NFI BULLETIN
Bulletin of the Nutrition Foundation of India
July 1992 Volume 13 Number 3

Growth Charts in Primary Child-Health Care: Time For Reassessment

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Over seven years ago, the Nutrition Foundation of India had brought out its publication: "Use of growth charts for promoting child nutrition — A review of global experience"[1]. That publication, while recognising the merits of growth-monitoring in appropriate selected situations, sounded a note of caution against pushing growth-monitoring as a universal, essential component of the child-health care package at the primary and domicilary levels. The enormous expenditure in time (training and service), and money involved in an operation, which at best could make no more than an indirect contribution to the promotion of child-health, was pointed out; as also the fact that given the ground realities, this expenditure could often prove to be infructuous and wasteful. We had elaborated this viewpoint in subsequent publications of the Foundation.[2,3]

Our point of view was, of course, not in consonance with the general support that was then being extended to the introduction of growth-monitoring on the public health scene, and ran counter to the optimistic reports of enormous "benefits" that growth-monitoring was claimed to be conferring on poor children around the world. During the last decade, millions of dollars worth of weighing scales manufactured in Europe, had been shipped to Africa and Asia; and several thousands of man (woman) - hours of health personnel in developing countries had been expended on this operation.

With what result? There are apparently many who have begun to ask this question now. There is, at long last, a genuine desire for an objective and sober reappraisal of the place of growth-monitoring in *primary* child-health care.

SOME BASIC FACTS

It may be useful, at the outset, to re-state the obvious. It is clearly not, (and indeed it cannot be) anybody's case that periodic weighment of children can, by itself, bring about improvement in child-health/nutrition. Weighments cannot obviously confer any direct biological benefit. All that can be claimed is that they could prove useful in facilitating (and possibly in providing support and direction to) those measures which could directly and positively contribute to the betterment of the nutritional status of children.

It is necessary to remind ourselves of this basic fact for, in quite a few of the reports which have claimed "success" for "growth-monitoring", the criterion of that success has been no more than that the workers who had been trained for the job at considerable expense, were found able to record weights accurately, and plot them correctly on the chart. What these reports fail to tell us, however, is whether such success with respect to weighment was necessarily reflected in better success with respect to improvement in child-health/nutrition; and more importantly, whether successful weighment was found to be a necessary and essential prelude to successful child-health promotion.

THE CENTRAL ISSUE

It is possible that in adequately staffed (MCH) clinics, and in select project-situations, where time and resources permit, longitudinal measurements of growth of individual children could be a useful tool for promotion of child-health/nutrition. The issue that needs to be addressed here, however, is whether the injection of growth-monitoring of individual children in poor communities around the world, as a universal, integral and central feature of public health programmes of Primary Child-Health/Nutrition Care (including domicilary health care), has proved to be a wise and feasible strategy.

In discussing this issue, we do not propose to attempt an exhaustive review of all publications on growth-monitoring subsequent to our earlier publications of 1985 [1,2,3]! The purpose will be served by a critical examination of just a few selected recent publications. We start this discussion with two recent papers, one by Shekar and Latham[4] in 1992, and the other by Nancy

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Gerein[5] in 1988. Between themselves, these papers have tried to articulate practically all arguments on both sides of the issue. Shekar and Latham present an optimistic picture, in justification of weighment as an integral component of child-health care, while Nancy Gerein[5] raises doubts about the validity of this strategy and asks, "Is it worthwhile?"

Shekar and Latham[4], on the basis of analysis of selected data from the Tamil Nadu Integrated Nutrition Project (TINP), have concluded that "growth-monitoring (as proxied by regularity of weighing) in TINP, was associated with improved child nutritional status". The "growth-monitoring" they refer to was not just the weighment operation alone, but the entire package of services that went with it in TINP. The authors claim that the evidence shows that "the benefits of growth-monitoring exist over and above those of supplementary feeding" — the evidence for this conclusion apparently being that even those children who did not receive the supplement as part of the package also benefitted. Even in this latter case, the growth-monitoring they refer to was not the isolated weighment operation but included the education and advice components of the package, though not the supplement.

The paper of Shekar and Latham thus fails to come to grips with the crucial question as to whether, if the weighing operation had been totally left out of the package leaving all other components in place, the result would have been any different. It may be legitimately argued that if the workers had spent the same amount of time they had spent with each family without being called upon to carry out weighment and charting, they could have given an additional 10 minutes to each family at each visit for the purpose of education, advice and direct help. The result in terms of improvement in child-health/nutrition may have been far more gratifying. Where success of the worker is measured by the supervisor, on the basis of the accuracy of the weighings and "plottings", it is reasonable to expect that the worker would give more time and attention to ensure the correctness of her weighing operation rather than on the all-important follow-up action which does not easily lend itself to achievement audit.

A large chunk of the time for training village-level workers and supervisors in TINP, which Shekar and Latham had investigated, had been devoted to train them in the mechanics of weighments and growth charting (three months). If this time had been devoted to training, providing information, and imparting skills with respect to:

- practical ways by which diets in poor households could be improved with the existing foods available in the villages and within the reach of the poor (regional and seasonal diet calendars);
- methods of preparation of nutritious recipes for weaning diets in children in poor households;
- developmental programmes at the village level and how best they could be availed of for maximal advantage;
- available opportunities for mothers to obtain vocational training in income-generating occupations;
- how and where family planning services could be availed of; and, most importantly,
- how to win the confidence and continued cooperation of the village community — the results could have been far more gratifying.

HOW ESSENTIAL ARE GROWTH CHARTS?

A legitimate, and a truly compelling, case for weighment as an essential and indispensable component of the child-health care package can arise only if it is clearly demonstrated that in the absence of the weighment and charting operation, it will just be impossible to deliver the other components of the package. No paper which has claimed success for growth-monitoring has demonstrated this. It cannot be seriously argued that without the benefit of a growth chart the worker will not know what advice to give. After all, over 85 per cent of the children in poor communities, in the regions where growth-monitoring is now being recommended, suffer from undernutrition and growth-retardation of varying degrees.

The nature and the causes of such undernutrition are fairly uniform and are known to all health workers of a given region. Is it necessary to measure the order of growth-retardation at a given point of time with mathematical precision in each individual case, and at each point of time, in order to give meaningful advice? Is the advice going to be so rigorously "case specific" like, say, deciding on the dosage of a potent drug for a case suffering from an acute disease, that an elaborate diagnostic exercise must precede the advice? These are not academic questions — certainly not for poor countries which are struggling to find out how the meagre resources available to them for child-health care programmes could be optimally deployed for maximal benefits accruing. It cannot be argued that without weighing and without the aid of growth charts mothers cannot be motivated. There are undoubtedly situations in poor countries where workers, not having access to sophisticated weighing scales, have achieved significant improvements in child-health/nutrition among poor communities, but these experiences have not been properly documented.

Nancy Gerein[5] has concluded that "taking into account the low sensitivity and specificity of anthropometry inaccuracies in weight measurements, low and non-representative coverage, and the high incidence of growth-faltering in young children, the benefits of using growth-monitoring as a screening mechanism appear to be few". The main potential appears to be as a catalyst for action on the part of "the mothers, community and health service".

EXPERIENCE IN NATIONAL PROJECTS

Unlike TINP, Integrated Child Development Services (ICDS), is a national programme which reflects prevailing ground realities more faithfully. An assessment report[6] of the ICDS programme in India states that growth charts were "maintained only in 51 per cent of *anganwadis*: though all *anganwadi* workers had been trained in growth-monitoring, only 46.3 per cent were found "good" with respect to weighing, 30.2 per cent with respect to age-assessment, 36.9 per cent with respect to plotting weights and 32.2 per cent with respect to interpretation". Tara Gopaldas *et al*[7], on the basis of examination of data covering 3,704 children under six years of age, in India's ICDS programme found that "almost half the children had never been monitored" and that another 25 per cent were "monitored inadequately".

Very few mothers (1 per cent) could interpret growth charts. "Analysis of covariance of the effect of growth-monitoring (GM) on weight for age and

morbidity, controlling for socio-economic status and other programme services, showed that GM did not have an impact on the nutritional health status of children!" Tara Gopaldas also quotes Abel[8], Director of the RHUSA project in India as having concluded that "growth-charting or monitoring did not have any additional benefit in improving the health of pre-schoolers who were covered in the RHUSA project".

What all these reports show is that health workers elaborately trained in growth-monitoring and charting, often find themselves unable to carry out this operation in a considerable proportion of children in the community. What is far more disturbing is, that, in a good proportion of cases where growth-monitoring had been undertaken, the accuracy of the data was in doubt, implying that instead of providing correct guidance and direction, they could have actually contributed to misleading workers and mothers. These ground realities should not be pushed under the carpet. Whether a tool, no doubt good in a few hands but poorly used and therefore potentially misleading in many others, can be safely injected into a large-scale public health operation, especially if it is not found to be absolutely essential, is an important point for consideration in this regard.

OPERATIONAL CONSIDERATIONS

In the ultimate analysis, the only three major (preventive) interventions that can be attempted by child-health workers serving poor communities are:

- Advice and education regarding appropriate diets and 'health' practices.
- Immunisation; prompt diagnosis and treatment of infections; ORT in diarrhoea.
- Supplementary feeding in selected situations with available resources.

For these three interventions, data generated by growth-monitoring can no doubt prove useful but they are not essential. Interactions with the families and information regarding their prevailing dietary and living conditions, health practices and even a close look at the children and their mothers could provide leads for action and for deciding on priorities and identifying items needing special emphasis. Discarding growth-monitoring of individual children in the course of domicilary visits will give the worker sufficient time to provide such advice in a relaxed manner, without unnecessary distraction.

Quite often, advice and education have to be given to groups of mothers rather than to individual mothers in separate households. This approach will not only be less time-consuming, but will also be advantageous in that it will provide opportunities for mutual reinforcement among participants of the group; the less resourceful and knowledgeable in the group would receive support and encouragement from the relatively more successful and resourceful ones. In such an exercise, growth-monitoring of individual children may not be necessary or feasible.

As for supplementary feeding, where resources are limited, it will be wise and prudent to target the supplements to communities of children identified by cross-sectional anthropometric studies as being the most depressed, and needing priority attention. This will be a far more sensible and feasible targetting approach than that of identifying individual candidates from within each community on the basis of evidence of extreme and persistent growth-retardation, as in the TINP. The latter ("clinical and therapeutic" rather than "public health") approach is an exercise in "nutritional brinksmanship" and in promotion of "child survival" rather than of "child-health".

It is gratifying that ICDS has chosen to follow the pragmatic policy of offering supplements to all needy children who to visit the anganwadi as a means of promoting regular attendance of mothers instead of resorting to the rigid unrealistic approach of TINP. After all, supplements, at best, supply no more than a third of the daily food requirement, and that too, for only part of the year. An expensive and elaborate selection process for this purpose would not be cost-effective. There is no evidence that the overall expense on supplementary feeding per community of 100 or 1,000 under-fives in ICDS has been greater than in TINP; if the cost of the elaborate and tedious 'selection process' in TINP is also taken into account, the ICDS strategy may turn out to be far less expensive.

During the last few years, vigorous efforts have been mounted to incorporate growth-monitoring into the primary child-health care systems of poor developing countries. Entire training programmes and work schedules were being moulded and modified to facilitate such incorporation. The introduction of growth-monitoring as an essential part of primary child-health care operations in developing countries must have, no doubt, been well-intentioned. But now that the limitations of this approach have become manifest, a reconsideration and revision of this strategy is called for.

All this is not to deny that growth-measurements have an important place in nutrition/health programmes. There is undoubtedly a place for cross-sectional growth measurements to assess the nutritional status of children in different locations and to evaluate the impact of interventions at different points of time in a given location. There is also a place for growth-monitoring (longitudinal growth measurements) in clinics and special situations where facilities, expertise, and financial resources for meaningful growth-monitoring exist. What is in doubt, however, is whether the universal injection of growth-monitoring *of the present elaborate pattern,* as an essential ingredient of *all* primary child-health care operations, is wise and realistic.

SIMPLIFIED GROWTH-MONITORING

We are certainly not arguing here for a total abandonment of growth-monitoring in child-health care programmes. We must, however, be careful not to blow up growth-monitoring operations to such an elaborate, expensive and time-consuming level that they become counter-productive. On the basis of experience gained thus far, the following suggestions are in order.

- Growth-monitoring should not be allowed to dominate child-health/nutrition operations as a compulsory, time-consuming ritual. Weighments need to be carried out only in MCH and *anganwadis* (ICDS) centres and not in individual homes during home visits by health workers. Even in these centres it may not be necessary to carry out weighments each time the child visits the centre. Two measurements in the course of the year for children and quarterly measurements for infants should be adequate to provide leads for action. Severely malnourished children should be directed to clinics or

rehabilitation centres (if any), where more intensive growth-monitoring, with other interventions may be justified.

● Plotting the weight data on charts could be totally done away with. This will save several reams of coloured graph sheets; avoid numerous misleading errors in plotting graphs, and a great deal of paper-work; and, in addition, also save a lot of time and money. All that the worker will then need to do, is to record on the child's health-card the following data: date of weighment; actual weight; and the "nutritional grade". The last item of information can be easily derived by the worker from a table that can be provided to her (as to all workers), in which the ranges of weight/age and the corresponding "grades" of malnutrition (Gomez or IAP scale) are set out.

The assumption that all village-level workers, let alone the villagers themselves, can comprehend the X and Y axes, and graphic representations of growth data, has proved erroneous in many cases. It may be wrong to assume that a mother will be more effectively motivated by a sloping line on a coloured chart (which she does not understand) rather than by the simple information from the health worker that her child is only in the second and third "grade" of health/nutrition instead of being in the "normal" grade.

Growth-monitoring thus shorn of its current, colourful, but expensive and cumbersome trappings, may prove more feasible and less misleading even in the hands of workers of average abilities, and may merit a legitimate place in primary child-health care.

Based on a paper prepared for the colloquim on "Growth Promotion for Child-development" in Kenya (May 11-13)

References

1. Gopalan, C., Chatterjee, M.: Use of Growth Charts For Promoting Child Nutrition — Review of Global Experience. Special Publication Series 2, Nutrition Foundation of India, New Delhi, 1985.
2. Gopalan, C., Growth-monitoring — Some Basic Issues. *Bulletin Nutrition Foundation of India*, 1987, 8(2): 1.
3. Srilatha, V.L.: Use of Growth Charts For Promoting Child Nutrition: Experiences and Reflections. *Bulletin Nutrition Foundation of India*, 1986, 7(2): 4.
4. Shekar, M., Latham, M.C.: Growth-monitoring Can and Does Work! An Example From The Tamil Nadu Integrated Nutrition Project in Rural South India. *Indian J. Pediatr*, 1992, 59:5-15.
5. Gerein, N.: Is Growth-monitoring Worthwhile? Health Policy and Planning, 1988, 3(3): 181-194.
6. Seminar on Growth-monitoring, February 3-5, 1987. A Report, of National Institute of Public Cooperation and Development, New Delhi.
7. Gopaldas, T. *et al:* Does Growth-monitoring Work As It Ought To In Countries Of Low Literacy? *J. Trop. Paeditr*, 1990, 36:322-327.
8. Abel, R.; Personal Communication from Tara Gopaldas, 1992.

REVIEWS AND COMMENTS

Child-mortality Reduction With Vitamin A
Now the "Bellagio Declaration" !

C. Gopalan

In previous issues of the Bulletin[1-6] we had drawn attention to the incongruities and internal contradictions in the studies which have claimed that vitamin A administration brings about a nearly 30 per cent reduction in child mortality. A recent "declaration from Bellagio" is now being presented to the world[7] as almost the final seal on this controversial subject, giving the impression that the claim of synthetic vitamin A's miraculous antilethal properties has now been firmly established beyond all doubt and controversy.

A committee of North American scientists has also undertaken a meta-analysis of the pooled data from the several studies on this subject from different parts of the world; and has come out with a tentative 'interim report' which apparently lends support[8] to the above mentioned "Bellagio declaration". These pronouncements have far-reaching implications to the health systems of developing countries.

Scientists and health administrators of developing countries should not let themselves be confused, overawed and misled by these seemingly weighty pronouncements. Promises of miracle drugs and magic bullets should not distract them from the real jobs that lie ahead of them, and should not be allowed to distort their Primary Health Care programmes.

Statistical exercises, however sophisticated and however eminent the scientists undertaking them, can only be as good as the data that they are dealing with.

In any case, they can be no substitute for sturdy commonsense. Before embarking on sophisticated statistical exercises, one must take note of factors in the designs of the studies from which the data have been generated, and of internal contradictions in the data themselves, which may have a bearing on the validity of interpretation of the data. If this is not done, we may be straining at "gnats" (and second decimal places) while ignoring whole "camels".

THE INDONESIAN STUDY

In the first study of Sommer *et al* in Aceh in Indonesia (which was not a double-blind study, and which we had earlier commented upon)[1] mortalities in *both* the control (7.4) and experimental (4.7) groups were far less than the erstwhile prevailing mortality in that country (18). This striking reduction in the mortality in *both* study groups as compared to the prevailing mortality has apparently been ignored in the ongoing meta-analysis. The reduction in child mortality as compared to the prevailing mortality was as high as 59 per cent in the control group and 74 per cent in the experimental group, a difference of 15 per cent, not a 36 per cent reduction as claimed by ignoring the prevailing mortality rate; and this could have possibly been statistically insignificant. In fact in all studies being analysed, the observed child mortalities in both groups (experimental and control) have been far less than the generally prevailing mortality in the areas. This is presumably the 'Hawthorne effect' with which workers in developing countries are familiar[3]. Repeated contacts between health workers and poor communities, even in the absence of obvious planned intervention, is apparently not an entirely "inert" exercise. In the overshadowing context of striking mortality declines in both experimental and control groups, any minor loop-holes in "blindness" of the double-blind design, abetted by subconscious investigator-bias, can easily account for relatively minor differences in the order of the decline as between control and experimental groups. Such differences could pale into statistical insignificance in the light of the marked mortality reduction in both study groups.

The question also arises as to whether an analysis of seven studies, at least three of which were carried out under one and the same leadership

(though in different locations) can be presented as being of the same value as an analysis of seven separate studies by seven different groups of investigators. If there are errors (both ways) with respect to implementation they are likely to be repeated where the same leading investigator is involved.

The more important issue from the practical point of view is this. If the communities under study were so depressed that even in situations where absolutely no conscious and deliberate intervention had been attempted (controls), reductions in mortality (of about 60 per cent in some areas) had been brought about (as part of the Hawthorne effect), an added intervention, such as, say, nutrition education and marginal improvements in health care (which was not provided in any of the studies) could have easily brought about an additional 10 per cent to 20 per cent decline in mortality and overall improvement in health status. The result would have been far more gratifying than with medication with any single nutrient. This is what sensible health administrators in developing countries would like to attempt and achieve. It is possible that even those workers who now find "30 per cent mortality reduction" with vitamin A medication alone in the highly artificial conditions of their studies may have failed to find this effect with vitamin A supplementation when it is combined with optimal all-round health care. Surely, it cannot be anybody's case that health workers visit villages regularly but provide no intervention apart from the sixth monthly vitamin A dose. The highly artificial situations under which mortality reductions have been claimed in some studies, are far removed from actual realities on the ground.

THE MADURAI STUDY

The Madurai study of Rahmathullah *et al*[9] bristles with several internal contradictions. Mortality attributable to respiratory diseases contributed to a surprisingly tiny fraction of overall mortality, contrary to all experience in public health practice in that part of the country, <5 per cent as against > 20 per cent. If risk of mortality from respiratory diseases is actually *enhanced* in vitamin A supplemented subjects as claimed by West *et al*[10], then respiratory diseases should have accounted for an even higher proportion of overall mortality than > 20 per cent. It is also claimed in the Madurai study that striking mortality reduction was unassociated with any significant effect on morbidity. What then were the "mysterious" diseases not identified in the morbidity profile that vitamin A was preventing? These considerations point to some serious flaws in the design and implementation of the Madurai study.

THE NEPAL STUDY

The studies in Nepal by West *et al*[10] showed the curious feature that while vitamin A had significantly reduced mortality risks with respect to diarrhoeal diseases, it had actually *increased* the mortality risk with respect to respiratory diseases! There was, however, an "average" overall reduction. This is somewhat like the average "equable" temperature achieved with one foot in boiling water and the other on a block of ice! While the observed increase in mortality risk in the respiratory diseases was dismissed as "insignificant", the lowering of risk with respect to diarrhoeal diseases was considered conclusive! It could be argued that if vitamin A does increase mortality risk with respect to some diseases even marginally, it would be unethical to use it at all since we cannot know in advance as to which child is a candidate for which mortality risk. A study from Indonesia is also reported to have confirmed the aggravation of risk of mortality from upper respiratory infections following on massive vitamin A dosage. An 'average' derived from data reflecting totally divergent and contradictory trends has no practical meaning and scientific validity, and can hardly be projected as a basis for a far-reaching public-health policy. In a rejoinder to our earlier comment on the Nepal study[6], West totally side-steps this central issue. He has apparently no answer!

These are important issues which no sophisticated statistical treatment of pooled data can solve or explain. There are serious internal contradictions in the data within each study claiming significant mortality reductions and serious contradictions between the studies of Sommer *et al*, on the one hand, and those of NIN and Sudan-Harvard, on the other. These cannot be lightly dismissed.

The so-called Bellagio Declaration, as far as its claim of child mortality reduction is concerned, is clearly a one-sided statement which practically brushes aside the important findings of the National Institute of Nutrition in India and those of the Sudan-Harvard group. It is not an objective impartial pronouncement which can claim global acceptability.

As was perhaps to be expected the 'Bellagio Declaration' is now being used to push synthetic vitamin A administration into the Expanded Programme of immunisation. The commercial overtones of this exercise should be obvious. In the present state of knowledge, this will be ill-advised, and an uncalled for burden on the Primary Health Care systems of poor countries, and must be resisted.

References

1. Gopalan, C.: Vitamin A Deficiency and Child Mortality. *Bulletin Nutrition Foundation of India*, 1986, 7(3), 6-7.
2. Gopalan, C.: Vitamin A and Child Mortality. *Bulletin Nutrition Foundation of India*, 1990, 11(3): 1-3.
3. Cravioto, J.: Vitamin A Supplementation and Child Mortality — Examination of a Claim. *Bulletin Nutrition Foundation of India*, 1990, 11(4): 5-6.
4. Ramachandran, K.: "Reduced Mortality" with Vitamin A Supplementation. *Bulletin Nutrition Foundation of India*, 1991, 12(1): 6-7.
5. Gopalan, C. Vitamin A and Child Mortality – Now the Nepal Study. *Bulletin Nutrition Foundation of India*, 1992, 13(1): 6-7.
6. Rajagopalan, S.: Vitamin A Supplementation and Child Mortality — The Nepal Study. *Bulletin Nutrition Foundation of India*, 1992, 13(1): 4-5.
7. Sommer, A.: Vitamin A Deficiency and Childhood Mortality, *Lancet*, pp 2, 339(4): 864.
8. Effectiveness of Vitamin A Supplementation in Control of Young Child Morbidity and Mortality in Developing Countries. Interim Report on Mortality Effect, Dept of Nutrition and Sciences: Faculty of Medicine, University of Toronto, Canada, March 1992.
9. Rahamathullah, L., Underwood, B.A., Thulasiraj, R.D., Mitton, R.C., Ramaswamy, K., Rahmathullah, R., Babu, G.: Reduced Mortality Among Children in Southern India Receiving a Small Weekly Dose of Vitamin A. *N Engl J Med*, 1990, 323: 929-935.
10. West, K.P. Jr., Pokherel R.P., Katz, J., LeClereg, S.C., Khutry, S.K. Shrestha, S.R., Pradhan, E.K., Tielsch, J.M., Pandey, M.R. Sommer, A.: Efficacy of Vitamin A in Reducing Preschool Child Mortality in Nepal, *Lancet*, 1991, 338: 67-70.

"Nutrition in Developmental Transition in South East Asia": By C. Gopalan; a WHO (SEARO) publication. The book which has just been released by WHO has 10 chapters, dealing with such aspects as: food production and consumption trends; changing profile of undernutrition and new dimension of old problems; nutritional repercussions of environmental degradation; the challenge of urbanisation; nutritional implication of demographic transition, and nutritional aspects of rising incidence of degenerative diseases. The final chapters deal with possible strategies for combating undernutrition based on country experiences and a "Nutritional Agenda for the turn of the century". Copies can be had from WHO SEARO, I.P. Estate, New Delhi- 110 002.