

Original article

Factors contributing to positive and negative deviances in child nutrition

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Abstract: A cross sectional study investigating factors leading to positive and negative deviance in child nutrition, was conducted between March and April 1996 at Zigbaboto, Gurage Zone. Among 400 children aged 6-59 months, 231 children were randomly selected and categorized into negative deviants (lower tercile), median growers (middle tercile) and positive deviants (upper tercile) based on local distribution of height for age. Over 20 variables presumed to affect nutritional status of children were then collected and analyzed to see their associations to each category. The prevalence of malnutrition was also determined using the NCHS standard. The results indicated that 46.8% were stunted, 44.2% were under-weight and 13.0% were wasted. Of the over 20 variables, only nine variables showed significant differences at least among two categories. Religion, maternal education, maternal age, and income distinguished negative deviants from median growers. Prenatal follow-up, age of the child, and duration of breast feeding distinguished median growers from positive deviants. Only two variables, maternal body mass index and maternal height differentiated both positive and negative deviants from median growers. In conclusion our study revealed that factors responsible for positive and negative deviances are not necessarily the converse of each other implying that indepth assessment of factors leading to optimum nutrition is required before intervention strategies are considered. [*Ethiop. J. Health Dev.* 1998;12(2):69-73]

Introduction

Nutritional disorders are associated with marked cognitive effects, largely emanating from a number of complex and interwoven factors indicating that the types of nutritional disorders existing in Ethiopia do not differ from those found in other developing countries in tropical and subtropical regions (1).

Various studies have indicated that care, health, and accessibility to adequate food are the major determinants of child growth (2, 3). It was assumed that lack of food intake, health, and care invariably leads to malnutrition, while the converse invariably leading to optimum nutrition (3,4). A few studies, however, indicated that variability in growth and nutritional status of children exists even when there is no substantial difference in care, health, and food accessibility (5).

It is clearly observable that some children having similar living conditions grow adequately, while others fail to do so in the same household let alone in the same community (5,6).

Positive deviances (PDs) are defined as children who grow adequately in low income families in a community where a large proportion of children suffer from growth retardation (7). It reflects good physical growth which serves as a marker for a good health, normal cognitive skills, and satisfactory social adjustment (4,7). This observational fact leads to the hypothesis that factors leading to positive deviance may not be always the reverse of factors leading to negative deviances. In other words, different mechanisms could be responsible for the negative and positive deviances. An intensive study undertaken by Meera Shekar et al, demonstrated that the

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determinant factors of positive deviants are some thing more than the converse of the determinants

of negative deviants (8). Although, recent evidences indicate that the nutritional status of children is deteriorating, there are no published reports that describe the relation between positive and negative deviances in child growth and development. However, there is enough information that the nutritional situation of mothers and children in Ethiopia is considered to be precarious (9).

The objective of this study is therefore, to investigate the relationship between positive and negative deviances and to identify factors that will lead to maximum improvements in child nutrition and to provide information for further reference and policy actions.

Methods

A cross-sectional study was undertaken between March and April, 1996 in rural Zigababoto, Guragie Zone, in the Southern Ethiopian People Regional State, where *Ensete ventricosum* is the main staple food. Zigababoto is located about 195 km from Addis Abeba and has a total population of 2625 and 525 households (personal communication). The village was selected based on the facts obtained from Zonal Administrative Offices regarding socio-economic, cultural, ethnic homogeneity of the community members, and willingness to participate in the study as well as the absence of intervention activities that could somehow alter the result of the study.

Out of the 400 children in the community, 240 were randomly selected depending on the available resource for the survey. However, only 231 of the children aged 6-59 months were captured due to either unwillingness to participate or not being available upon repeated visits during the actual data collection.

Prior to the collection of information individuals were briefed about the purpose of the study and were requested to provide accurate and honest responses.

Information on socio-demographic (age, education, income, marital status, parents relation etc), psychological, health, physiologic, anthropometric, and other variables related to child nutrition were collected from mothers or care takers of the study children.

Informations were collected by enumerators who were recruited from the community members and who completed 12th grade. They were given intensive training for one week on the content of the questionnaire and overall data collection skills by the investigators prior to the survey. The questionnaires were administered under the close supervision of the investigators while the anthropometric measurements were taken by the investigators.

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Table 1: **Distribution of child characteristics, Zigababoto, 1996.**

Variable	ND.		MG		SL.	MG		PD.		SL
	n	%	n	%		n	%	n	%	
Vaccination					NS					NS
- Complete	50	51.5	47	48.5		74	50.5	46	49.5	49.5
- Incomplete	36	60.0	24	40.0		24	53.3	21	46.7	46.7
Sex of child					NS					NS
- Male	42	53.2	37	46.8		37	47.4	41	52.6	52.6

- Female	35	46.7	40	53.2		40	52.6	36	47.4	47.4
Episodes of illness										
- Yes	45	51.1	43	48.9		43	49.4	44	50.6	50.6
- No	32	48.5	34	51.5		34	50.7	33	49.3	49.3
Bottle feed					NS					NS
- Yes	15	55.6	12	44.4		12	54.5	10	45.5	45.5
- No	62	48.8	65	51.2		65	49.2	67	50.8	50.8

NB

ND=Negative deviance

MG=Median grower

PD=Positive deviance

SL=level of significanc

Table 2: **Nutritional status of the studied children at Zigaboto, 1996.**

Indicators	<-2 Z-Score (Malnourished)		≥-2 Z-Score (Normal)	
	n	%	n	%
Height for Age	108	46.8	46.8	53.3
Weight for Age	102	44.2	44.2	55.8
Weight for Height	30	13.0	13.0	87.0

Weight was measured using Sochne battery operated weighing scale of 130 kg capacity to the nearest 0.1 kg and height was measured using a harpender stadiometer to the nearest 0.1 cm for those who could stand while length board was used for infants and children who were not mature enough to stand. Statistical Package for Social Sciences (SPSS /PC+) and anthropometric (ANTHRO) software were used to enter and analyze the collected data.

Using the National Center for Health Statistics (NCHS) standard, the Height for Age Z-Score (HAZ) was calculated for each child and the study children were classified as positive deviants, median growers and negative deviants as lower tercile, middle tercile and upper tercile respectively, based on local distribution. Consequently, Children whose height for age were below the 33.3 percentile are considered as negative deviants, between 33.3 and 66.6 percentile as median growers and above 66.6 percentile as positive deviants. The chi-square and t-test statistics were used for testing significance differences of variables between negative deviants and median growers, as well as, median growers and positive deviants at $p < 0.05$.

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Results

Table 1 shows the detailed distribution of child characteristics captured during the study. Of the 231 children considered for the study 46.8% were low height for age (stunted), 44.2% were low

weight for age (under weight), and 13% were low weight for height (wasted). This results show that the children in the study community are highly malnourished (Table 2).

Variables such as mothers' religion, literacy, age and household income showed statistically significant difference on children who were negative deviants and median growers but not between median growers and positive deviants (Tables 3, 4). Children of christian mothers, young, literate and relatively rich mothers are more likely to be median growers compared to children of mothers of other religion, who are old, illiterate and relatively poor.

Prenatal care of the mother, age of the child and duration of breast feeding (Table 4) distinguished between the median growers and the positive deviants, but not between median growers and negative deviants. Children from mothers who attended prenatal check-ups, breast-fed for 18 months on average and younger children were more likely to be positive deviants.

Table 3: **Socio-demographic and physiological parameters of the studied subjects in Zigaboto, 1996.**

Variable	ND.		MG		SL	MG		PD.		SL
	N	%	N	%		N	%	N	%	
Mother's Religion					0.047					NS
- Christian	41	43.6	53	56.4		53	48.6	56	51.4	
- Moslem	36	60.0	24	40.0		24	53.3	21	46.7	
Mother Literacy					0.007					NS
- Literate	6	50.4	18	75.0		18	46.2	21	53.8	
- Illiterate	71	54.6	59	45.4		59	51.3	56	48.7	
Father Literacy					NS					NS
- Literate	21	42.0	29	58.0		29	48.3	31	51.7	
- Illiterate	56	53.8	48	46.2		48	51.1	46	48.9	
Physiological status					NS					NS
- Pregnant	61	48.0	66	52.0		66	49.3	68	50.7	NS
- Non preg/lactating	16	59.3	11	40.7		11	55.0	9	45.0	
Prenatal follow up										
- Yes	39	53.4	34	46.60	NS	34	41.0	49	59.0	0.015
- No	38	46.9	43	53.1		3	60.6	28	39.4	

Table 4: **Mean distribution of various variables considered during the study, Zigaboto, 1996**

Variable	Mean			Mean		
	ND	MG	SL	MG	PD	SL
Household size	5.5	5.6	ND	5.6	5.5	NS
Income	69.8	168.7	0.035	168.7	162.6	NS
Age of Mother	31.5	29.4	0.026	29.4	29.4	NS
Height of mother	152.5	155.8	0.023	155.8	158.1	0.018
Body Mass Index	17.8	19.0	0.031	19.0	19.9	0.017
Birth order	4.1	4.1	NS	4.1	3.9	NS
Age of child	30.5	29.6	NS	29.6	24.2	0.023
Duration of Breast Feeding	21.7	20.9	NS	20.9	18.3	0.048
Age of supplement	4.4	4.3	NS	4.3	4.4	NS

The heights of the mothers distinguished median growers from both positive deviants and negative deviants. Similarly the Body Mass Index, equals to $\text{weight}/\text{height}^2$ ($\text{BMI}=\text{W}/\text{H}^2$) of the mothers distinguished median growers from both positive deviants and negative deviants (Table

3). Mothers of negative deviant children have lowest height and body mass index compared to the mothers of median growers, while mothers of median growers have lowest height and body mass index compared to mothers of positive deviant children.

Discussion

The relative distribution of the respondents on factors contributing to positive or negative deviant continuum in child nutrition as indicated in Table 2 showed that no factors from negative or positive deviant fell across median growers in child nutrition. But two factors are observed to fall across median growers (Table 4). A few literatures focused in analyzing positive deviance aspects only with assumption that the mechanisms producing positive and negative deviances are similar (3,5,7). However, Meera and her collaborators attempted to add the terms negative deviants and median growers and defined them in the context of observed growth patterns in poor environments, thus obtaining the need for reference to adequate and inadequate growth (8).

Furthermore they identified the uppermost end of the spectrum as positive deviance and the lowermost end as negative deviant, while taking children growing at or around median for the sample population's as median growers (8). The present study illustrates the potential usefulness of this approach (10). The comparisons of cross-sectional studies conducted in developing countries have shown that few children have symptoms and clinical signs of severe protein-energy malnutrition or micronutrient deficiency, while the majority of these children seemed to tolerate well exposure to suboptimal diets (7). There has been growing recognition that the long term underlying poverty related factors such as household food security, health status, child care, feeding practices, and other factors (income, prices, markets, water, sanitation, education, female workloads, etc) (9) are contributing to both chronic undernutrition and social deprivation (6).

In our study, out of the 20 variables presumed to affect the nutritional status of children, only nine were identified to differ at least between two categories. Religion, age, literacy, and income status of mothers are related to negative deviance only and did not show any relations as a significant change by moving from median growers towards positive deviance for optimal nutrition, while age of child, duration of breast feeding, and prenatal care were associated with positive deviance. These findings are again compatible with the results obtained by Meera et al (8). Thus the implication of this finding is that the effect of reversing or, intervening with, these factors in improving child nutrition is mild/moderate or marginal.

The result indicating that some variables are associated with positive deviance concurs again with the findings of Meera et al. The finding indicated that two variables, maternal height and body mass index, differentiated the median growers from both negative and positive deviants was also observed by Meera et al. The taller and fatter the mothers are the more positive deviants their children will be, while the shorter and the thinner the mothers are the more negative deviants the children will be. This implies that by intervening with, or reversing, these variables negative deviant children can be moved to positive deviance. In other words, the strength of the effect obtained by intervening/reversing or improving maternal height and body mass index is greater than that of acting on other factors.

In conclusion our study has shown that all factors leading to positive deviance are not necessarily the converse of factors leading to negative deviance. It also showed that factors which continues across the whole spectrum of malnutrition, or factors which can produce desired outcomes by reversing, are very important in improving nutritional status of children. In Zigaboto, height and Body Mass Index of the mother have significant effect on child nutritional status as the two results indicated maternal problems at early childhood ages. It is, therefore, recommended that intervention

strategy to improve nutritional status of mothers and children should start from the very early childhood throughout their adulthood and motherhood. A study based on longitudinal growth patterns is also recommended.

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