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**THE USE OF NUTRITIONAL "POSITIVE DEVIANTS" TO
IDENTIFY APPROACHES FOR MODIFICATION
OF DIETARY PRACTICES**

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Nutritional "Positive Deviants" - Wishik

The present paper describes the first phase in a five-phase scheme for modifying dietary practices in deprived populations. The impressions about the method and about relationships between nutrition and other considerations are based upon data collected in a Central American country. The experience is the subject of several detailed reports.^{1,2,3} This report emphasizes the method rather than the findings.

The usual basis for establishing a food supplementation program in a community is to assess the nature of the prevailing dietary deficit, perhaps identify the categories of persons most in need and introduce the needed nutrients in whatever form and from whatever source is economically and logistically available. Without impugning the method in general, the exaggerated parody of the result is, "So, they fed the fish flour to the animals."

Our approach is somewhat opposite. The objective is to identify the unusually well nourished members of the community and find out how they have managed to escape the prevailing insults of life there. If successful in finding an answer, the secret should be revealed to all. Beneficial foodstuffs or food practices that are likely to be accepted

would be introduced. The ensurance of such likelihood rests on the fact that the practices already exist in the community as atypical behavior. Although exceptional rather than general, the measures have a chance of being feasible and culturally acceptable just because they are indigenously rather than extraneously derived.

The general nutritional level of a population is primarily a socio-economic matter that permits high or low access to adequate amounts of food. This is especially prominent among poor subgroups of a population, whether a minority is defined in ethnic, occupational or geographic terms.

When there is a defined, deprived subgroup, it is by definition somewhat homogeneous, particularly in its sub-normal health and nutritional status. Nevertheless, some members of the group may be clearly in good health and nutritional status. The theoretical explanation for this departure from the group norm may be one of five sets of reasons, based respectively upon socio-economic status, genetic traits, disease susceptibility and/or exposure, fertility behavior or differences in diet.

Whatever the reason, the first step in analyzing the situation is to identify which members of the group are in

better than usual nutritional state. Toward that end, a number of questions need to be raised and answered in arriving at the most useful and practicable methodology, as follows:

- 1) What kinds of nutritional criteria should be used?

Rather than attempting to measure the dietary intake, the approach here used and recommended is to classify nutritional state in physical terms. Analysis of diet will be a later phase, as described further in this paper.

- 2) Should the members of the population be approached

as separate individuals or with the family as the unit? The decision here is the family, since the objective is to identify subtle family food practices, in the notion that family behavior in the home in relation to diet may be a common and unrecognized avenue to better health in those families.

- 3) Which members of the family should be selected as

the index to family appraisal? One might try to do a complete study of all members of the family, but this increases the difficulty and cost of the survey. There are reasons for avoiding the father

who often has access to extra-familial sources of food, and the mother who experiences gross bodily fluctuations associated with pregnancy and lactation. We have selected young children under school age because they are dependent upon family practices and sources of food before they have begun to do much "foraging" or finding sources of food outside the family. We have also set a lower limit of six months in order to avoid the usual period of full breast feeding. After that time, even the breast-fed child is partially dependent upon other food sources. At time of and after weaning, he is most vulnerable to nutrition disturbances. Also, at that age, his nutritional state is more definable and more accurately measurable.

- 4) Which physical parameters should be used to assess nutritional status of these young children?

We have used simply height, weight and age, as lending themselves to simple survey techniques.

We are reporting here on only these measurements, although many more determinations were made in the nutritional survey from which the data were derived.

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- 5) What degree of detail of measurement should be used? This is a crucial question. We recommend the threshold concept, rather than an attempt to make more exact determinations and classifications into many groups. The threshold establishes a point for simple dichotomy into two groups, those above and those below that point.
- 6) At what level should the threshold be placed? For the individual child, we placed the level very high within the range of the total population group under study, for several reasons. First, we are looking for conspicuous departures from the common nutritional state in the community, not just minor degrees of advantage. Second, although both height and weight can be measured with accuracy, it is very difficult to have confidence in the reported ages of the children. It is the accepted age that determines the estimate of whether the child is well nourished or poorly nourished with respect to norms and expectations. Especially, since the types of populations under discussion are those where children are more often than not undernourished, the tendency is to report children as being younger than

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their actual age. Consequently, acceptance of such reporting would give an impression of better nutritional state of the children than is the case. We followed the common practice recommended by Jelliffe⁴ and others to place the threshold at 10% below the median of the Stuart Harvard standard. In our population, this threw 25% of the children into the so called "better" nutritional group, the remainder in the "poorer" nutritional group. Since such a small proportion of the total children fell into the upper group, the error of age reporting would have to be very large in order to permit an undernourished child to escape falling into the lower group. In order to simplify the analysis, we recommend limiting each family to one child, the youngest one between six months and five years. It would be quite reasonable, however, if one wished to measure all the children within the age span and include every family that had at least one child who qualifies for the upper nutritional group; this on the theory that if they could achieve that at all they should be looked at.

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In order to keep the threshold line very high relative to the usual range in this population group, the requirements were for the child to be above the threshold both according to his height for age and his weight for age. With either one below the threshold, the child was placed in the lower nutritional group.

- 7) Since only certain members of the family are being studied, do we really have a familial index or merely an appraisal of those individual children? In other reports on findings of these studies, we have indicated extensive significant statistical correlations between the findings for the children and for the other family members, especially the mothers. We have also reported on correlations between the child's nutritional classification and the fertility history of the mother. (see below) All these correlations of family data with the child's nutritional classification indicate that the use of the young child as an index to the family is not an unreasonable approach. Among the more useful fertility parameters were: age-specific parity; and the mother's age at the time of the

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first birth, regardless of the parity at the time of the birth of the children used in the analysis.

8) To what extent is it necessary to rule out other hypothetical explanations than diet for certain children and their families being nutritionally different from and better than most of the others in the community? For most purposes, it seems reasonable to bypass the genetic explanation or the possibility that for some reason or other these children have less exposure to infectious diseases, such as recurrent diarrhea. For the genetic question, one can be satisfied at least that the child in the high nutritional group has not been prevented by undernutrition from achieving whatever might have been his genetic potential. For the infectious question, we believe that the problem is less one of frequency of exposure to infections than susceptibility to the effects of infectious episodes because of malnutrition. Scrimshaw et al⁵ have long called attention to this phenomenon. It should be emphasized that the focus is on the small select "high group." If some children fall inappropriately into the lower group, the method does not suffer.

But it is essential to ascertain whether a family has unusual socio-economic advantage which permits them merely to buy more food. Therefore, a socio-economic classification is required as part of the community survey. We have done this by emphasizing two parameters more than questions about cash income or equivalent earnings. In the communities that we have studied, classification seems to be easiest and most reliable when it is based upon the type of housing of the families and the personal possessions they have acquired.⁶ Such criteria have to be developed specifically with respect to the cultural situation under study. It is relatively easy to find out how to rank order houses according to roof, floor, oven or walls; and according to which possessions are considered more desirable than others. We use anthropologist observations to do this.

In some circumstances, it may challenge ingenuity to find criteria that are in tune with the culture. For example, what are the criteria for migrant workers? Housing is clearly not applicable. We have not done any studies on such groups.

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One might guess that the family's vehicle, which they use for transportation and sometimes for family living while moving from place to place, is the equivalent of the house. Among migrant workers, it may be useful to identify conspicuous exceptional sources of income.

The eight steps listed so far are all components of the first phase of the method, that of identifying the segment of the population that is to carry the label of "positive deviants" because they manifest departures from the general nutritional status of the population and because those departures are in an upward direction. The next phase is to study the food habits of a sample of the positive deviants in comparison with a sample of the others. The major categories for study are sources of food, storage, preparation and family eating patterns in addition to diet content and quantities. Information for this phase is collected by in-depth observations of a small number of families rather than by a large sample survey. At present, an anthropologist is doing this on a Caribbean Island.

On the basis of the observations and if aberrations in food behavior and practices have been identified, the

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third phase of the method is the design of ways of adapting such unusual positive behavior for more general use. One surprising observation, for example, was to find advantage in a local kind of "Eskimo Pie" popular among the children. Made of milk in a particular way, it had enough protein content to make a difference.

The fourth phase is to introduce the adaptation into the general community. This is where economic, industrial and distribution considerations enter the picture. The last phase is to design and build in ways of evaluating the effectiveness of the program.

We have been working on this method primarily for application in developing countries. A recent report in Science magazine⁷ is a dramatic example of how observations of food practices could be useful, but are often missed. This was a report on about 50 cultures that were dependent upon corn or maize in different historical times and how the survival of the maize-dependent cultures rested upon whether or not the society had discovered and used a technique of alkalinizing the corn before use, such as by soaking the corn in water with ashes from the wood fire. This and other alkalinizing techniques have been observed and reported for about 40 years by anthropologists, but

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only recently have food chemists realized that the alkalization process appreciably improved the protein value of the corn.

With special applicability to minority groups in the United States, the positive deviant approach can be used in a double fashion. In our study we divided the population into four cells on the basis of two parameters, whether they fell into the upper or lower nutritional group and whether they were in the high or low socio-economic status. This gave a so-to-speak affluent well nourished group, as expected, and a poor malnourished one, also as expected. The poor, but paradoxically better nourished, were the "positive deviants." The affluent, but paradoxically poorly nourished, were the "negative deviants." Despite their relative affluence, something was keeping the latter from reaping the benefits of their advantageous position. We can cite an example with reference to the same story about processing of corn. A Caribbean country in which we are working has recently begun to introduce the growing of corn. Only some of the people who can afford it are able to buy it at present. We are certain that they will not subject the corn to alkalization, because there is nothing in their culture to have taught them to do this. In this

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respect, they will not benefit from their affluence as much as they might. The negative deviant group gives clues to fixed cultural patterns that are maintained even though the economic means exist to do otherwise.

Among the hypothetical explanations for positive deviance mentioned earlier in this paper, we must now give attention to the matter of fertility behavior. Our findings are so striking that we cannot approach problems of undernutrition without including allowances for fertility in the design of programs or of research.

The types of fertility that deserve emphasis here are very early age of the post-adolescent teenage mother and short intervals between births, when accompanied by undernutrition of the mother. A well nourished mother could be fairly young and have babies fairly close together, that is she could be over 16 but less than 21 and she could safely have babies as close together as two years. But if she is undernourished, it is much more difficult for her child to be in the upper nutritional group if she has the first child before 21 years of age and if she has them closer together than 2 1/2 or three years. There is a kind of trade off between nutrition and fertility performance. But there are strict limits to the trade off possibilities

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when either the nutritional deprivation or the excessive fertility becomes extreme. Table I indicates the limitations of the trade off. It also points the way for program intervention in a dual family planning/nutrition correction approach. Since the table is designed to show the maximum possible benefit that lengthened birth interval can contribute, further lengthening of interval can achieve no additional advantage under the given circumstances. The lower parity is only somewhat better than the higher parity for the poorly nourished mothers and hardly different for the better nourished mothers. Whereas, the change in maternal nutritional status, such as from the fifth percentile to the 95 percentile, increases the chances of being in better nutrition from 55% to 95% for the child of second birth order; if he is of sixth birth order, from 35% to 90%.

This interdependence and interaction of undernutrition and close birth interval is presented qualitatively in Figure (1). The top row indicates a woman in normal nutritional status who has four children at intervals of two years apart. Another woman is undernourished and needs a longer than usual interval (e.g. about 3 years) for the reconstitution of her body between pregnancies. If, however, she has her babies at the same interval as the first woman, there is

increasing period of deficit from one pregnancy to the next with respect to times when she might have been in a "window of readiness" for another pregnancy. If, on the other hand, she is in normal nutritional status but has the babies at closer intervals than desirable, there is a deficit of a different kind, but for the same general reason of lack of readiness of her physiology and metabolism. The last woman is both malnourished and subject to short birth interval. She quickly is thrown into continuous cumulative deficit far ahead of any possible window.

We also have collected information, again presented qualitatively in Figure 2, supporting the general belief that there are ages for childbirth that are more or less favorable for the child's early development. The maternal ages are grossly and approximately divided into five groups. The first, below 16, is an age of physiologic immaturity for practically any female. The second may be one of partial immaturity, but not too grossly disadvantageous to a healthy woman. The middle segment is the optimum period and the reverse status occurs in the next two older age groups. Moderate degrees of undernutrition contract the time periods that are favorable, and severe degrees of undernutrition do this still further. But, eventually there remains only an

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extremely narrow window of time within which the female is not at greater than normal risk from the effects of child-birth. Further studies are needed to support the contention and to quantify it.

We are convinced by our findings on correlations between nutrition and fertility that the fertility history of the mother must be included in the "Positive Deviant" approach. Thus, Positive Deviant families are those who show better than usual nutritional status of young children in the absence of particularly favorable socio-economic status and fertility history.

Implications

To make a comparison, the reduction of crime in our country will come when we change the milieu in which crime flourishes. Fortunately, most children manage somehow to grow up in such unfavorable settings without becoming criminals. While we are unable to improve the general life situation as we would like, we do what we can for the children who are there. Our primary aim still is to change the basic moral climate, not only where they are, but also for white collar and other types of crime everywhere.

Similarly, the primary cause of undernutrition among

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minority groups in the United States is poverty. Our central aim should be the elimination of poverty. Just as we know that malnutrition is not limited to the poor, that money alone is no guarantor of a wholesome diet or of better nutrition, so within the deprived groups there exist variable practices, some more favorable than others. We try to extract the favorable ones that can be identified and to use them, while continuing to work for the more important fundamental change.

Undernourished women have less margin of safety with respect to fertility patterns. Their children suffer from fertility patterns which do not threaten healthy women.

We should try to improve the health and nutritional status of the women. At the same time we should recognize how vulnerable they are and try to avoid fertility excess.

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TABLE 1

Maximum Percent Probability of Youngest Child Being in High Nutrition Group Achievable by Lengthening Birth Interval

mother's nutritional status percentile	Parity 2	Parity 6
95	90	90
80	80	70
50	70	60
20	65	50
5	55	35

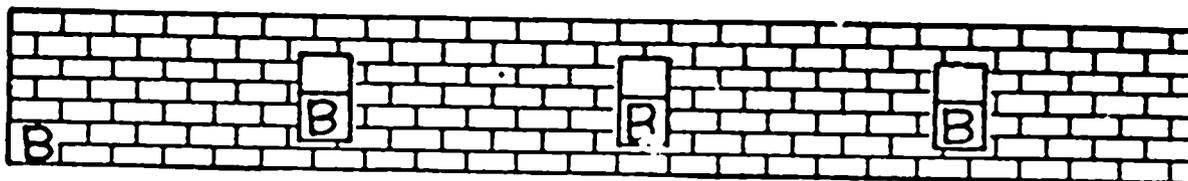
Modification Possibilities

1. Lengthen interval - cannot exceed the above (already placed at maximum).
2. Lessen parity - already at lowest parity (2).
3. Improve maternal nutrition - can reach higher level quickly regardless of parity.

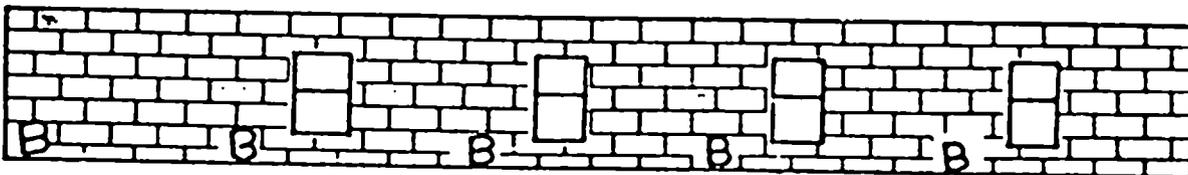
Source: Lichtblau & Wishik, 1974.

FIGURE 1. QUALITATIVE DEPICTION OF CUMULATIVE MATERNAL DEFICIT — EFFECTS OF NUTRITIONAL STATUS ON MINIMUM SAFE BIRTH INTERVAL AND TIMING OF BIRTHS IN ADVANCE OF "WINDOWS OF READINESS"

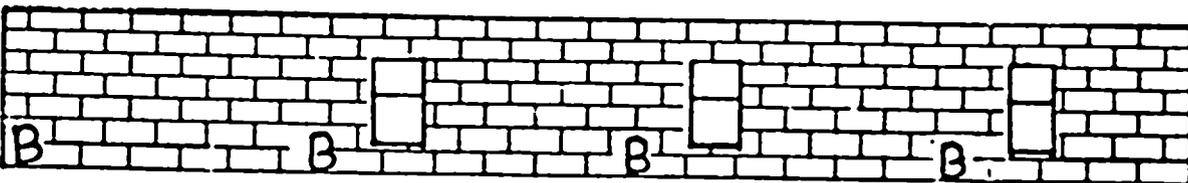
Normal Nutrition-Minimum Window-2 Yrs.
Actual Interval - 2 Yrs.



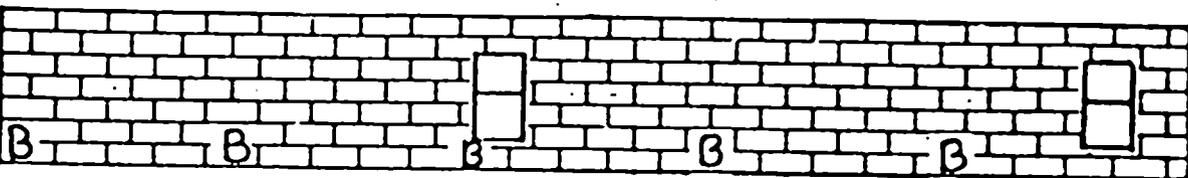
Normal Nutrition-Minimum Window-2 Yrs.
Short Actual Interval - 1-1/2 Yrs.



Undernutrition-Minimum Window-3 Yrs.
Actual Interval - 2 Yrs.



Undernutrition-Minimum Window-3 Yrs.
Short Actual Interval - 1-1/2 Yrs.



B - Births

Years

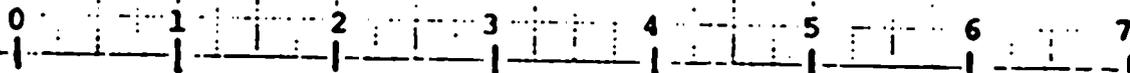
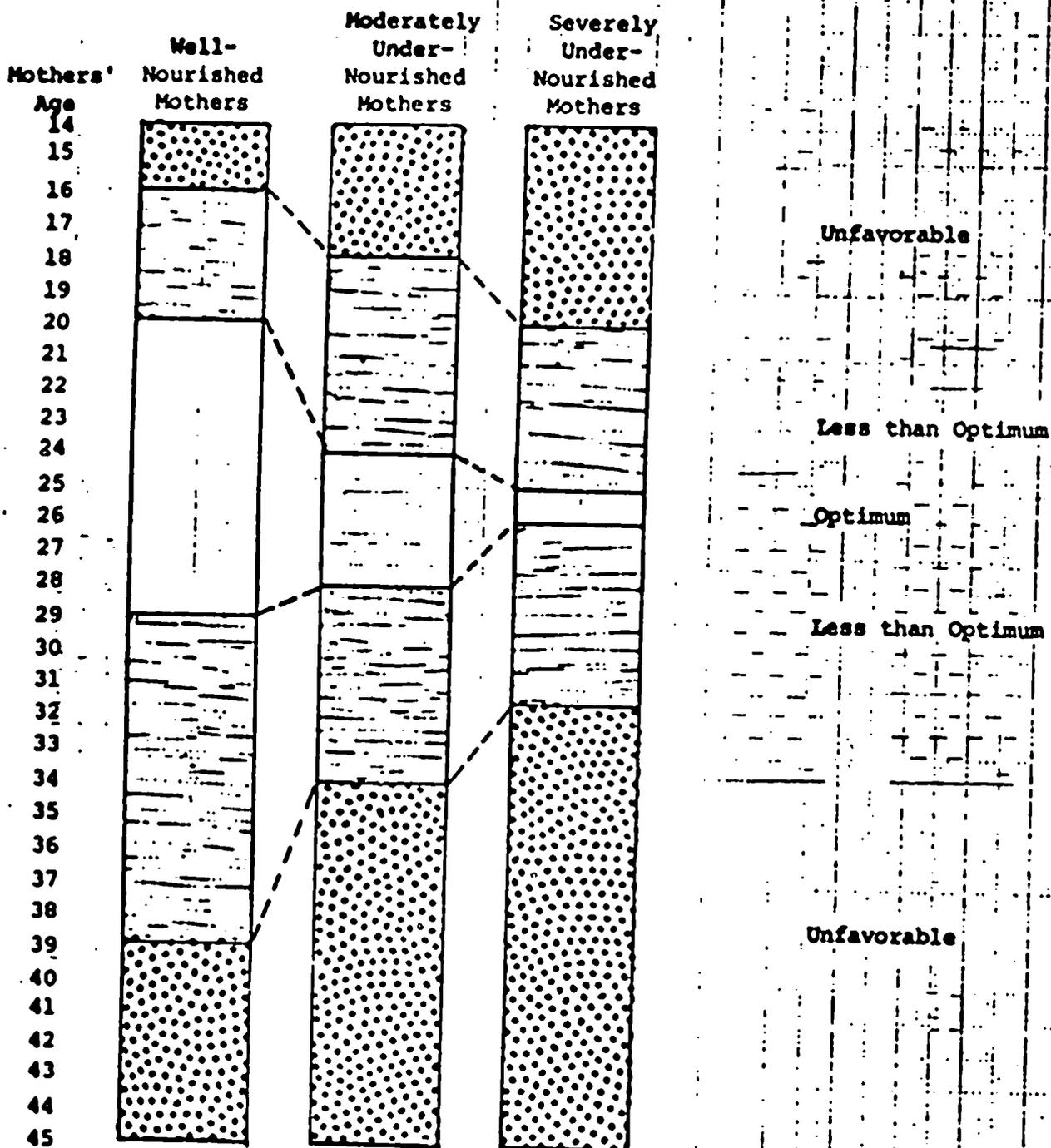


FIGURE 2. QUALITATIVE DEPICTION
 RISK OF UNFAVORABLE IMPACT ON CHILD GROWTH AND DEVELOPMENT
 FROM MATERNAL UNDERNUTRITION AT DIFFERENT AGES



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