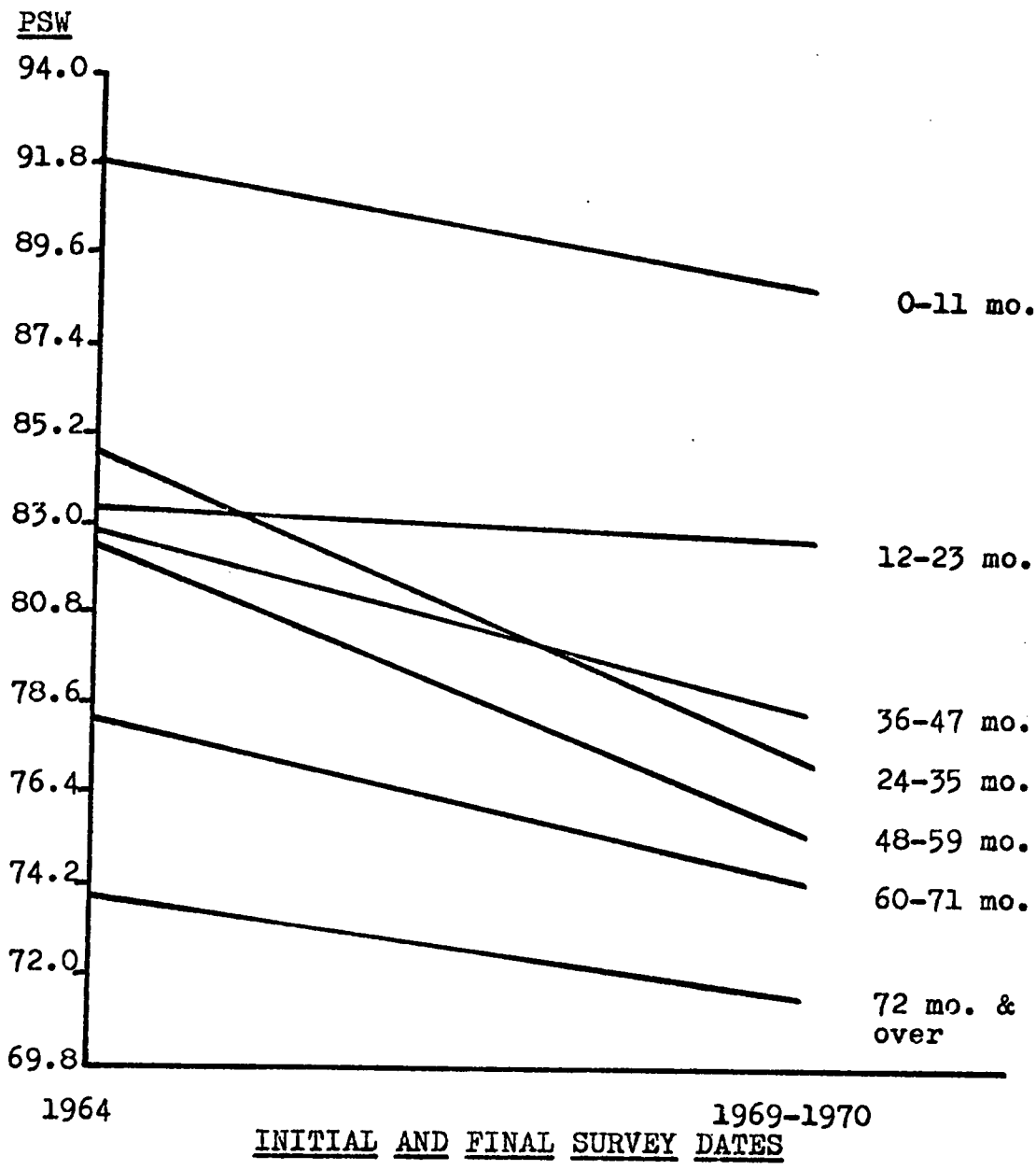

FIGURE 2

MEAN PSW'S OF NON-CENTER CHILDREN IN INITIAL AND FINAL SURVEYS IN FOND PARISIEN

status of the children in the community generally declined during the Center's operating period cannot easily be made. But, that there could not have been any great improvement in their nutritional status also seems evident.

When the actual means of an age group show no improvement, improvements in the Gomez classifications of the age group have sometimes been used as evidence of improved nutritional status. For reasons mentioned above, this author does not find such arguments very convincing. In the Bureau of Nutrition's annual reports on Fond Parisien, an improved Gomez classification of the one, two, and three year olds was shown. But, according to the annual reports the percentages represented in Gomez classifications for one, two and three year olds in the 1964 survey were 14 per cent normal, 52 per cent first degree, 22 per cent second degree, and 13 per cent third degree. This author found these same Gomez classifications in the 1964 survey for one, two and three year olds to be 13 per cent normal, 57 per cent first degree, 25 per cent second degree, and 5 per cent third degree. This gives a higher percentage for first degree and second degree, and a lower percentage for third degree, and presents a less depressing picture of the original population which makes the differences in following surveys mostly arbitrary.

The occurrence of edema did drop over this period. The number of edema cases found in each survey were: 26 in 1964, 1 in 1969, and 4 in 1970. This drop should be expected, as

any edematous child noted should have been entered in a Center group. As edema usually sets in after two years of age, the lowered occurrence of edema in 1969 and 1970 could be attributed to the temporary effects of the Center. A low rate of edema in 1972 and 1973, however, would have been more indicative of a permanent change in the nutritional status of the community children.

From the few indicators available for the nutritional status of the community children, it seems that no definite permanent improvements appeared during this period.

IV FOND PARISIEN - THE MOTHERCRAFT CENTER

The Mothercraft Center in Fond Parisien operated for five years, graduating twelve separate groups. Eleven of these groups ran for four months or more, while one, the sixth, ran for only three months. The Center was finally closed when the great majority of children entering the Center groups were repeaters. For each Center group, children's weights were usually recorded at entrance, and at weekly intervals until graduation. Follow-up weights were recorded two months, three months, six months and one year after graduation whenever possible.

For this analysis, the attendances of a repeating child after the first graduation were not utilized. As this author had access to only the monthly weights, weights of children who had not been weighed at entrance, three months after entrance, or four months after entrance were also excluded. And any edematous children were analyzed separately. A slight trend of decreasing age and increasing PSW was noted in the Center groups, excluding repeaters, over time. This happened because the most malnourished children were entered in the first Center groups. It was felt, therefore, that differences between Center groups were due to differing ages and amounts of malnutrition, rather than any influence of the separate groups. The PSW's used for analysis are listed in Table III on the following pages by age, within Center group. Center

TABLE III

PSW'S DURING CENTER ATTENDANCE EXCLUDING

REPEATING AND EDEMATOUS CHILDREN

CENTER I

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
12-23	75.6	81.6	77.6
24-35	73.0	71.9	72.7
	73.8	77.8	75.7
	73.0	75.4	77.3
	73.4	75.8	75.6
36-47	54.2	63.1	65.4
	65.0	67.6	65.9
	63.5	66.9	66.2
	72.2	79.2	78.9
	76.2	88.3	86.0
	77.5	80.3	82.0
48-59	68.2	69.9	68.6
	66.0	69.2	70.8
	64.2	67.1	63.7
60-71	67.9	73.5	74.6
	63.6	68.8	67.6
	71.5	72.0	72.1
	64.8	72.0	72.1
	63.4	69.5	69.2
	66.2	67.0	66.2
	69.6	74.1	76.2
	67.0	70.2	70.7
72 & above	75.1	72.9	73.9
	67.5	68.3	68.9
	70.9	71.8	72.9
	74.0	77.6	77.9
	67.9	71.6	72.1

TABLE III

(continued)

CENTER II

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
12-23	58.4	66.2	64.3
	74.5	79.9	80.3
	57.0	62.5	63.7
	78.0	75.0	77.0
24-35	71.1	78.1	80.4
	76.0	76.8	76.3
	76.9	80.1	81.1
	65.6	70.5	72.2
	58.4	68.4	69.5
36-47	70.8	71.1	70.3
	66.4	76.5	76.2
	55.0	59.8	59.5
	62.5	67.1	68.3
	63.6	74.2	76.4
	67.6	72.3	73.5
	63.1	71.7	71.3
48-59	62.2	68.1	68.9
	58.3	64.7	65.0
	74.7	76.8	74.8
	65.5	68.7	66.6
60-71	54.7	63.8	65.7
	67.1	70.1	69.4
	64.3	67.6	68.8
	60.6	62.6	62.4
	54.5	57.4	58.6
72 & above	72.1	75.8	75.1
	63.3	67.3	68.1
	44.9	54.3	56.7
	71.9	73.3	75.2
	67.5	72.2	70.5
	58.9	60.4	60.7
	73.5	76.7	77.6
	67.5	70.4	71.1
	69.2	70.0	68.8
	60.8	63.6	64.4
	58.5	64.6	65.0

TABLE III

(continued)

CENTER III

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
12-23	74.9	75.7	75.4
	62.7	68.2	65.8
	64.7	63.5	61.4
	66.5	68.0	70.3
	63.5	65.7	66.8
	71.0	70.5	68.2
	66.8	66.6	68.7
	68.2	66.2	64.3
	63.3	67.0	65.4
	81.4	83.1	80.5
	62.9	67.0	68.2
24-35	53.6	64.2	64.8
	58.4	62.7	60.4
	73.7	72.5	73.7
	70.7	73.6	74.5
	69.6	77.5	77.5
	64.9	71.6	69.5
	70.5	75.1	76.1
36-47	44.7	49.1	49.3
	48.2	59.8	57.5
	56.4	65.2	65.7
	66.5	73.3	71.3
	68.3	71.6	71.0
	67.5	72.7	72.5
	73.7	68.5	68.1
	60.7	63.3	68.3
48-59	65.8	70.9	68.3
	63.2	69.8	71.8
	64.4	72.0	72.6
	61.3	61.9	62.8
	66.5	66.7	65.5

TABLE III

(continued)

CENTER IV

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
12-23	68.0	66.5	71.4
	76.0	75.1	73.4
	74.8	68.8	69.9
24-35	65.4	68.0	67.3
	78.0	81.5	80.4
	63.6	75.7	74.2
	75.4	71.2	72.1
	74.0	68.2	71.8
	71.1	70.8	69.9
	67.5	69.5	68.0
	76.1	79.8	79.7
36-47	70.1	63.9	64.0
	68.4	72.0	71.8
	69.3	68.0	67.7
	67.5	71.0	73.3
	52.2	53.9	54.2
48-59	64.0	64.1	62.3
	67.1	64.3	67.3
	61.4	62.1	63.2
	70.9	74.3	73.6
	54.3	55.6	57.2
	45.6	45.8	44.8
	41.6	44.2	43.7
60-71	58.5	62.3	63.6
	CENTER V		
12-23	81.2	84.6	85.5
	84.4	85.8	84.5
	72.9	78.8	74.5
	81.4	79.3	76.5
	79.3	78.9	77.0

TABLE III

(continued)

CENTER V, contd.

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
24-35	78.6	74.9	75.0
	80.7	77.4	80.8
	76.3	79.0	79.1
	58.0	63.0	61.5
	72.2	79.5	78.9
	69.4	76.1	80.8
	80.5	78.9	81.7
36-47	81.8	80.0	84.2
	87.2	81.4	84.2
	56.7	59.2	58.6
	72.7	71.1	71.7
	78.7	82.3	81.2
	64.6	66.6	66.2
	83.5	81.3	79.2
48-59	80.2	74.2	75.9
	68.9	70.4	70.1
	56.0	62.3	62.3
	58.4	61.9	61.5
60-71	40.0	46.5	50.2
	59.3	63.4	63.3
	66.1	70.3	67.6
	CENTER VI		
12-23	46.4	55.7	
	62.0	64.8	
	66.1	67.1	
24-35	68.7	73.2	
	58.9	61.0	
	63.2	71.4	
	69.2	76.1	
36-47	68.8	70.7	
	68.7	70.7	
	70.7	72.2	
	35.0	38.6	

TABLE III

(continued)

CENTER VI, contd.

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
48-59	66.6	77.0	
	63.7	67.5	
60-71	56.5	61.0	
	50.2	56.2	
	56.8	59.6	
	74.9	75.5	
	57.6	70.1	
72 & above	56.0	60.5	
	CENTER VII		
12-23	72.1	72.9	69.6
24-35	71.0	75.4	76.1
	70.0	79.0	76.1
	56.1	58.4	50.6
36-47	66.0	70.0	71.0
	51.2	57.6	57.9
	72.4	77.1	78.5
48-59	64.6	67.6	66.8
	60.8	67.1	71.1
60-71	69.0	77.0	76.8
	CENTER VIII		
12-23	75.1	78.4	76.6
	56.8	59.5	59.4

TABLE III

(continued)

CENTER VIII, contd.

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
24-35	66.2	71.1	74.3
	58.8	58.0	59.6
	53.7	54.5	55.5
	64.1	69.2	69.5
	67.0	68.7	70.7
	67.3	67.9	71.1
	72.1	70.8	73.0
	73.5	72.2	74.7
	58.7	61.7	64.0
	68.0	69.7	71.9
36-47	66.1	71.0	73.3
48-59	67.1	69.2	66.4
	74.0	76.3	77.7
	62.7	64.2	67.0
60-71	52.0	54.4	57.3
	CENTER IX		
24-35	50.0	46.1	46.5
	70.6	71.5	70.7
	64.2	66.7	67.2
	60.6	60.3	62.0
	60.7	44.8	44.3
36-47	39.4	42.6	43.0
	58.9	57.9	61.4
48-59	51.1	55.9	57.5
	59.9	61.4	60.9
72 & above	37.6	36.7	37.2

TABLE III

(continued)

CENTER X

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
12-23	50.0	59.4	58.9
	59.9	58.9	59.5
	53.1	50.2	49.5
	84.2	87.1	85.6
24-35	62.6	68.8	67.1
	54.2	59.8	61.0
36-47	69.9	75.6	77.4
	62.2	64.4	61.8
48-59	56.3	59.3	57.9
	68.8	70.9	71.1
	65.7	72.3	72.9
	71.8	68.5	65.0
	69.9	74.7	72.6
60-71	49.0	65.0	68.5
	72.8	71.6	70.3
72 & above	46.2	54.1	51.8
	50.3	53.4	52.7
	64.0	70.8	71.3

CENTER XI

12-23	59.5		61.3
24-35	60.5		61.8
	56.6		50.3
	57.5		54.9
48-59	64.1		58.2

TABLE III

(continued)

CENTER XII

Initial Age in mos.	Initial PSW	After 3 mo.	After 4 mo.
12-23	55.4	61.2	66.1
	65.5	67.9	67.0
24-35	63.0	67.1	68.6
	56.2	59.6	60.6
36-47	53.8	57.5	58.4
48-59	49.3	56.9	58.3
60-71	34.4	38.5	39.7

groups six and eleven are recorded, though they could not be used for much of the analysis. Weights of group eleven, which did not have third month weights recorded, were used whenever possible. This left for the analysis 207, or occasionally 212, non-edematous children's weights in Center and some follow-up weights.

Before actually analyzing the data on the Center, an interest arose over evaluative methods being currently used. The main concern was that the methods used in this study would accurately reflect any gains the children made. So, a few preliminary tests were run. Regression equations were made using the initial gross weight and age to predict third and fourth month gross weight, which were compared to similar regressions based on PSW's, which will be considered later. As the PSW's are basically adjusted for age, a larger partial correlation coefficient (r) was expectedly found in the gross weight equations, giving them a slightly higher coefficient of determination (R^2). But the regression coefficients were approximately equal indicating that the two measures reflected the gains similarly. The same regression was then performed on the fourth month PSW, but including all repeat experiences, which resulted in a lowered R^2, a higher standard error of estimate (s.e.e.), and a complete change in the regression coefficient of initial age, which was then not significant. This reaffirmed this author's purpose in excluding repeat experiences in the Center analysis.

The first point concerning the Fond Parisien Center to be considered deals with the actual performance of the children while in the Center. This author felt it would be of interest to test whether sex, degree of malnutrition at entrance, or age significantly affected weight gains in the children. As the numbers in every comparison were unequal, it was decided to regroup the data into either a separate one-way Analysis of Variance or an Analysis of Covariance for each variable to be tested. Using the actual difference in initial and final fourth month PSW's as the measure of a child's gain, hereafter referred to as percent gain, the following analyses were performed.

The possibility of any difference in percent gain performance between males and females was explored by performing an Analysis of Covariance on the percent gains of boys and of girls, with initial Center entrance age in months as covariate. (Table VIII) Age was a highly significant (alpha level of .005) influence on the percent gains. With the influence of age adjusted, an F statistic of 1.734, with 1 and 204 degrees of freedom (d.f.) was obtained. This indicated that the difference between the percent gains of boys and girls was significant at only an alpha level of .25. The girls' average percent gain was slightly higher than the boys', both before and after adjusting for age.

To test whether the degree of malnutrition upon entrance affected the percent gains of the children, the percent gains

were grouped into the three Gomez classifications. An Analysis of Covariance was then performed on the three groups of percent gains with initial age as the covariate. (Table IX) An F statistic of 6.891 with 2 and 208 d.f. was computed. This showed a highly significant (alpha level of .005) difference in percent gains among the three degrees of malnutrition, after having been adjusted for the influence of age. Actually such a signifcant difference had not been expected since the Gomez classes are so large. The influence of age had been significant (alpha level of .025) also. Before and after adjusting for age, the third degree malnourished children had the largest average percent gain, followed by the second degree children, while the first degree children had the smallest average percent gain.

Since age had been shown to contribute significantly to the differences in percent gains, it was decided to attempt two different analyses in order to test the effects of age on percent gains. A simple one-way Analysis of Variance was performed on the percent gains, grouped into six one year age groups, starting with one year olds. (Table X) An F statistic of 3.13 with 5 and 206 d.f. was calculated, and, as expected, found to be significant with an alpha level of .10. An interesting result was the ranking of the actual group means. The gains were made in decreasing order by five year olds, three year olds, six year olds, two year olds, four year olds, and one year olds. To test the possible significance of the

differences of these means, a Duncan's Multiple Range Test was performed. At a protection level of .05, no straightforward grouping appeared, though the means generally formed three groups which consisted of the five year olds, then a second group of the six, four, three, and two year olds and a final group of the one year olds. No explanation for the performance of the five year olds and the one year olds could be found in the data available. Unobtained data, such as height, frequency of illnesses, and attendance might explain it. The results of the Multiple Range Test and the actual mean percent gains are listed in Table IV on the following page.

As these percent gains showed no definite trend, due to age, it was decided to analyze the actual final fourth month PSW's grouped by ages. An Analysis of Covariance was performed on the fourth month PSW's, grouped into the same six one year age groups. (Table XI) The covariate was initial PSW. An F statistic of 2.065 with 5 and 205 d.f. was computed, which was significant at the alpha level of .10. The contribution made by the initial PSW was highly significant (alpha level of .001). Although the means of final PSW's for each age group showed a general ranking of decreasing final PSW with increasing initial age group, after adjusting for initial PSW they did not show an obvious trend. The same ranking and approximate magnitudes of differences resulted as with the one-way Analysis of Variance.

TABLE IV

MEAN PERCENT GAINS WHILE IN CENTER OF AGE GROUPS AND THEIR RANKING

Age in mos.	Mean	s.d.	N
12-23	1.326	3.84	34
24-35	2.477	4.61	57
36-47	3.962	4.37	42
48-59	2.430	3.93	37
60-71	5.209	4.51	22
72 & over	3.515	2.93	20

Age in mos.	12-23	48-59	24-35	72 & over	36-47	60-71
Means	1.326	2.430	2.477	3.515	3.962	5.209

(Protection level of .05, Duncan's Multiple Range Test)

Having found two statistically significant influences on percent gain, an effort to find a good prediction equation for the percent gain of children in a Haitian Center, based on the Fond Parisien data for this period was then made. It was discovered that a successful regression equation for the percent gain could not be found, because of the very large coefficient of variation of the percent gains, with a mean of 3.09 PSW and a s.d. of 4.23 PSW. However, it was still true that if a successful regression could be found for the final PSW, based on the initial PSW and age, then the predicted percent gain could be computed from the predicted final PSW and actual initial PSW.

Since Center groups throughout the world sometimes run for only three months rather than four, both the third month PSW and the fourth month PSW were used as final PSW in finding regression equations to predict a final PSW. A good equation for each final PSW was found using only initial PSW and age as independent variables. Adding quadratic terms improved the equation very little and the terms were subsequently dropped because of the time and trouble involved in using them. As initial age was not contributing nearly as much as initial PSW to the equation, though it did contribute significantly (alpha level of .1), an equation was made using only initial PSW to see how much the loss of predictive power would be offset by a lowered s.e.e. The regression based only on initial PSW showed not only a slight loss in R^2, but

also a higher s.e.e. It was, therefore, decided that the regression equation based on initial age and initial PSW was the best for predicting final PSW, and consequently, percent gain. Interestingly, the equations for predicting third month and fourth month PSW were quite similar. A check on the average third month PSW and fourth month PSW of the 207 children revealed that there was, in fact, little difference between them.

The equation for predicting the third month PSW of a Center child (Y_3), from his initial age in months (X_1) and initial PSW (X_2) is:

$$Y_3 = 10.142 + .021\ X_1 + .875\ X_2$$

In both equations, PSW's are expressed as percentages, i.e. 83.4 PSW, not .834 standard weight. The standard errors of the regression coefficients are .014 and .028 and their partial correlation coefficients (r) are .103 and .907 respectively. The s.e.e. is 3.689, and R^2 is .831. (Table XII)

The prediction equation for the fourth month PSW (Y_4) of a Center child based on his initial age (X_1) in months, and initial PSW (X_2) is:

$$Y_4 = 11.269 + .025\ X_1 + .859\ X_2$$

The standard errors of the regression coefficients are .015 and .031 and their r's are .115 and .890 respectively. The s.e.e. is 3.985 and R^2 is .801. In both prediction equations, X_2 contributed very significantly (alpha level of .001), while X_1 contributed significantly at an alpha level of .10.

(Table XIII)

As tools for prediction, these equations may be used to indicate differences in expected gains for various children while at a Haitian Center. Once the equations have been checked in the field, they may facilitate a more accurate expectation of a child entering a rural Haitian Mothercraft Center. For a child with a low predicted percent gain, if he and his family are shown in advance that he is not expected to make a large percent gain while at the Center, possible feelings of failure on their part may be prevented. This could have an important influence on the mother's education and motivation to apply such. Table V on the following page presents a tabulation of some predicted percent gains illustrating how wide a range they cover.

Predictions at the extremes of either independent variable, of course, are not as reliable as those in the middle ranges. Below approximately 45 PSW and above approximately 80 PSW, predicted gains are too high and too low respectively. For example, for children with an initial age of thirty-six months, and initial PSW's of 40, 50, 60, 80, and 90, predicted percent gains, using the regression equation for the fourth month PSW, would be 6.53, 5.12, 3.71, .89, and -.52 respectively. At 40 and 90 PSW, the equation gives extreme values (Beghin and Viteri; 1971). While at 80 PSW, the fourth month predicted percent gain is actually .01 less than that for the third month, though in this data three year olds did gain

TABLE V

SOME PREDICTED PERCENT GAINS FOR HAITIAN CENTER CHILDREN

Actual Initial Age	Actual Initial PSW	Predicted After Three Mos.		Predicted After Four Mos.	
		% Gain	PSW	% Gain	PSW
24	60	3.15	63.146	3.41	63.409
	70	1.90	71.896	2.00	71.999
	80	.65	80.646	.59	80.589
36	60	3.40	63.398	3.71	63.709
	70	2.15	72.148	2.30	72.299
	80	.90	80.898	.89	80.889
48	60	3.65	63.650	4.01	64.009
	70	2.40	72.400	2.60	72.599
	80	1.15	81.150	1.19	81.189
60	60	3.90	63.902	4.31	64.309
	70	2.65	72.652	2.90	72.899
	80	1.40	81.402	1.49	81.489

during their fourth month in the Center. The extremes in the age range, however, affect the predicting quality relatively little. For example, for children with an initial PSW of 70, and initial ages of 12, 24, 60, and 72 months, predicted percent gains using the equation for fourth month PSW would be 1.70, 2.00, 2.90, and 3.20 PSW respectively. According to the two similar regression equations for third and fourth month PSW then, for a constant initial age, an increased initial PSW will result in a smaller percent gain, while for a constant initial PSW, an increased age will result in a slightly larger percent gain. Also, initial age is slightly more important and initial PSW slightly less important in predicting the fourth month PSW than in predicting the third month PSW.

The small increase in predicted gain between the third and fourth month PSW's can be demonstrated by a few examples. A child with an initial age of twenty-four months and an initial PSW of sixty will have a predicted gain after three months of 3.15 PSW and after four months of 3.41 PSW. A child with an initial age of thirty-six months and an initial PSW of seventy will have a predicted gain after three months of 2.15 PSW, and after four months of 2.30 PSW. Finally, a child with an initial age of forty-eight months and an initial PSW of seventy will have a predicted gain after three months of 2.40 PSW, and after four months of 2.60 PSW.

This small increase in predicted gain centers attention upon the question of how long a Center group should meet. In the Philippines, Center groups are regularly run for only three months. Needless to say, this results in savings of manpower and money. If the major factor in making such a decision is the weight gains of the children, then the untested Fond Parisien regression equations indicate there is little gain to be expected during the fourth month in a rural Haitian Center.

Further evidence from Fond Parisien of the small advantage of a fourth month in the Center in terms of the weight gains of children, can be demonstrated by the mean PSW's of the Center children, grouped by age, reported monthly. The means, s.d.'s, and numbers are reported in Table VI, and the means are graphed in Figure 3, on the following pages.

As can be seen in the graph, there was a continual increase in PSW through the third month for all ages, but during the fourth month three age groups improved only slightly while the other three regressed slightly. However, a very small overall increase was still recorded during the fourth month. It should be emphasized here that no edematous children were analyzed. They might have shown more improvement during the fourth month than non-edematous children. Though edematous children may require a four month Center stay, for the great majority of Center children the fourth month in the Center may not contribute to any marked improvement in their PSW.

TABLE VI

MONTHLY MEAN PSW'S OF AGE GROUPS DURING CENTER ATTENDANCE

Age in mo.	INITIAL Mean	s.d.	N	AFTER 1 MO. Mean	s.d.	N
12-23	68.00	9.67	38	68.36	9.59	38
24-35	67.12	7.75	61	67.95	8.34	61
36-47	64.70	10.92	46	67.27	10.02	45
48-59	63.21	7.71	39	64.89	7.52	39
60-71	60.46	9.64	27	63.84	8.29	25
72 & over	62.74	10.56	21	64.91	10.71	21

Age in mo.	AFTER 2 MO. Mean	s.d.	N	AFTER 3 MO. Mean	s.d.	N
12-23	69.41	9.21	37	70.36	8.70	37
24-35	69.12	8.27	57	69.93	7.95	58
36-47	67.48	10.60	46	68.22	10.07	46
48-59	65.56	7.67	38	66.15	7.51	38
60-71	64.04	8.97	27	65.19	8.89	27
72 & over	65.71	10.15	21	66.01	9.95	21

Age in mo.	AFTER 4 MO. Mean	s.d.	N
12-23	70.12	8.38	34
24-35	69.65	9.06	56
36-47	69.11	9.74	42
48-59	65.53	7.51	37
60-71	65.96	8.59	22
72 & over	66.60	10.27	20

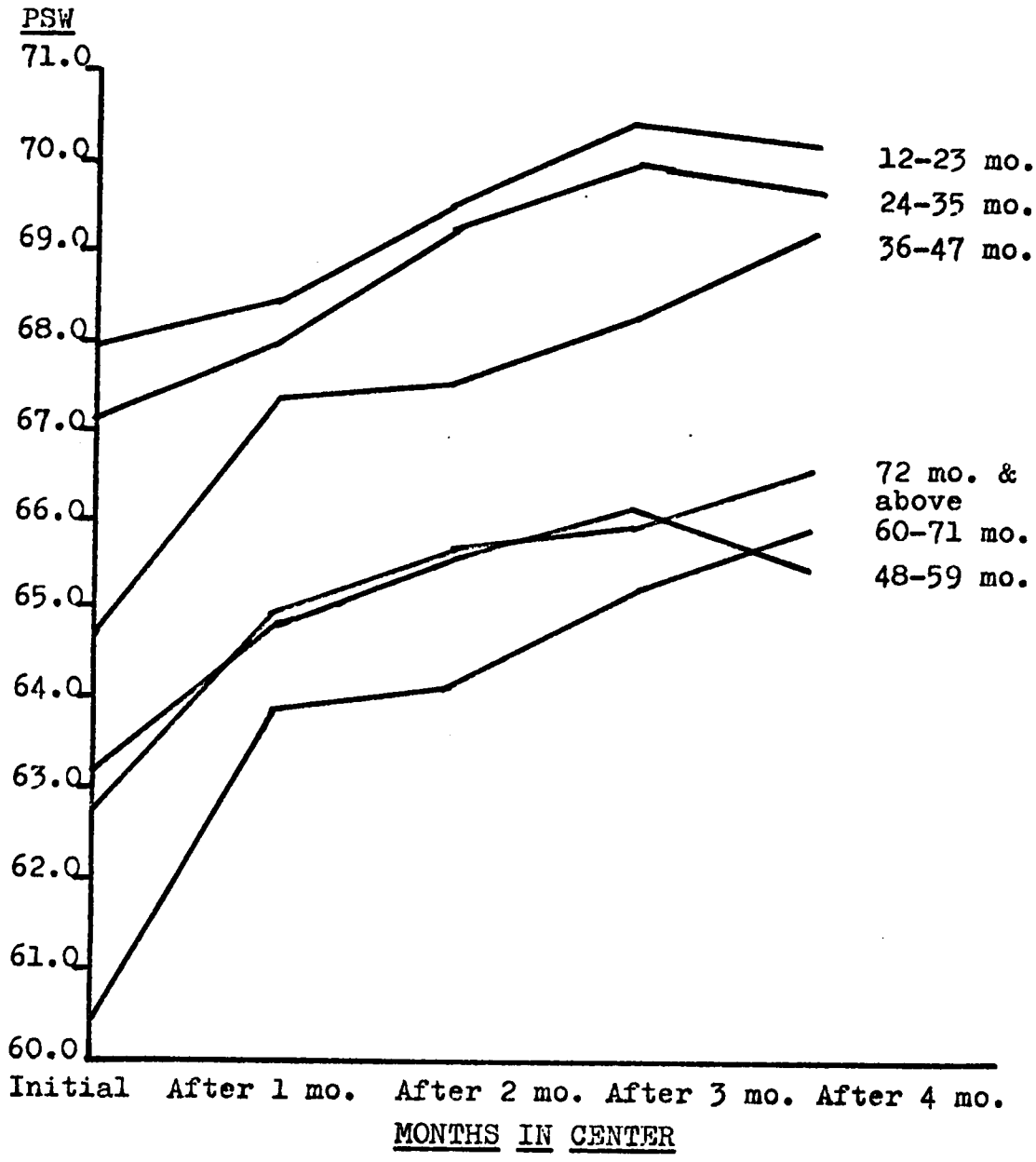

FIGURE 3

MONTHLY MEAN PSW'S OF AGE GROUPS DURING CENTER ATTENDANCE

For Center group six, which ran for only three months, there is a very small amount of follow-up data. For nine children with six month follow-up weights, the mean third month PSW was 66.28, with a s.d. of 6.95 and a mean percent gain since entrance of 4.14 PSW. Their mean PSW six months after graduation was 65.99, which was a smaller loss than the average based on four months attendance, but the mean percent gain in Center was also better than the four month group average. Only four children in the sixth group were weighed one year after graduation. Their mean third month PSW was 68.95, with a s.d. of 6.70, and a mean percent gain of 3.88. Their one-year follow-up mean PSW was 70.13. Again, they performed better after Center graduation than the mean, but had also done better while in the Center. These are too few children to conclude anything other than that their performance in and soon after attending the Center was probably not harmed by the fact that their Center group ran for only three months.

Compared to the amount of data available on children while in the Center, follow-up data for the other Center groups is also sketchy. Based on the 1969 and 1970 surveys, siblings of only eighteen non-repeating Center children of all ages were weighed. This was too small a group to analyze at all. There were twenty-four Center children with only six month follow-up weights, twenty Center children with both six month and one year follow-up weights. A variety of regression equations were tried in order to test the effects of some

supposed influencing factors upon follow-up PSW's. The independent variables chosen were initial age and PSW, third month Center PSW, percent gain based on four months in Center, and quadratic terms. In equations for both the six month and one year follow-up PSW's quadratic terms gave only a slight improvement in the R^2, which was offset by a greater s.e.e. They were, therefore, judged not useful.

The six month follow-up PSW's were statistically significantly influenced by both the child's initial PSW (alpha level of .001) and his percent gain while in the Center (alpha level of .01). The r's were .8068 and -.3725 respectively. The influence of age was significant with only an alpha level of .25. (Table XIV) A slightly better predictive equation (lower s.e.e. and higher R^2) was constructed using third month PSW rather than percent gain. This was because of the large coefficient of variation of the percent gain. But the r's of this second equation were smaller than those of the first, so that the first equation was judged the most helpful for demonstrating correlations.

The one year follow-up PSW was influenced more by the age of the child than the six month follow-up PSW was. Again, two regression equations, one based on initial age and PSW, and percent gain, and the other based on initial age and PSW, and third month PSW were found to have the highest correlations. (Tables XV and XVI) Neither equation would be helpful as a predictor, as both had R^2's of only .55. In the first

equation, all three variables contributed significantly (minimum alpha level of .025) to explaining the one year follow-up PSW. The r's were -.295 for initial age, .660 for initial PSW, and -.277 for percent gain in Center. For the second equation, initial age and third month PSW contributed significantly (minimum alpha level of .01) to explaining the one year follow-up PSW, but the initial PSW was significant with only an alpha level of .25. The r's were -.302, .346, and .120, respectively. The mean one year follow-up PSW was 64.76, with a s.d. of 10.12. These children also had a mean initial PSW of 66.076, with a s.d. of 7.48 PSW, and a mean percent gain in Center of 3.413 PSW. For the six month follow-up, the mean PSW was 66.87, with a s.d. of 10.29 and a mean initial PSW of 67.113, with a s.d. of 8.76, and a mean percent gain of 2.69.

That the initial age should be correlated significantly with the one year follow-up PSW, and yet, not with the six month follow-up PSW, is not, of course, reassuring to one looking for consistent influences on follow-up PSW's. Moreover, there appear to be other possibly important influences on follow-up PSW's that were not recorded, and therefore cannot be tested. An example of one of these is a child's percent weight-for-height.

One trend noted in the analysis of follow-up data is the negative correlation of the continually decreasing mean follow-up PSW, adjusted for initial age and PSW, with percent

gain while at the Center. The unfortunate implication is that the more the child had gained while at the Center, the more he would have lost after graduation. But it is quite possible that a sampling bias may have affected the data, as the follow-ups were not always systematically performed, so this implication may not be very conclusive.

Finally during the Center's operation, twenty-one edematous children who were not repeaters attended. Though this was too few children for any meaningful statistical analysis, some characteristics of these children as a group are worth noting. Their mean initial age was slightly lower than that of the non-edematous children, but only one child was under twenty months old, while only three were under twenty-four months old. The hypothesis that the initial weight loss of these few children was accomplished after varying amounts of time can be illustrated here. Their mean initial Center PSW was 64.8 with a s.d. of 11.02, while their mean PSW after one month was 63.37 with a s.d. of 11.52. Though there was a slight decrease in the mean PSW, only nine children recorded a loss in PSW, while three remained stable, and nine recorded a gain. The children who remained stable or who had gained presumably lost their edema much faster than the others, and had already started to gain weight, at one month. If the average percent gain of the twenty-one children is computed from the lower one month mean PSW, rather than their initial PSW, it is 3.97 PSW, which compares favorably with the non-

edematous children's mean percent gain of 3.09 PSW for the four month period, though the four month mean percent gain of the edematous children is only 2.34 PSW.

To make any comparisons between the Center children and the non-Center children, one must resort to the child health surveys. For the analysis, the Center children were separated into repeaters and non-repeaters for both 1964 and 1969-1970. The samples are fairly small. The means, s,d,'s, and sample sizes for the 1964 and combined 1969 and 1970 surveys are listed in Table VII on the following page.

As would generally be expected, the younger children in 1970 who had previously attended the Center had mostly higher PSW's than their counterparts surveyed in 1964 who had not yet attended the Center. But the samples are far too small to say anything conclusive about any actual change. It also seems true that the PSW's of the repeaters were much lower in 1970 than those of the non-repeaters, perhaps indicating that the repeaters did not benefit by their repeat experience.

Weights in both 1964 and 1969 or 1970 were recorded for sixty-one children who never attended the Center, twenty-four children who attended the Center but didn't repeat, and fourteen children who did repeat their Center stay. Since the distribution of the PSW's of the children in the entire village is assumed to be normal, the distribution of the non-Center children's PSW's would be a truncated normal, as the

TABLE VII

SURVEY RESULTS OF CENTER CHILDREN IN AGE GROUPS

NON-REPEATERS

Age in mo.	1964 Mean	1964 s.d.	1964 N	1969-1970 Mean	1969-1970 s.d.	1969-1970 N
0-11	85.63	11.01	8			
12-23	75.09	7.84	11			
24-35	73.37	5.04	8			
36-47	67.39	7.09	18	79.83	15.59	6
48-59	67.60	2.61	5	71.84	7.37	6
60-71	67.00	3.76	12	71.60	9.34	5
72 & over	65.62	7.65	8	64.21	11.19	49

REPEATERS

Age in mo.	1964 Mean	1964 s.d.	1964 N	1969-1970 Mean	1969-1970 s.d.	1969-1970 N
0-11	83.80	12.28	5			
12-23	69.83	8.84	6			
24-35	63.80	12.70	5	73.00	0.0	1
36-47	66.67	10.12	3	65.25	1.06	4
48-59				56.00	19.80	2
60-71	64.00	0.0	1	59.00	6.02	9
72 & over				52.18	7.03	17

Center children were mostly included in the lower PSW's of the village. Additionally, the distribution of the non-repeating and repeating Center children are completely unknown. It was therefore decided that a non-parametric test was needed to compare the three groups. A Kruskal-Wallis rank test was performed on the percent gains (generally negative) between 1964 and 1970 for the three groups. A corrected H statistic of 2.9095 was calculated, which was only significant at the alpha level of .25. The mean percent gains of the three groups were -15.41 with a s.d. of 12.07 PSW, -12.29 PSW with a s.d. of 14.50 PSW, and -19.64 PSW with a s.d. of 14.28 PSW respectively.

In an effort to remove bias stemming from age and nutritional status in 1964 upon the means, the non-Center and non-repeating Center children between the ages of twelve and forty-seven months in 1964 were divided into two groups each which were above and below 85.5 PSW in 1964. This grouping had the same age distribution in both the Center and non-Center children. The means of the non- Center children were -13.78 PSW with a s.d. of 12.74 PSW and sample of 18 for those below 85.5 PSW, and -18.26 PSW with a s.d. of 14.04 PSW and a sample of 19 for those above 85.5 PSW. The percent gain means for the non-repeating Center children were -10.55 PSW with a s.d. of 14.06 PSW and a sample of 11 for those below 85.5 PSW, and -35.0 PSW with a sample of 1 above 85.5 PSW.

A similar procedure was used to remove age bias when

comparing the non-repeating and repeating Center children's percent gains. The mean percent gains for non-repeating and repeating Center children between the ages of 0 months and 23 months in 1964 were -18.00 PSW with a s.d. of 18.73 and a sample of 9, and -22.33 PSW with a s.d. of 16.46 PSW and a sample of 9, respectively.

Again, because of small sample size, no definite conclusions can be drawn. The difference within the children below 85.5 PSW in 1964 between the loss of the non-Center children and the non-repeating Center children was approximately equal to the percent gain of the Center children while in the Center. The greater losses of the originally better nourished children is disheartening, as is the greater loss of the repeating Center children compared to the non-repeaters. From this small sample, it can only be inferred that the Center children's percent loss was temporarily halted, but not stopped.

Analysis presented in this chapter has indicated the significant effects initial age and nutritional status can have upon the percent gain of a child while in a Center. Moreover, a three month rather than four month Center group may not significantly affect a child's percent gain while in a Center. Other indications are quite subject to sampling bias and require much more further study.

V CONCLUSIONS

It appears that the Mothercraft Center in Fond Parisien made some positive contribution to the health of the children directly affected by it, but at the same time, made no demonstrable changes in the health of the other community children. There are many possible reasons for this, but two important ones are the following. The first is that the data collection may not have been adequate to properly reflect any changes due to the operation of the Center. The second is that the specific Center involved, and the concept behind it, while basically sound, also were probably not as effective as they might have been.

This author suggests that in the future, when data is collected for any Center, additional pertinent information should be recorded, thus enabling one to test for important influences upon the children and the mothers. Most importantly, in any community where there are other sources of change, such as the agricultural enrichment programs in Fond Parisien, a child's contact with these other influences should be recorded whenever he is measured. This recommendation holds both for surveys of all kinds and Center records and follow-ups. In the Center records, height and degree of physical activity as an indication of general emotional state should be recorded regularly along with weight, and illnesses reported upon occurrence. Daily attendance of both children

and mothers should also be reported. And when a child enters the Center, the number and ages of individuals in his family unit, and their basic means of support should be noted.

Besides collecting other pertinent data in addition to weight and age for children, other data could be collected. Every effort should be made to obtain morbidity and mortality data for the community, and censuses rather than surveys of community children. Systematic and complete follow-up of a large group of Center children for three or four years after graduation ought to be attempted. Also the child health census and morbidity and mortality data should be recorded annually for at least three or four years after a Center has closed as well as for three years before the Center has opened. Even with all of this data, though, the educational benefits would only be estimable through the indirect evidence of the children's health trends over a long period of time. Yet this concentrated data collection at a few typical Centers will yield evaluations not possible with less data collected at each of a large number of Centers.

But the Centers themselves probably can also be improved upon. If they regularly included health care, a modicum of education for the children and a higher calorie diet, temporary, and possibly permanent, improvements in the children might be greater. One suggestion for improvement made by Beghin and Viteri (1971), which this author feels could be of great significance, is to include the fathers, besides mothers,

in the nutritional education program of the Center. This seems especially sensible in areas of near-subsistence agriculture.

In the analysis presented in Chapter IV, a few possible improvements of Centers were noted. A systematic comparison and three or four year follow-up on three month and four month Center groups might definitely demonstrate if a three month Center stay is as beneficial as a four month one. The correlation of many factors, besides age and percent gain, with follow-up performance should be investigated further. Important insights into the limits, possible improvements and failures of the Centers might be found by thoroughly investigating the health status and family conditions of Center drop-outs and Center repeaters. And the predictive equations for Center performance proposed in Chapter IV should be tested in other Haitian Centers before they are applied.

Beaudry-Darisme and Latham (1971) used cost-benefit analysis to demonstrate that the cost of recuperating a child in a Mothercraft Center was higher than generally believed. Other nutritional recuperation and education programs, such as supervised supplementary feeding, may be less expensive, and should be thoroughly investigated.

In all liklihood, improved Mothercraft Centers can be shown to fill a definite position in a program to alleviate malnutrition. But without proper data collection and evaluation, its benefits and limitations will not be clear. Though

great commitments of time, money, and manpower might initially be required to obtain and evaluate this data, these commitments would help in preventing the misallocation of already limited resources, besides effectively helping the malnourished.

TABLE VIII

ANALYSIS OF COVARIANCE TABLE FOR PERCENT GAIN IN CENTER GROUPED BY SEX WITH AGE AS COVARIATE

Source	df	YY	Sum Sq. Due To	Sum Sq. About	df	Mean Sq.
Between	1	51.03				
Within	205	3626.22	149.35	3476.86	204	17.05
Total	206	3677.24	170.82	3506.42	205	
Numerator for F statistic						29.55

$F(1, 204) = 1.734$ n.s.

TABLE OF COVARIATE AGE

Computed From	Coefficient	Stand. Error	t Statistic
Within	0.0455	0.0154	2.9602**
Total	0.0482	0.0153	3.1602***

**: Significant at alpha level of .005

***: Significant at alpha level of .001

TABLE IX

ANALYSIS OF COVARIANCE TABLE FOR PERCENT GAIN IN CENTER GROUPED BY GOMEZ CLASS WITH AGE AS COVARIATE

Source	df	YY	Sum Sq. Due To	Sum Sq. About	df	Mean Sq.
Between	2	320.86				
Within	209	3558.99	92.19	3466.80	208	16.67
Total	211	3879.85	183.35	3696.50	210	
Numerator for F statistic						114.85

$F(2, 208) = 6.891$ **

TABLE OF COVARIATE AGE

Computed From	Coefficient	Stand. Error	t Statistic
Within	0.0363	0.0155	2.3518*
Total	0.0495	0.0153	3.2274***

*: Significant at alpha level of .025

**: Significant at alpha level of .005

***: Significant at alpha level of .001

TABLE X

ANALYSIS OF VARIANCE TABLE FOR PERCENT GAIN IN CENTER

Source	df	Sum Sq.	Mean Sq.
Between	5	274.02	54.80
Within	206	3605.93	17.50
Total	211	3879.95	

$F(5, 206) = 3.1309$ *

*: Significant at alpha level of .10

TABLE XI

ANALYSIS OF COVARIANCE TABLE FOR FOURTH MONTH PSW IN CENTER GROUPED BY AGE WITH INITIAL PSW AS COVARIATE

Source	df	YY	Sum Sq. Due To	Sum Sq. About	df	Mean Sq.
Between	5	669.56				
Within	206	16294.94	12927.80	3367.14	205	16.43
Total	211	16964.50	13427.81	3536.69	210	
Numerator for F statistic						33.91

$F(5, 205) = 2.065$ *

TABLE OF COVARIATE INITIAL PSW

Computed From	Coefficient	Stand. Error	t Statistic
Within	0.8673	0.0309	28.0549***
Total	0.8530	0.0302	28.2367***

*: Significant at alpha level of .100

***: Significant at alpha level of .001

TABLE XII

REGRESSION OF THIRD MONTH PSW IN CENTER (Y_3) ON INITIAL AGE (X_1) AND INITIAL PSW (X_2)

$$Y_3 = 10.1422 + .0210\ X_1 + .8754\ X_2$$

ANALYSIS OF VARIANCE TABLE FOR THE REGRESSION

Source	df	Sum Sq.	Mean Sq.
Due to	2	13652.96	6826.48
About	204	2776.03	13.61
Total	206	16429.00	

$F(2, 204) = 501.65$ ***

$R^2 = 0.8310$

TABLE OF INDEPENDENT VARIABLES

Var.	Mean	s.d.	s.e. of Coef.	t Stat	r
X_1	43.362	18.876	0.014	1.474*	0.103
X_2	65.286	9.422	0.028	30.671***	0.907

*: Significant at alpha level of .100

***: Significant at alpha level of .001

TABLE XIII

REGRESSION OF FOURTH MONTH PSW IN CENTER (Y_3) ON INITIAL AGE (X_1) AND INITIAL PSW (X_2)

$$Y_4 = 11.2686 + .0254\ X_1 + .8586\ X_2$$

ANALYSIS OF VARIANCE TABLE FOR THE REGRESSION

Source	df	Sum Sq.	Mean Sq.
Due to	2	13058.44	6529.22
About	204	3239.81	15.88
Total	206	16298.25	

$F(2, 204) = 411.12$ ***

$R^2 = 0.8012$

TABLE OF INDEPENDENT VARIABLES

Var.	Mean	s.d.	s.e. of Coef.	t Stat	r
X_1	43.362	18.876	0.015	1.648*	0.115
X_2	65.286	9.422	0.031	27.843***	0.890

*: Significant at alpha level of .10

***: Significant at alpha level of .001

TABLE XIV

REGRESSION OF SIX MONTH FOLLOW-UP PSW (Y_6) ON INITIAL AGE (X_1), INITIAL PSW (X_2) AND PERCENT GAIN (X_3)

$$Y_6 = -3.6321 - .0661\ X_1 + 1.0662\ X_2 - .5663\ X_3$$

ANALYSIS OF VARIANCE TABLE FOR THE REGRESSION

Source	df	Sum Sq.	Mean Sq.
Due to	3	3335.46	1111.82
About	40	1215.61	30.39
Total	43	4551.06	

$F(3, 40) = 36.58$ ***

$R^2 = 0.7329$

TABLE OF INDEPENDENT VARIABLES

Var.	Mean	s.d.	s.e. of Coef.	t Stat	r
X_1	34.114	14.905	0.061	-1.081n.s.	-0.168
X_2	69.520	7.282	0.123	8.637***	0.807
X_3	2.407	3.883	0.223	-2.538**	-0.372

**: Significant at alpha level of .01

***: Significant at alpha level of .001

TABLE XV

REGRESSION OF ONE YEAR FOLLOW-UP PSW (Y_1) ON INITIAL AGE (X_1), INITIAL PSW (X_2) AND PERCENT GAIN (X_3)

$$Y_1 = 8.5470 - .1144\ X_1 + .9025\ X_2 - .4779\ X_3$$

ANALYSIS OF VARIANCE TABLE FOR THE REGRESSION

Source	df	Sum Sq.	Mean Sq.
Due to	3	3651.25	1217.08
About	63	2975.56	47.23
Total	66	6626.81	

$F(3, 63) = 25.77$ ***

$R^2 = 0.5510$

TABLE OF INDEPENDENT VARIABLES

Var.	Mean	s.d.	s.e. of Coef.	t Stat	r
X_1	43.701	19.697	0.047	-2.452**	-0.295
X_2	69.628	7.096	0.130	6.964***	0.659
X_3	3.403	4.295	0.209	-2.289*	-0.277

*: Significant at alpha level of .025

**: Significant at alpha level of .01

***: Significant at alpha level of .001

TABLE XVI

REGRESSION OF ONE YEAR FOLLOW-UP PSW (Y_1) ON INITIAL AGE (X_1), INITIAL PSW (X_2) AND THIRD MONTH PSW (X_4)

$$Y_1 = 5.3625 - .1159\ X_1 + .2169\ X_2 + .7213\ X_3$$

ANALYSIS OF VARIANCE TABLE FOR THE REGRESSION

Source	df	Sum Sq.	Mean Sq.
Due to	3	3671.93	1223.98
About	63	2954.88	46.90
Total	66	6626.81	

$F(3, 63) = 26.10$ ***

$R^2 = 0.5541$

TABLE OF INDEPENDENT VARIABLES

Var.	Mean	s.d.	s.e. of Coef.	t Stat	r
X_1	43.701	19.697	0.046	-2.511*	-0.302
X_2	66.076	7.478	0.227	0.957n.s.	0.120
X_4	69.489	6.772	0.246	2.927**	0.346

*: Significant at alpha level of .01

**: Significant at alpha level of .005

***: Significant at alpha level of .001

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A STATISTICAL ANALYSIS OF A HAITIAN MOTHERCRAFT CENTER

by

Karla VanMeter Cengel

(ABSTRACT)

Mothercraft, or Nutritional Rehabilitation, Centers have been instituted throughout the Third World, in order to aleviate malnutrition in preschool populations. Analysis of Centers, however, is complicated by problems with evaluative methods. There is controversy over the best measure of a child's nutritional status, while confusion has also arisen from the use of static methods for dynamic data. And this author noted that maintenance of any certain Percent Standard Weight (PSW) is often wrongly interpreted as a 100 Percent Standard Weight Gain.

From 1964 through 1969, when the Center in Fond Parisien was operating, agricultural improvement programs were also being conducted there. Improvements seen in the nutritional survey could not, therefore, be credited to any single program. The community child health survey indicated that the health of the preschool children who never attended the Center worsened during this period. But both surveys were subject to sampling bias, and no clear conclusions could be drawn.

Fond Parisien Center data indicated initial age and PSW as statistically significant influences on the percentage points a child gained in his PSW (percent gain). Regression

equations based on these two variables were found to predict the percent gain after three and four months in the Center. Indications from this data are that most children do not profit in their percent gain from a fourth month in the Center. Follow-up data was inconclusive. Comparisons between non-Center and Center children indicated no long-term benefits of the Center. Detailed long-range study of a few Centers is needed.