Indicators of Nutritional Status in Turkish Preschool Children: results of Turkish Demographic and Health Survey 1993

by Ergül Tunçbilek,* Turgay Ünalan,** *and* Turgay Coşkun*
**Department of Pediatrics, Faculty of Medicine and*
***Institute of Population Studies, 06100 Hacettepe/Ankara, Turkey*

Summary

The Turkish Demographic and Health Survey (TDHS), conducted in 1993, provided data on the magnitude of malnutrition in a sample of 3152 preschool children from five geographical regions, and on its causal and conditioning factors. Stunting was found to be the dominant form of malnutrition (21 per cent). Altogether 10 per cent of children were underweight and 3 per cent were wasted. There were urban-rural (16 *v.* 27 per cent, $P<0.001$) and regional differences (highest in the East 38 per cent, lowest in the West and North 10 and 14 per cent, respectively; $P<0.001$) in the rate of stunting. Among the most important conditioning factors were too early introduction of supplementary foods, mother's educational level, mother's work area, person who takes care of children while mother is at work, birth rank of children, birth spacing, number of children in an individual family, family size, and mother's welfare and hygiene indices. The need for an intersectoral approach for the development of remedial programs to reduce the effect of these factors and for periodic assessment of nutritional status of preschool children is stressed.

A study of aetiology of malnutrition, which is still prevalent in many developing countries, is not simple. Although deficiencies of protein and energy seem to be the major causes from the biological point of view, it is more realistic to look upon malnutrition as an environmental disease. Various socio-economic, health, agricultural and dietary factors are closely related to the problem of malnutrition.[1,2]

An assessment of nutritional problems at the regional level is the first step in establishing a national intervention programme since a characteristic set of variables that play a role in the causation of malnutrition applies to each community and cannot be expected to operate in other communities where different conditions prevail. At present, there is lack of such data for the use of policy makers to improve the nutritional status of Turkish children and to compare these findings with those obtained in other countries.

A cross-sectional survey which was carried out in Turkey in 1993 as part of the worldwide Demographic and Health Surveys Program collected data on nutritional status of 3152 children under 5 years of age. This report describes the results of the survey which are of importance in the planning and evaluation of nutrition intervention programmes.

Material and Methods

The 1993 Turkish Demographic and Health Survey (TDHS) was conducted by the Institute of Population Studies, Hacettepe University in co-operation with the Ministry of Health, General Directorate of Mother and Child Health and Family Planning, and Macro International Inc., of Calverton, Maryland, USA. The 1993 TDHS, part of the worldwide Demographic and Health Surveys Program, is a nationally representative survey of ever-married women less than 50 years old. The survey is designed to provide information on fertility levels and trends, infant and child mortality, family planning, and maternal and child health.

A household questionnaire was designed to collect basic data on the age, sex, educational attainment, marital status, and relationship to the head of household for each person listed as a household member or visitor, and the interview technique was used. A total of 6519 women between the ages of 15 and 49 years from 8619 households were interviewed. Information was also collected on household characteristics such as the number of rooms, the flooring material, the source of water, the type of toilet facilities, and the household's ownership of a variety of consumer goods.

For the individual woman, detailed information was collected on reproductive intentions and behaviour, knowledge and use of contraceptives, employment, marital status, husband's education, maternal health, and use of health care facilities. Additional information was obtained for children born during

the previous 5 years, covering breastfeeding and infant feeding practices, child health and vaccination status. Pretesting of the questionnaire was conducted in several districts of Ankara and necessary revisions were made.

Data collection for the TDHS was carried out by 17 teams; each team consisted of four to five interviewers, a field editor, a measurer, and the field supervisor. Survey personnel, as well as the measurers who are responsible for taking the anthropometric measurements, were trained at the Institute of Population Studies, Hacettepe University, for 3 weeks and their skills were tested in orphanage, creches, and several districts in Ankara. Their precision and accuracy was systematically checked by the supervisors while working in the field.

Supine length was measured in all children up to 2 years of age, whereas standing height was measured in children older than 2 years using wooden height measuring boards (Shorr Productions, USA) to the nearest 0.5 cm. Measurements were done with the child in full extension, with feet bare and head positioned so that the child's gaze is directed at right angles to its body alignment. An electronic Seca scale (Seca 770 alpha, Germany) was used for taking the body weight of children. Its accuracy was checked periodically with weights of known mass. Weight was measured to the nearest 10 g without footwear and with the minimum of clothing.[3–5]

Questionnaires were returned to the Hacettepe Institute of Population Studies in Ankara for data processing. The office editing teams checked that the questionnaires for all selected households and eligible respondents were returned from the field. The data were then entered and edited using microcomputers and the ISSA (Integrated System for Survey Analysis, version 3.0) package.

The nutritional status of children in the survey was compared with an international reference population defined by the US National Center for Health Statistics (NCHS) and three indices were constructed based on the data and the child's age: height-for-age, weight-for-height, and weight-for-age.[6] Children whose height-for-age was below minus two standard deviations (−2 SD) from the median of the reference population were considered short for their age (stunted) and were termed chronically undernourished. Children whose weight-for-age was below −2 SD from the median of the reference population were classified as 'underweight'. More specific statistical analyses on malnutrition, and its causal and conditioning factors were done at the Institute of Population Studies using SPSS (Statistical Package for Social Sciences, version 5.0).

Two indices which were constructed by researchers at Hacettepe Institute of Population Studies to be used during the further analysis studies of the TDHS data, were also used in this study: hygiene index and welfare index. In order to construct the hygiene index the following variables were used: source of household's non-drinking and drinking water, existence of toilet inside or outside the house, whether the toilet is shared with other households, type of toilet (flush, open pit, closed pit), whether there is a place in toilet to wash hands, and whether there is a refrigerator in the household. Welfare index was constructed using the variables possession of a refrigerator, oven for cooking, washing machine, dish washer, vacuum cleaner, television, video, radio, and telephone.

Results

Table 1 shows the percentage of children under 5 years of age classified as undernourished according to height-for-age, weight-for-height, and weight-for-age indices by the child's age group and selected demographic characteristics.

The overall frequency of malnutrition (stunting) by height-for-age criteria was 21 per cent. An increase in the percentage of stunted children was noted after 6 months of age. The same trend continued through

TABLE 1

Percentage of children under 5 years who were classified as undernourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age, by selected demographic characteristics

Demographic characteristic	Height-for-age	Weight-for-height	Weight-for-age
Age			
<6 months	3.7	2.1	1.0
6–11 months	9.2	2.9	10.3
12–23 months	19.4	5.0	11.6
24–35 months	22.3	2.8	12.7
36–47 months	26.0	2.0	10.5
48–59 months	29.3	2.4	12.0
	$P<0.001$	$P<0.05$	$P<0.001$
Sex			
Male	21.1	3.3	10.3
Female	19.8	2.5	10.5
	$P>0.05$	$P>0.05$	$P>0.05$
Birth order			
1	14.0	2.1	7.9
2–3	19.6	2.2	8.7
4–5	27.0	4.6	13.7
6	33.2	5.9	18.9
	$P<0.001$	$P<0.001$	$P<0.001$
Birth interval			
First birth	14.0	2.1	7.9
<2 years	30.9	3.1	17.0
2–3 years	28.3	4.0	12.4
4 or more years	10.4	2.7	5.8
	$P<0.001$	$P>0.05$	$P<0.001$
All children	20.5	2.9	10.4

the second and third years of life, and thereafter reached a plateau. Three per cent of children were below −2 SD according to weight-for-height with 5 per cent being affected between 12 and 23 months. Nearly 10 per cent of all children were found to be underweight according to the survey results. When the z-scores of three indicators of nutritional status by the age were plotted on the same chart, the weight-for-height is close to that of the reference population except for children in the second half of the first year.

Height-for-age tends to decline until the fourth year of life, whereas weight-for-age stabilizes around the second year (see Fig. 1; since the number of cases at each age is small, a three-point moving average was calculated).

Birth order and interval were the two important variables affecting the height-for-age index in the survey ($P<0.001$). Nearly one-third of children whose birth order is 6 or above and one-quarter of children whose birth order is 4–5 were found to be stunted. Children who were born with a birth interval of less than 2 years were more prone to stunting with 31 per cent being stunted. Five and six per cent of children were wasted if the birth order was 4–5 and more than 6, respectively. The same applied to weight for age index. Child's sex was not found an important factor for being malnourished according to the three criteria used ($P>0.05$) (Table 1).

There were striking differences in the percentage of children classified as stunted according to mother's and father's educational status ($P<0.001$). Almost one-third of children whose mothers lack formal education had stunting. Stunting was more common in rural (27 per cent) than in urban areas (16 per cent). Stunting was highest in the Eastern region (38 per cent) and was lowest in the Western (10 per cent) and Northern (14 per cent) regions ($P<0.001$). The same was true for weight-for-height and weight-for-age indices ($P<0.001$) (Table 2).

Some selected characteristics of the mothers were also found to be effective regarding the nutritional status of preschool children. As the mother's welfare and hygiene index got better so did the nutritional status of their children ($P<0.001$ according to height-for-age and weight-for-age, $P<0.05$ according to weight-for-height). The children of the mothers who were working in industry/service were less prone to be stunted ($P<0.005$). This risk increased if the mothers were involved in farming. Children left in the care of older children when the mother was away from home were at risk for stunting (27 per cent, $P<0.005$). The presence of a neighbour of child-minder decreased the risk to 3 per cent (Table 3). Maternal age is not found to be one of the factors related to the development of malnutrition in this study ($P>0.05$).

There was no significant difference between the percentage of stunted and wasted children who belonged to nuclear and extended families (20 and 3 per cent *v.* 22 and 3 per cent, $P>0.05$). However, according to the three indices of nutritional status, family size was one of the important determinant of nutritional status. The percentage of stunted children

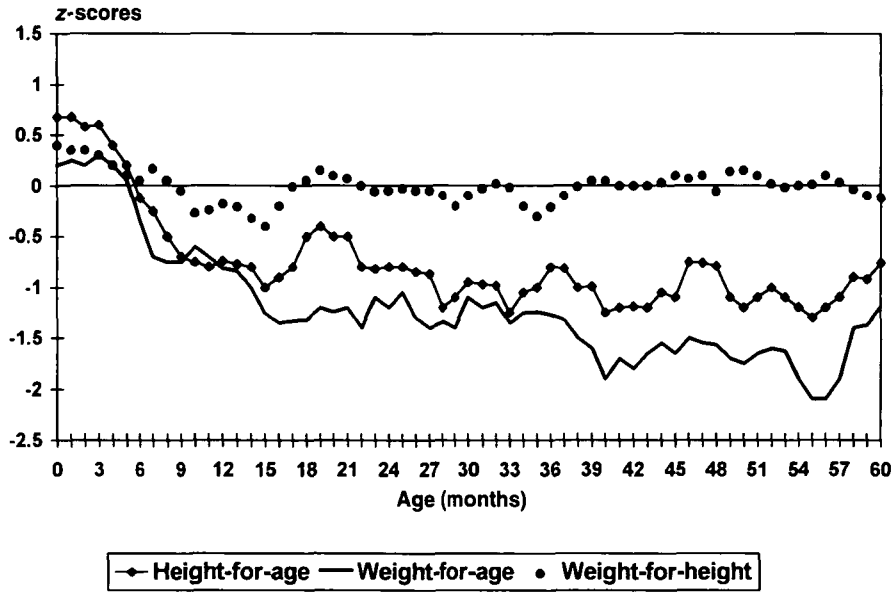

FIG. 1. Growth of children under 5 years, mean z-scores by age in months 1993 TDHS, rural Turkey.

TABLE 2

Percentage of children under 5 years who were classified as undernourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age by selected socio-economic characteristics

Socio-economic characteristic	Height-for-age	Weight-for-height	Weight-for-age
Residence			
Urban	16.1	2.9	8.5
Rural	27.1	3.0	13.2
	$P<0.001$	$P>0.05$	$P<0.001$
Region			
West	10.3	2.6	4.8
South	15.8	1.4	7.4
Central	19.2	1.7	7.3
North	14.1	1.4	7.2
East	37.7	5.9	22.1
	$P<0.001$	$P<0.001$	$P<0.001$
Mother's education			
No education/Primary incomplete	33.4	4.4	8.8
Primary complete/Secondary incomplete	15.7	2.3	12.8
Secondary complete/+	4.4	1.5	11.9
	$P<0.001$	$P<0.001$	$P<0.001$
Father's education			
None	37.0	4.2	19.4
Primary	21.1	3.2	11.0
Secondary	11.9	2.0	5.0
	$P<0.001$	$P>0.05$	$P<0.001$

started to increase if the family size was 5 or more reaching 30 per cent in the 7+ category ($P<0.001$).

A minority of the Turkish children were found exclusively breastfed in the early months of life (19 per cent).[7] The survey revealed that most of the children under 2 years of age were receiving supplementary food at the time of interview and the longer the breastfeeding period the higher would be the percentages of stunted children ($P<0.001$).

Among children under age 2 who were receiving supplementary food, the percentage of stunted children was 3.4 in <7 month-olds, 13.1 in 7–12-month-olds, 30.4 in 13–18-month-olds, and 35.0 in 19–23-month-old children respectively. When the breastfeeding period was classified by the mother's hygiene index, the percentage of the stunted increased as the child grew older within each category–poor, medium, and good. Overall frequency of stunting among children under 2 years of age who are receiving supplementary food tended to be less as mother's hygiene index got better (25 per cent in poor, 10 per cent in medium, and 5 per cent in good hygiene index category, $P<0.001$). Diarrhoea in the preceding 2 weeks was more frequent in the underweight group ($P<0.001$). An association was found between fever and undernutrition ($P<0.005$). Cough and immunization against measles was not found to be associated with undernutrition ($P>0.05$).

Discussion

Information on the magnitude of the problem of malnutrition and the identification of vulnerable groups can best be obtained by objective and periodic assessment of the nutritional status of representative groups.[5] Being a cross-sectional study of nutritional status of 0–5-year-old preschool children, the 1993 TDHS revealed data on the indicators of nutritional status of preschool children. Deterioration of one or more of such indicators may render children malnourished, and thus susceptible to infections and illness.

The three main indicators of nutritional status, which are commonly used in community studies, are stunting, wasting, and underweight. Stunting is a good indicator of past or chronic malnutrition and results from an inadequate intake of food for a relatively long period of time and frequent episodes of infection. The results of the survey show that there is a continuous deterioration in the nutritional status of preschool children in the form of stunting after 6 months of age. This is contrary to expectations that a period of about 12–24 months is needed to see stunting.[8] By age 5 nearly one-fifth of children are chronically malnourished indicating inadequate feeding practices throughout childhood and the presence of recurrent or chronic illness. Wasting is not a

TABLE 3

Percentage of children under 5 years who were classified as undernourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age by selected characteristics of mother

Mother's characteristics	Height-for-age	Weight-for-height	Weight-for-age
Welfare index			
Poor	33.1	4.2	18.0
Medium	17.1	2.4	7.6
Good	7.2	2.1	4.1
	$P<0.001$	$P<0.05$	$P<0.001$
Household size			
0–3	10.1	1.9	5.1
4	12.8	2.1	6.1
5	19.1	1.4	6.6
6	21.3	4.3	10.9
7+	29.5	4.1	16.5
	$P<0.001$	$P<0.05$	$P<0.001$
Working status			
Not working	20.3	3.1	10.6
Agriculture	24.0	3.0	11.1
Industry/service	14.2	2.4	5.4
	$P<0.05$	$P>0.05$	$P<0.05$
While working child's caretaker			
Older children	26.9	4.4	13.5
Other relatives	17.6	2.9	7.1
Works at home-no need	16.3	1.4	6.5
Neighbour-childsitter	2.7	3.6	8.3
	$P<0.05$	$P>0.05$	$P>0.05$

problem among preschool children (2 per cent). The weight-for-height curve was parallel to the curve of reference population throughout the preschool years (Fig. 1). On the whole, it can be said that although there is a decrease in the frequency of underweight as compared to the figures obtained through 1974 Nutrition Survey (underweight 18 per cent),[9] malnutrition in the form of stunting still continues to be the major nutritional problem in Turkey.

Breastfeeding of infants is surely the most important factor contributing to the maintenance of growth. Moreover, breastmilk is clean and always is available at just the right temperature and it promotes a close mother–child relationship. Breastfeeding should continue along with the supplementary foods given at an appropriate time (4–6 months) up to the second birthday or beyond.[10] Breastfeeding is almost universal in Turkey with 95 per cent of all children being breastfed for sometime according to the 1993 TDHS. Only 19 per cent of these, however, are exclusively breastfed within the first month of life.[7] Early introduction of the supplementary food into the infants' diet prevents them from making much benefit of breastmilk and increases the risk of gastrointestinal infections, which is one of the leading causes of infant mortality in Turkey. On the other hand, almost half of the breastfed children do not receive any solid or mushy food until they are around 1 year of age. This explains, to some extent, why stunting is dominant among Turkish preschoolers and why age of onset shifted to earlier months of life.

One of the important observations in this survey is that increasing birth order is associated with an increase in the percentage of undernourished.[1,11,12] Nearly one-third of children whose birth order is 6 or above and one-quarter of children whose birth order is 4–5 are stunted. This is probably due to the fact that as the number of children increases, the time allocated for child rearing decreases for an individual child. Birth interval is another variable affecting all the three indices. If the space between the two subsequent births is narrow, there will be limited time for the mother for recuperation, which, in turn, can affect the nutriture of the fetus and the young infant in the lactation period in the case of mothers with limited reserves.

Mother's education, age, work, and time allocation for the child are of importance from the nutritional point of view.[10,13] Female literacy and female education have positive impact on the rates of utilization of health care facilities and use of proper preventive care, sanitation and nutrition practices.[10] The survey shows that as the educational level of the mother and also of the father increases, the nutritional status of preschool children gets better.

In recent years, the role of poverty in the aetiology of malnutrition has been receiving increasing attention, due to the fact that it is primarily a problem of poor countries and of the poorest section of the community within those countries.[2] It is generally accepted that poverty influences nutritional status at least indirectly.[14,15] A welfare index was developed considering income related parameters and was used in this report. When the percentage of the stunted in the poor, medium, and good brackets is compared, the highest figure was found in the poor as expected. However, the presence of stunting in 7 per cent of the children in the better category according to welfare index shows that not only economical conditions, but also some other demographic and social factors such as number of children at home, birth interval educational status of the parents, hygiene index, the sector in which the mother works, and so on, play an important role in the development of malnutrition. Sanitary conditions in which man lives is one of the public health measures effective in the improvement of nutrition. In poor environmental, and personal hygiene and sanitation, diseases may flourish. As expected, poor hygiene index was found to be with the highest rate of stunting in this report.

There is mounting evidence that in poor households, there tends to be a negative relationship between the mother's participation in the labour force, and the health and nutritional status of the young child.[16] Our survey showed, however, that the person who takes care of the child is much more important than the mother's working condition from the child's nutrition point of view. Mothers who are obliged to work leave their babies and young children in the care of young school age sibling, thus the child may be unintentionally starved or at least deprived of proper feeding because of lack of nutrition knowledge and knowhow of the elder sibling. The effect of mother's work on the nutritional status of children varies according to the area of work the mother is engaged in the present survey. Mothers involved in farming usually have to work away from home in the field with limited child care facilities and with poor hygienic conditions, and as a result, their children have a high percentage of stunting as compared to the children of their counterparts working in industry/service where there are usually creches or daycare centres, with proper child care facilities.

Maternal age is one of the known contributory factors in the causation of malnutrition.[1,13,17] The older (above 35 years) or younger (adolescent) the mother, the more likely is the child to be malnourished. However, it was not the case in the present survey as it was in some of the previous community studies.[11]

Many authors drew attention to family size in the causation of malnutrition. Large families are more prone to having malnourished children.[11,14,17] This could be attributed to the inability of mothers to provide adequate care to their young children. Added to this, poor intrafamily food distribution and facilitated spread of infections like diarrhoea and upper respiratory tract infections are more common in crowded families. The percentage of stunted children tended to increase if the family size is 5 or more ($P<0.001$).

Some other family characteristics such as type of the family and number of siblings also have bearing on nutritional status.[1,18] Children who live in homes where there is a total of not more than two children under 5 years of age were found to be heavier than those who belong to homes with more than two under fives.[11] In accord with these findings, the percentage of stunting reached 27 per cent in families with four children compared to 16 per cent in families with two children ($P<0.001$).

Grewal *et al.*[19] showed that a larger proportion of well nourished children belonged to extended families where there was a greater likelihood of adult women being available to mother the younger child. Family structure was not found to be a risk factor among preschool children in terms of malnutrition in Turkey as it was the case in Rawson and Valverde's[18] studies.

Malnutrition and diarrhoea interacts in a vicious cycle. As nutritional status gets worse, so does diarrhoea.[20–22] Since malnourished children are more or less immunocompromised, they are prone to diarrhoea. Occurrence of diarrhoeal episode affects body weight in a short period of time. Therefore, diarrhoea in the preceding 2 weeks is more common in underweight children (14 per cent, $P<0.001$). Fever is also more common in the underweight group (13 per cent, $P<0.005$). Cough, known as to be associated with chronic malnutrition, is not found to be associated with any indicator of nutritional status ($P>0.05$). Immunization against measles is usually taken as an indicator of access to health services that may also reflect to some extent the level of maternal care and knowledge of appropriate health practices and thus it is expected to be associated with a lower level of underweight among children.[13] No such association could be demonstrated in the present survey, and is most probably due to the recent mass campaign of measles vaccination.

In the 1993 TDHS, many factors were found to be related to poor nutritional status of preschool children who are mostly stunted, whereas wasting was on the decline. Improvement in nutritional status of Turkish preschool children will only be seen when they are no longer exposed to these risk factors. To achieve this goal, an intersectoral approach and action are necessary in discouraging mothers from too early introduction of supplementary food; teaching them on the timely introduction of appropriate supplementary foods; keeping the number of preschool children in the family within acceptable limits; and providing optimal birth spacing through family planning, increasing the couple's particularly the

mother's educational status and increasing the welfare and hygiene indexes. Such an action would surely reduce these risk factors. As an indicator of children's health, nutritional or anthropometric status of children should be periodically tracked over time.

References

1. Wray JD, Aguirre A. Protein-calorie malnutrition in Candeleria, Colombia I. Prevalence; social and demographic causal factors. J Trop Pediat 1969; 15: 76–98.
2. Alleyne GAO, Hay RW, Picou DI, Stanfield JP, Whitehead RG. Protein-energy malnutrition. London: Butler & Tanner Ltd., 1979.
3. Jelliffe D. The assessment of the nutritional status of the community with special reference to field surveys in developing regions of the world, WHO Monograph Series No. 53. Geneva: WHO, 1966.
4. How to Weigh and Measure Children. Assessing the Nutritional Status of Young Children in Household Surveys, preliminary version. New York: United Nations, 1986.
5. Miller DC, Nichaman MZ, Lane M. Simplified field assessment of nutritional assessment of nutritional status in early childhood: practical suggestions for developing countries. Bull Wld Hlth Org 1977; 55: 79–86.
6. Martorell R, Habicht JP. Growth in early childhood in developing countries. In: Falkner F, Tanner JM (eds) Human Growth: A Comprehensive Treatise. New York: Plenum Press, 1986: 241–62.
7. Ministry of Health (Turkey), Hacettepe University Institute of Population Studies, and Macro International Inc., Turkish Demographic and Health Survey 1993, Ankara: Ministry of Health, 1994.
8. Jelliffe DB, Jelliffe EFP. Growth Monitoring and Promotion in Young Children. Guidelines for the Selection of Methods and Training Techniques. New York: Oxford University Press, 1990.
9. Köksal O. National Nutrition-Health and Consumption Survey of Turkey Ankara: UNICEF, 1974.
10. Infant and Young Child Feeding Current Issues. Geneva: World Health Organization, 1981.
11. Antrobus ACK. Child growth and related factors in a rural community in St. Vincent. J Trop Pediat Environ Chld Hlth 1971; 17: 187–210.
12. Morley DC, Bicknell J, Woodland M. Factors influencing the growth and nutritional status of infants and young children in a Nigerian village. Trans Roy Soc Trop Med Hyg 1968; 62: 164–99.
13. Atinmo T, Grange N, Onyezili N, Nestel P, Lutter C, Rutstein S. Nutrition and Health Status of Infants and Young Children in Nigeria. Findings from the 1990 Nigeria Demographic and Health Survey. Macro International Inc., 1993.
14. Levinson FJ. Morinda: An Economic Analysis of Malnutrition Among Young Children in Rural India. Cornell/MIT International Nutrition Policy Series, 1974.
15. Aguillon DB, Caedo MM, Arnold JC, Engel RW. The relationship of family characteristics to the nutritional status of preschool children. Food Nutr Bull 1982; 4: 5–12.
16. Popkin BM, Solon FS. Income, time, the working mother and child nutriture. J Trop Pediat Environ Child Hlth 1976; 122: 156–66.
17. Ballweg JA. Family characteristics and nutrition problems of preschool children in Fond Parisien Haiti. J Trop Pediat Environ Child Hlth 1972; 18: 230–43.
18. Rawson IG, Valverde V. The etiology of malnutrition among preschool children in rural Costa Rica. J Trop Pediat Environ Child Hlth 1976; 22: 12–17.
19. Grewal T, Gopaldas T, Gadre VJ. Etiology of malnutrition in rural Indian preschool children (Madhya Pradesh). J Trop Pediat Environ Child Hlth 1973; 19: 265–70.
20. Chen LC. Interactions of diarrhoea and malnutrition: mechanisms and interventions. In: Chen LC, Scrimshaw NS (eds) Diarrhea and Malnutrition: Interactions, Mechanisms and Interventions. New York: Plenum Press, 1983: 3–19.
21. Tomkins A. Nutritional status and severity of diarrheal diseases among preschool children in Rural Nigeria. Lancet 1981; 1: 860–2.
22. Al-Dabbagh A, Ebrahim GJ. The preventable antecedants of childhood malnutrition. J Trop Pediat 1984; 30: 50–2.