
ORIGINAL ARTICLE

Comparison of Nutritional Results of Clinic
Based and Village Based Weighing
Programs*

by

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Abstract

1. Weighing programs for young children, whether based in clinic or the village, run by health professionals or trained laymen, give comparable results to improve child nutrition.

2. When carried out in the village, participation of village mothers, particularly the poor and underserved is far more likely to give greater coverage to this nutritional activity.

3. In view of the drop in percent standard weight during the first year of life greater attention should be placed on this period in all nutrition programs.

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4. *In addition to weighing each month, the village Taman Gizi where mothers prepare and feed a nutritious meal to their children is a useful educational device and should be encouraged in all villages. Government assistance in establishment of Taman Gizi is desirable but should, from the outset, require a level of participation by the community that will eventually result in total selfreliance in this activity.*

5. *Distribution of dried milk powder which can be used in child feeding bottles should be discontinued both in the health center and the village. Dried milk mixed with a cereal would be an acceptable food supplement to offer to children not gaining weight in clinic or village programs.*

6. *The basic elements of a national nutrition program should include :*

- a. *monthly weighing and the use of KMS as a communication and motivation tool for mothers,*
- b. *communal preparation of food and other educational activities in a Taman Gizi aimed at behavioral change to bring about greater attention to feed more and better food to children, especially under two years age, and,*
- c. *participation and independence of the community should be stimulated from the outset, not only to make the program more affordable but also to assure its continuation in the village.*

Introduction

The growth of a child, graphically displayed as body weight, has been found to be the best indicator of health in children under 5 years of age. Pediatricians and nutritionists are widely of the opinion that monthly weighing of each child should form the basis of any well child care program.

Until several years ago, child weighing was exclusively carried out in MCH clinics where mothers brought their children to be weighed by medical personnel, who examined the child and gave advice on health and nutrition at the same time. In the last several years, various programs have developed in which children are weighed in their own village leading to a far greater coverage of "under five" children. This village based activity has been carried out by simply trained paramedic workers like Family Planning workers (PLKB) or, in many cases, by mothers themselves who had been trained as Kader Gizi (Rohde et al., 1975). The use of the simplified weightchart, Kartu Menuju Sehat (KMS), has assisted in this process of decentralizing weighing activities. Using the KMS and its colorful display of a series of normal weight curves, the mother can readily see the trend in growth to her child regardless of who has weighed him. The aim of weighing programs for under five, is more than just knowing about growth of the child. This close attention to growth is linked to discussion among the mothers about improved

feeding for their child and daily attention is encouraged to result in a more rapid gain in body weight.

The aim of this study was to compare the nutritional impact of weighing programs carried out in the Health Center and in the village either by trained health worker or the mothers themselves as Kader Gizi. In the MCH center, weighing and advice are given by a professional worker usually mid-wives, providing face-to-face education and usually the additional provision of dried skim milk, a World Food Program contribution which is used predominantly to encourage attendance at the clinic. In the village, the PLKB who has received only passing training in nutrition and child care, plays a facilitating role in the weighing activities. She provides specific advice as directed from the Health Center, and in addition in some cases may provide to selected undernourished children, small amounts of WFP dried skim milk. In addition, she encourages the regular gathering of mothers to prepare a nutritious meal in the setting of one village home, called the Taman Gizi. At least in the initial stages, the cost of the food for Taman Gizi is paid for by the government with the hope that this will continue as an independent village effort.

Kader run weighing programs are by far the most economical, being run by volunteer women of the village who have been trained by the Health Center staff in weighing, filling the weight-chart, specific nutritional instruction, and or-

ganizing and running their own Taman Gizi based on money or food materials raised from amongst the community itself. No free food or milk is provided. The extremely low cost of this approach makes it affordable virtually universally.

The purpose of this study is to compare the results of these three approaches to nutritional improvement and to investigate which appears to be the most cost-effective way of providing nutritional and well baby services to large, village populations.

Materials and Methods

The study was based in villages in Kawedanan, Karangobar, Kabupaten Banjarnegara, Central Java during late 1978. The area is mountainous, dry land and classed as a poor area in a poor kabupaten. In 1976, the daily per capita income was estimated at Rp. 32, 25% are illiterate and only 13% have attended schools beyond primary school. The vast majority are farmers, eating cassava and corn as their main diet. Many must eat kana (garut) as a substitute for the basic food when harvests are low. A 1976 IPB survey showed that average calorie intake was 1900 calories per day and protein 25 grams of which only one was animal protein. (Suwandono, 1977). Recommended allowances by the Nutrition Directorate of Indonesia are 2100 calories and .45 gm protein (Nutrition Research and Development Center, 1978).

Children selected for inclusion in this study were those under five years of age, newly entered into one of three weighing programs: MCH, PLKB, or Kader. Only those who came to 3 or 4 weighing sessions in four consecutive months were used in this analysis. Any reporting illness during this time period were excluded. Weights were recorded directly on KMS which became the basic tool for recording study data as well as educating mothers. Children attending the MCH clinics received personal advice and 250 grams of dried skim milk, each time they came. The PLKB-run village program received government assistance for a monthly Taman Gizi plus 250 grams of milk for selected children whose body weight was below 80% of Harvard standard. The program was combined with motivational activities related to Family Planning in the village. The Kader group was organized by village mothers who have been trained for 2 weeks by the Puskesmas doctor. All nutrition education was given by mothers themselves and a Taman Gizi was established monthly using village raised funding.

Body weights were noted to the nearest $\frac{1}{10}$ kilograms, and expressed in percent of Harvard standard to allow comparison between age groups. Change in body weight over the course of 4 consecutive months and provision of milk was recorded for each child. Data was analyzed on the UGM UNIVAC computer using Portstat programs.

Results

The number of children analyzed from each weighing program, their age range, mean age and results of weighing, expressed in percent of Harvard standard, are shown in Table 1. A total of 151 children were analyzed with mean age of 19 months. To allow comparison of body weight between ages, all weights were expressed as percent of the Harvard standard as suggested by the Indonesian National Meeting on Anthropometric Standards in Nutrition (Lokakarya Anthropometri Gizi, 1975). Change in body weight in each group is expressed in kilograms over the three month-course of the study. Change in percent of Harvard standard is also shown. The small differences in body weight and weight gain are not significant between the groups. Although, the average weight-gain over three months was 150 grams this represented a net-fall in standard weight of roughly 2%.

In Table 2, weight change is expressed by age group. It can be seen that the major fall in percent of standard weight occurs in the youngest age groups, while children above 1 year demonstrated a slight improvement in body weight standard. Thus the greater fall in percent body weight seen in MCH clinic cases most likely reflects the younger age of these children.

Weight percentile by age is shown in Figure 1, where it can be seen, as previously shown in numerous other stud-

es, that Indonesian children are born with weights close to the Harvard standard but drop rapidly during the first year of life towards the value of roughly 80% of the standard (Rohde, 1974; Sri Kardjati et al., 1977, 1978). While this fall in body weight percentage continues in most studies till age 2 - 3 years, it is notable that in this study this decline appears to have been arrested by the age 1 year after which growth continued at a rate equal to or slightly better than the Harvard standard. Thus, children participating in the weighing programs tended to loose relative weight only in the first year but showed normal growth thereafter. Although, the graph in Fig. 1 is clearly curvilinear it can be analyzed by a simple linear regression which gives an equation $Y = 94.1 - 0.55 X$, where Y equals body weight and X = age in months. Thus, the new born is roughly 94% of the standard and his weight for age declines at 0.55% of the standard for each month of growth. Even with a fall of this magnitude in the 1st year, the child would be roughly 87% of standard at 12 months of age. The children in this study had a far greater fall during the 1st year but it should be noted that the study occurred as a cross-sectional one, and no children were involved from birth.

Table 3 shows the growth in body weight and percent body weight in groups receiving milk and no milk. Overall, there is no difference in growth between the 42 children who received milk and 109 who did not. A comparison of mal-

TABLE 1: *Nutritional Status and Weight Gain over Three Months in Children Attending Clinic or Village Weighing Programs*

	Total Children	Age in Months Range	Months average	First weight % Harvard	Last Weight % Harvard	Weight Change Kg	% of Standard
Kader	25	1 — 51	20	84.6	82.0	0.6	-2.6
PLKB	110	1 — 54	18.8	82.0	80.7	0.73	-1.3
MCH	16	1 — 40	15.6	83.8	80.8	1.0	-3.0
Total	151	1 — 54	18.7	82.8	80.9	0.74	-1.9

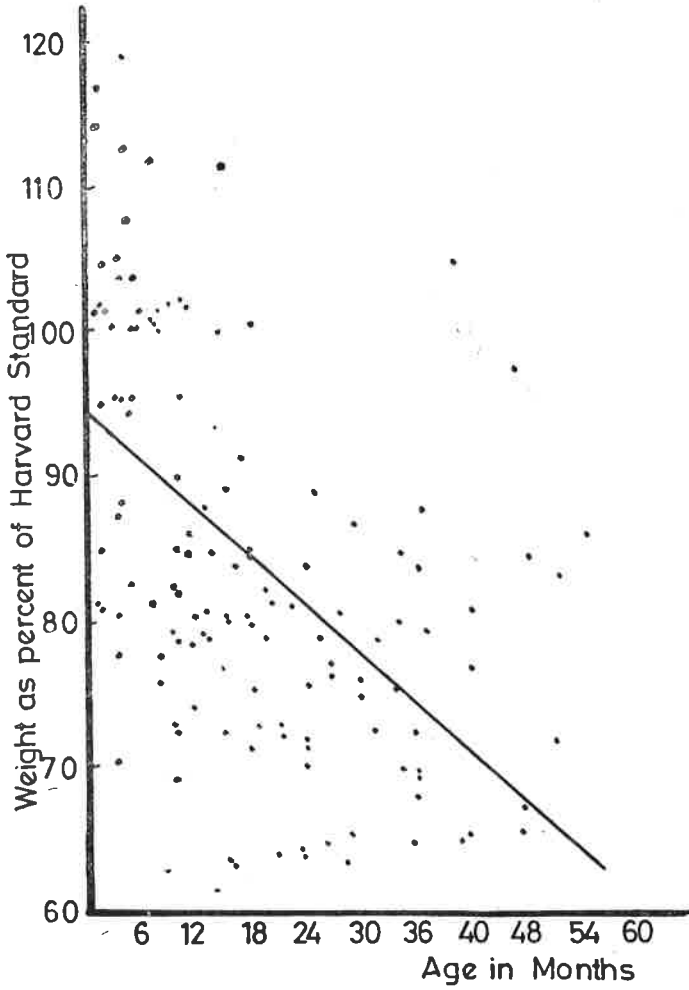
TABLE 2: *Three — Month Weight Gain by Age of Child at Entry to Program*

Age in month	Number of children	Change in Weight Kg/3 months	Mean Change in Weight % Standard
0 — 3	18	1.46	— 9.5%
4 — 6	14	0.82	— 8.1%
7 — 12	28	0.6	— 2.3%
13 up	91	0.6	+ 1.0%
1 — 54	151	0.74 kg	— 1.9%

TABLE 3: *Three — Month Weight Gain in Children Given Free Milk or No Milk*

Milk Supplement	n	All Children			Malnourished			Well nourished		
		Change in Weight Kg	% Std.	n	Change in Weight Kg	% Std.	n	Change in Weight Kg	% Std.	n
Milk	42	+ 0.6	— 2.2	12	+ 0.7	+ 2.7	3	+ 0.7	— 17	
No milk	109	+ 0.8	— 2.2	19	+ 1.0	+ 4.2	36	+ 0.9	— 6	

FIG. 1: *Weight for Age Expressed as Percent of Harvard Standard*
 Weight as Percent of Harvard Standard



Age in Months Linear regression line : % Weight = 94.1 — 0.55 age

nourished children (those with body weights below 70% of Harvard standard) reveals that both milk recipients and non-recipients had positive growth in both body weight and percent standard body weight over the course of the study. Interestingly, those receiving milk had substantially less growth than those with no milk. The well nourished group (those greater than 90% of body weight) had only 3 who received milk but this is interesting to note that their growth both in terms of absolute weight and percent of standard weight was less than those well nourished children who did not receive milk.

Discussion

As shown in Table 1 the number of children coming to MCH clinic for regular weighing is extremely small. Three reasons appear to underlie this under-utilization :

1. At the MCH clinic a mother must pay similarly to receiving treatment at the poly-clinic,
2. The MCH clinic is considered by mothers a place to take the child only when he is sick,
3. The clinic is open only limited times and located far from the village making attendance difficult and even expensive for mothers,
4. Mothers consider the alternative of weighing the child in the village far more easy and practical.

While the results of weighing in MCH appear to have been accompanied by the greatest fall in percent standard weight. This clearly reflects the younger age of children attending these clinics and it can be safely stated that results of child growth are equal between all three weighing programs.

Growth data from a number of studies in Indonesia have shown that children grow close to the Harvard standard for the first three to four months of life after which they deviate progressively downward from that standard until two and a half to three years of age after which they grow parallel with the standard once again. In this study a similar pattern is seen throughout the first year but it is important to note that children participating in the weighing program appeared to parallel the growth of the Harvard standard once they had passed the age of twelve months. The slope of the linear regression curve of body weight percentage with age shows that these children lose 0.55% of standard per month. If this fall could be arrested at one year of age and growth continue parallel to the Harvard standard after that, the average child would weigh more than 85% of this standard, a substantial improvement over the present mean of less than 80%. To accomplish this, far greater attention to growth in the first year should be given. In order to intensify nutrition activities for this age group, the weanling age, it would be best to limit nutrition activities to

children 0-24 months in an effort to assure optimal growth at this age. It appears likely that relatively good growth would occur automatically in older age groups. While the influence of genetic factors on growth are clearly important in the adolescent age groups most studies have shown that racial differences are relatively minor in the early age groups and that environmental factors are the major determinants of growth in the young (Habicht et al., 1974).

With regular monthly weighing and effective nutrition education activities, such as Taman Gizi, coupled with improved health through immunization, clean environment, and early treatment of disease, it appears likely that Indonesian children can be assured of improved nutrition even in their village environment. It is notable in this study as well as others that while some children are indeed malnourished, a substantial portion of children from the same community are well-nourished and healthy, indicating the possibility of sustained growth in this environment. Regular weighing and nutrition education activities based in the village can assure this growth for a larger portion of the children.

There is still a strong belief in many professional quarters as well as among laymen that dried milk powder is of particular importance for improving nutritional status of children. From table 3 it can be clearly seen that the ad-

dition of milk is not associated with any improved nutritional status at least over a period of three continuous months and that it may account for a relative decline in nutrition of those receiving this supplement. Weight gain amongst both malnourished and normally nourished children was less amongst milk recipients. Those malnourished children receiving no milk had an improvement in body weight for standard of 4.2% in comparison to 2.7% for those receiving milk. Because the group was not strictly randomized it is impossible to attribute this difference to the milk alone but it appears likely that those children malnourished who did not receive milk were given greater attention for their nutritional needs through the Taman Gizi and daily feeding at home. The comparison of well-nourished children, although only 3 received milk, supports this impression. Overall the provision of milk gave no measurable nutritional benefit in this community.

In spite of instructions to the contrary, almost all dried skim milk supplied from World Food Program is given to the child in a feeding bottle. Interviews with these mothers showed that they tend to breastfeed less frequently and indeed many indicated that breastfeeding stopped entirely after the provision of milk. Their attention to milk feeds resulted in a belief among mothers that other foods were not important for their child as long as the child was receiving bottle milk. Previous studies have shown

close association between bottlemilk and frequency of diarrhea (Kanaaneh, 1972) and heavy contamination of bottles have documented in this society (Suryono et al., 1980). Although we made no attempt in this study to record the incidence of diarrhea it seems likely that this may have contributed to the results in the milk recipient group.

We should emphasize that although this study would indicate that milk has no particular benefit and may be detrimental, that it is probably related to both the way in which it is used and the attitudes of village mothers towards the milk in relationship to the total diet of the child. If milk were provided in a form in which it could not be placed in the bottle, such as mixed with flour

to form an easily made baby weaning cereal, it could well enhance rather than detract from the nutrition program. Monthly weighing could detect when children begin to deviate from a normal growth pattern and the Taman Gizi could provide samples of this cereal based on milk fortified weaning food as well as a demonstration to the mothers on how to make their own in their home on a daily basis. The provision of weaning food could be based entirely on weight gain and not weight for age of the child with the aim of continuous growth throughout the first year. By carrying out the weighing themselves mothers better understand the meaning of growth and can motivate and evaluate each other as the village program continues.

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