

## RELATIONSHIP BETWEEN THE CHILD NUTRITION AND SOCIO-ECONOMICAL STATUS OF THE FAMILIES LIVING IN AN OVERPOPULATED CITY IN A DEVELOPING COUNTRY

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### SUMMARY

**Objective:** We aimed to evaluate the relation of child nutrition to socio-economical status of the families living in an overpopulated city in Turkey as a developing country.

**Study design:** Five hundred children (252 male, mean age 4.64±0.14 years, range 4 months - 11.5 years) were evaluated anthropometrically for their nutritional status and for the cost of food consumed for three consecutive days. They were classified as those who are nutritionally sufficient or insufficient according to the Waterlow classification and then, the parameters related to the nutritional and socio-economical status of both groups were compared. Socio-economical status of the families was determined by the monthly income based on the minimum wages, and educational level of the parents.

**Results:** The study showed that 27.4% the children was malnourished, but their families were unaware of it. Well-nourished children had the following family characteristics: Monthly family income (408.0±11.0\$, 38% of it being spent for the food), average age of marriage of the mother (26-30 years). Other parameters related to child nutrition were as follows: The income of mother, if exists, was a primary source for the nutrition of children. Primary school-graduated mothers used any extra income for the nutrition of their child. Two of the seven children (28.57%) of the mothers who are illiterate and have low income were well-nourished. The prevalence of these mothers in our study population was low (2/500, 0.4%). In general, the children of illiterate or university graduated-mothers were better nutritionally than the children of secondary school graduated-mothers.

**Conclusion:** The children whose mothers are illiterate or graduated from university may be in better nutritional status due to their mothers' instinct of motherhood or high educational level, respectively. The economical politics in favour of consumption may have negative influence upon behaviour of mothers graduated from secondary school, as nutrition of their children was concerned. To increase the number of mothers with "art of motherhood" (who provide sufficient nutrition with low income for their children) may be suggested as a simple solution for the good nutritional politics in developing countries.

**Key words:** Motherhood, child nutrition, developing country, socio-economical status.

### ÖZET

**Amaç:** Gelişmekte olan bir ülke olarak, Türkiye'nin kalabalık bir kentinde yaşayan çocukların beslenme durumu ile ailelerinin sosyoekonomik yapısı arasındaki ilişkinin araştırılması amaçlanmıştır.

**Yöntem:** Beş yüz çocuğun (252 erkek, ortalama yaş 4.64±0.14 yıl) antropometrik ölçüleri ve ardışık üç gün süresince tükettikleri gıdaların toplam maliyeti hesaplandı. Çocuklar Waterlow sınıflamasına göre nutrisyonel olarak yeterli ve yetersiz olanlar şeklinde sınıflandırılarak, her iki grubun nutrisyonel ve sosyoekonomik yapısı ile ilişkili parametreler karşılaştırıldı. Ailelerin sosyoekonomik yapısı değerlendirilirken, asgari ücrete göre aylık gelirleri ve anne-babanın eğitim düzeyleri göz önüne alındı.

**Bulgular:** Çocukların %27.4'ünde malnütriyon belirlenmesine karşın, aileleri bu durumun farkında değildi. Beslenme durumu iyi olan çocukların ailelerinin aylık geliri 408.0±11.0\$ (gıda tüketimi için harcanan oran %38) ve bu ailelerde annenin ortalama evlilik yaşı 26-30 idi. Çocuk beslenmesi ile ilişkili diğer parametreler şunlardı: Eğer var ise, anneye ait gelir çocuğun beslenmesinde birincil kaynağı oluşturuyordu. İlkokul mezunu annelerin, var olan ekstra gelir kaynaklarını çocuklarının beslenmesi için harcadıkları belirlendi. Okur-yazar olmayan ve düşük gelirli annelere ait yedi çocuğun ikisinin (%28.57) beslenme durumu yeterli bulundu. Bu annelerin bizim çalışma popülasyonundaki oranı düşük idi (2/500, 0.4). Genel olarak, okur-yazar olmayan ve üniversite mezunu annelerin çocuklarının beslenme durumu orta okul ve lise mezunu annelerinkilere oranla daha iyi bulundu.

**Sonuç:** Okur-yazar olmayan ve üniversite mezunu anneler, sırası ile annelik içgüdüleri ve yüksek eğitim düzeylerine bağlı olarak, çocuklarını daha iyi beslemektedirler. Tüketimi körükleyen ekonomik politikalar orta okul ve lise mezunu annelerin, çocuk beslenmesi yönünden, davranışlarını olumsuz yönde etkileyebilir. Gelişmekte olan ülkelerde çocuk beslenmesine yönelik politikalar arasında basit bir çözüm de "annelik sanatı"nı iyi uygulayan (az gelirli iyi çocuk beslemeyi başaran) annelerin yetiştirilmesi olabilir.

**Anahtar sözcükler:** Analık sanatı, çocuk beslenmesi, gelişmekte olan ülke, sosyoekonomik yapı.

The economic structures of the developing countries show differences from agricultural to industrial economy and it goes parallel with the increase of emigration from rural to urban areas. Rapid urbanisation and population increase in the cities cause insufficiency in the resources and infrastructure and effect the socio-economic structure of the families living in overpopulated cities (1). The relation between the socio-economic structure of the family and child nutrition is clear (2). Figure 1 summarises the parameters associated with the socio-economic status

of a family that effect the child's nutritional status (1,2). It is an inevitable fact that those parameters which effect the nutritional state of a family may show differences depending on time and place.

This study was designed to reveal the relationship between the child nutrition and the socio-economic status of the families living in Izmir, a metropolis of Turkey. Thus, we aimed to define easy, simple and cheap solutions to make the child nutrition better for developing communities.

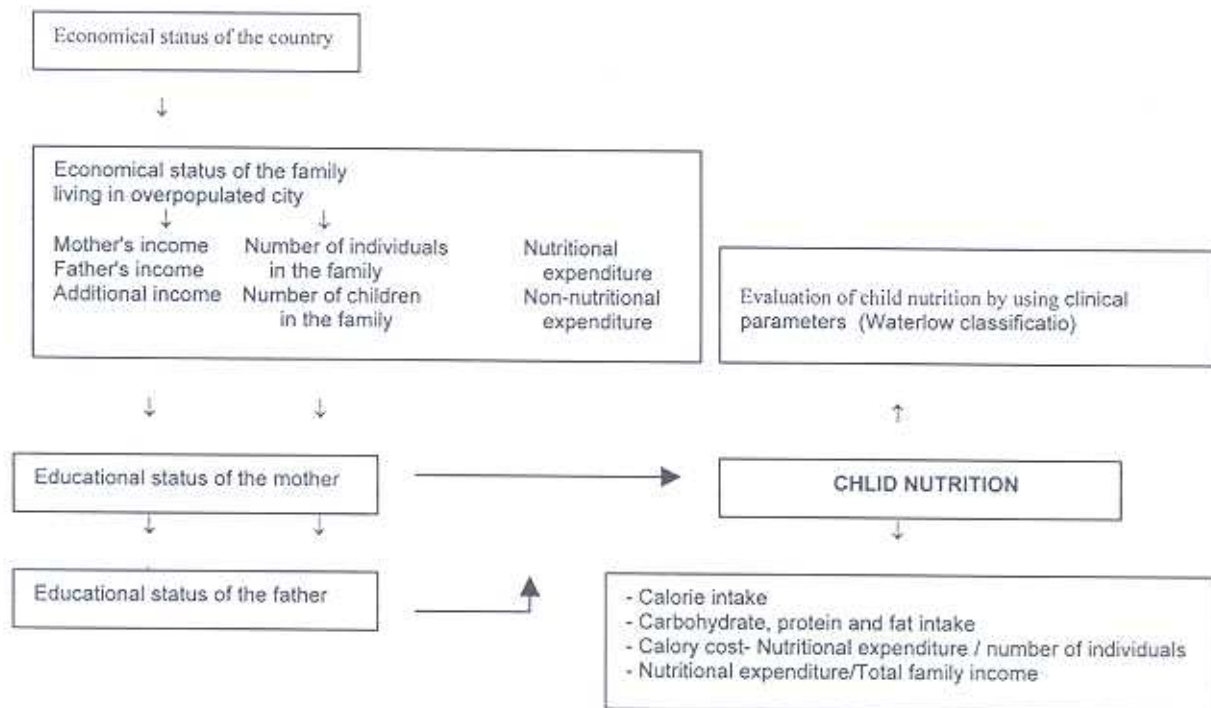


Figure 1. A model of the factors related with the family's socio-economical status that effects the child nutrition.

## MATERIALS AND METHODS

### Subjects

Subjects were selected among the otherwise healthy children presenting with upper respiratory tract infection to the outpatient clinic of Dokuz Eylül University Medical Faculty. After informed consent, the parents completed a questionnaire that detailed to

determine the socio-economic and educational status of the family.

### The calculation of the nutriments' costs

After the amount of consumed goods for three days were determined, nutrition costs per child were calculated by using the price lists of Izmir Municipality Market and the calorie cost of the child for 30 days

were calculated. All the monetary values in Turkish Lira (TL) unit were changed into US Dollars to eliminate the inflation factor.

#### **Evaluation of the nutritional profile according to the questionnaire**

The nutriment consumed by the child on the day before attending to the hospital (retrospective list) and the quality and quantity of the successive two days' nutriment that the child would consume in subsequent two days (prospective list) were obtained from the mother. Breast-fed children were excluded from the study. From these two lists of three days, children's daily calorie, protein, fat and carbohydrate intakes were calculated by using the "nutriment's ingredients scale" (3).

#### **Evaluation of the socio-economical status of the families**

Families were grouped according to their parent's both the mother's and father's educational level as illiterate, graduated from primary school (after 5 or 8 years of education), graduated from secondary school or from the university. In addition, families were grouped according to the monthly income with respect to the minimum wages and its multiples.

#### **Parameters created to evaluate the relation of family income to child nutrition**

The following parameters were calculated for each child:

1. Child's monthly nutritional cost/family total income
2. Family's monthly nutritional expenditure/family total income
3. Child's monthly nutritional cost/family's monthly nutritional expenditure
4. Child's monthly nutritional cost/(Family's monthly nutritional expenditure/ number of household)
5. Family's monthly nutritional expenditure/number of household
6. Child's monthly nutritional cost/kg
7. Family's monthly non-nutritional expenditure
8. Child's monthly nutritional cost/(kg/Family's monthly nutritional expenditure)
9. Total calorie intake of the child/kg
10. Total protein intake of the child/kg
11. Total fat intake of the child/kg
12. Total carbohydrate intake of the child/kg

#### **Evaluation of the nutritional state of the children**

Height for age (HT/A), weight for height (W/HT), triceps skin fold (TSF) thickness and mid-arm circumference (MAC) were used as anthropometric measurements. The children were grouped as "well-nourished" and "under-nourished" according to Waterlow classification in which W/HT  $\geq 90\%$  and HT/A  $\geq 95\%$  were accepted as well-nourished (4). MAC and TSF parameters were also compared in both groups to control the valuability of the evaluation of nutrition designed by Waterlow classification.

The serum transferrin level of the children were also calculated by using "0.8 x serum iron binding capacity + 43" formula (5). Serum iron binding capacity was measured by standard laboratory methods.

All the parameters were compared between the two groups. In addition, the relationships between the parameters determining the family's socio-economical status, the values showing the profile of nutrition and the nutritional status of the child were investigated statistically.

#### **Statistical Evaluation**

Statistical analyses has been done by using a minitab program in Ege University, Computer Engineering Faculty. As statistical methods, we used correlation analysis, variance analysis, t-test and x-square test. Median  $\pm$  standard deviation values has been calculated for each parameter.

## **RESULTS**

Five hundred cases were enrolled in the study. The average age of the children was  $4.64 \pm 0.14$  years (range: 4 months to 11.5 years). Two hundred and fifty

two of the children were male (50.40%), 248 were female (49.60%). Educational status of the mothers were illiterate (2.6%), primary school (5 years; 33%), secondary school (8 years; 18%), high school (31.6%) and university (14.8%). Those of the fathers were 0.2%, 14.6%, 19.2%, 41.4% and 24.6% respectively.

The ratios of the well-nourished and undernourished children based on stunted and wasting parameters in Waterlow classification were 72.6 and 27.4 percent respectively. MAC and TSF values of these groups were also significantly different, indicating that grouping by Waterlow classification was satisfactory. Mean MAC percentages of the well- and under-nourished groups were  $112.02 \pm 11.52$  and  $55.78 \pm$

$7.74$  ( $p < 0.001$ ). Mean TSF percentages of the well- and under-nourished groups were  $118.01 \pm 13.62$  and  $53.23 \pm 9.25$  ( $p < 0.001$ ). Mean age, number of individuals in the family, and mother's age at marriage were not different among the groups (Table I). The relationship of nutritional sufficiency to the mother's and father's educational status was shown in Figures 2 and 3. As it is seen, nutritional sufficiency rate increases as the educational level of the parents increase, being highest among those graduated from university. However, among the illiterate mothers, two women had a total of seven children and five of these children (71.5%) were nutritionally sufficient. Surprisingly, these two women were in the low income group as well.

Table I. Comparison of the children in the well-nourished and under-nourished groups (The values are expressed as mean  $\pm$  SD)

	Well-nourished Group	Under-nourished Group	p
Age (year)	$4.59 \pm 0.16$	$4.78 \pm 0.29$	0.34
Number of the family members	$3.85 \pm 0.04$	$3.94 \pm 0.08$	0.21
Mother's age at marriage (year)	$21.60 \pm 0.20$	$21.50 \pm 0.37$	0.79
Child's calorie intake per kg (kcal/kg)	$78.90 \pm 0.99$	$56.70 \pm 1.90$	0.00001
Child's protein intake per kg (g/kg)	$2.17 \pm 0.03$	$2.11 \pm 0.07$	0.41
Child's fat intake per kilogram (g/kg)	$2.88 \pm 0.05$	$2.62 \pm 0.09$	0.0063
Child's carbohydrate intake per kg (g/kg)	$6.73 \pm 0.14$	$6.00 \pm 0.23$	0.0060
Total income of the family (US Dollar)	$408 \pm 11$	$315 \pm 12$	0.00001
Family's monthly nutritional expenditure (\$*)	$154.90 \pm 0.89$	$132.5 \pm 0.79$	0.0012
Family's non-nutritional expenditure (\$*)	$253 \pm 8.7$	$182 \pm 10$	0.00001
Child's monthly nutritional cost (\$*)	$44.40 \pm 0.89$	$23.5 \pm 0.79$	0.00001
Child's monthly nutritional cost per kg (\$*)	$2.92 \pm 0.08$	$1.87 \pm 0.10$	0.00001
Child's monthly nutritional cost/			
Family's monthly nutritional expenditure	$29.00 \pm 0.003$	$18 \pm 0.004$	0.00001
Child's monthly nutritional cost per kg/			
Family's monthly nutritional expenditure	$2.00 \pm 0.0006$	$1.5 \pm 0.0007$	0.00001
Child's monthly nutritional cost/			
Nutritional expenditure per individual	$1.11 \pm 0.009$	$0.69 \pm 0.013$	0.00001
Serum transferrin level (ng/dl)	$228.20 \pm 2.70$	$190.5 \pm 3.0$	0.00001

\* : US Dollar

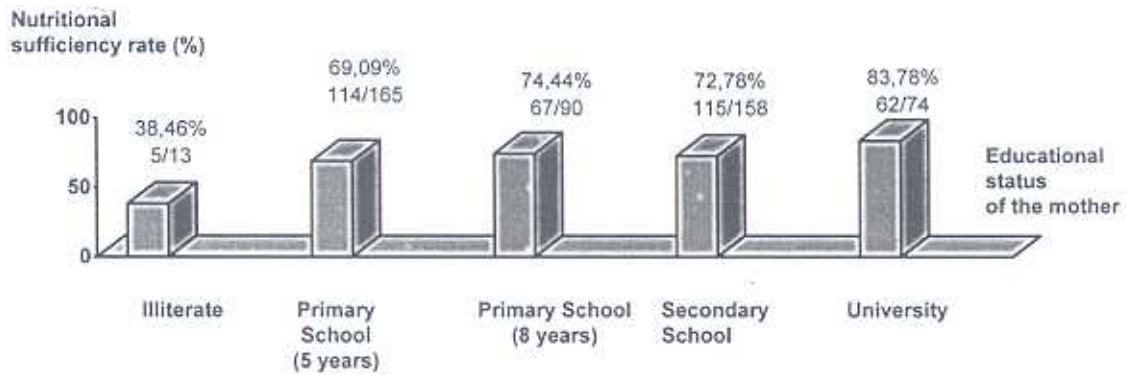


Figure 2. The relationship between the mother's educational status and nutritional sufficiency rate of the children ( $p < 0.01$ ).

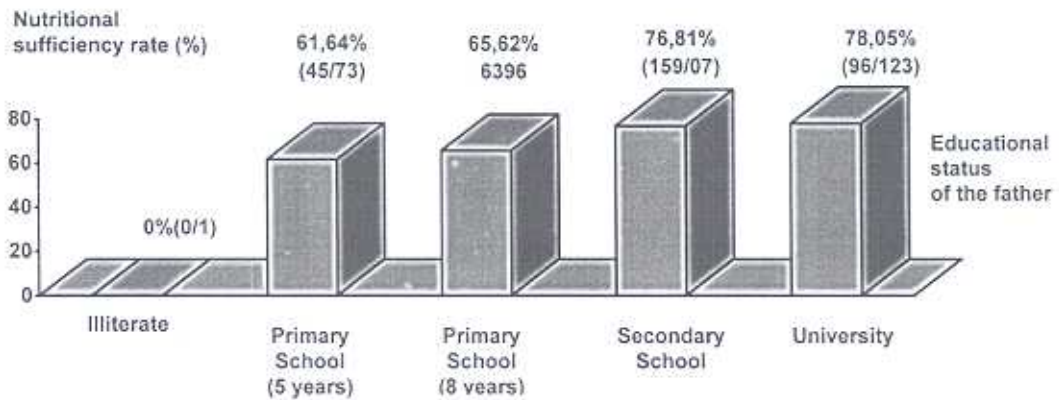


Figure 3. The relationship between the father's educational status and nutritional sufficiency rate of the children ( $p < 0.025$ ).

In this study, the results which are more valuable for our regional population are listed below:

1. There was a difference in the children's calorie intake/kg between the well-nourished and under-nourished groups. However, when we consider the energy source, in the well-nourished group there was a significant increase in carbohydrate and fat consumption, but there was no difference in protein consumption among the groups (Table I).
2. Family's total income, the child's monthly nutritional costs, child's monthly nutritional cost/kg, family's monthly nutritional and non-nutritional expenditure were significantly higher in the well-nourished group (Table I).
3. Also, the ratio of the child's monthly nutritional cost to the family's monthly nutritional expenditure and the ratio of the child's monthly nutritional cost to the nutritional cost of each individual in the family were significantly less in the under-nourished group (Table I).
4. Nutritional sufficiency rate was higher among the children whose mothers contribute to income

- ( $p < 0.005$ , Figure 4). Monthly nutritional cost ( $45.4 \pm 1.50$  \$) and monthly nutritional cost per kilogram ( $3.09 \pm 0.14$  \$) were higher in this group of than the children who have non-working mothers ( $35.3 \pm 0.89$  \$ and  $2.41 \pm 0.08$  \$ respectively) ( $p = 0.00001$  for both parameters).
5. In terms of child nutrition, the ideal marriage age of the mother was determined as 26-30 years old for the families living in Izmir. In this group of mothers, nutritional sufficiency of the children was significantly higher than the other groups (39/43-90.7% and 324/457-70.9%, respectively) ( $p < 0.01$ ).
  6. When we evaluate the income of the families in terms of minimum wage and its folds, there was a significant difference of nutritional sufficiency between the children of the families with income less than the minimum wage and those with income equal or higher than the minimum wage (12.5 and 73.8 percent respectively, Figure 5,  $p < 0.005$ ). However, no significant increase in nutritional sufficiency rate of the children was present in between the families with income two to three times the minimum wage and the families with income equal to the minimum wage (Figure 5,  $p > 0.05$ ). As it is seen in Figure 5, in a family including  $3.85 \pm 0.04$  individuals and living in Izmir, the minimum wage must be at least five times more (556.7 \$) to increase nutritional sufficiency

over 90 percent.

7. Nutritional sufficiency rates of the children with respect to their mothers' educational levels are shown in Figures 6 through 10. Increase in the income of family with primary school (5 years) and university-graduated mothers (Figures 7 and 10) was reflected directly in the child's nutrition, whereas no change was observed in the nutritional status of the children whose mothers were graduated from secondary school (Figure 9). The same pattern was also present in the children of primary school (8 years)-graduated mothers, when we exclude those with income of minimum wages (Figure 8). Such a pattern could not be evaluated in the families where the mothers were illiterate due to the low number of cases (Figure 6).
8. The ratio of the mothers with poor educational level and low income, but having nutritionally sufficient children was 28.57 percent (2/7) in the illiterate group with a minimum wage income (Figure 6). In our study population of 500 cases, the prevalence of these mothers was low (2/500, 0.4%).
9. When we compared the serum transferrin levels, it was within the normal limits in the nutritionally sufficient group, but below the lower limit of normal in the nutritionally insufficient group ( $p = 0.00001$ ) (Table I).

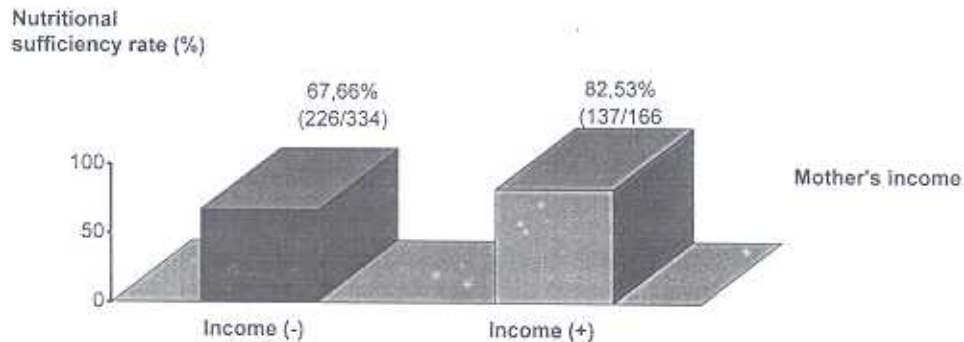


Figure 4. The comparison of the child's nutritional sufficiency rate with the mother's income ( $p < 0.005$ ).

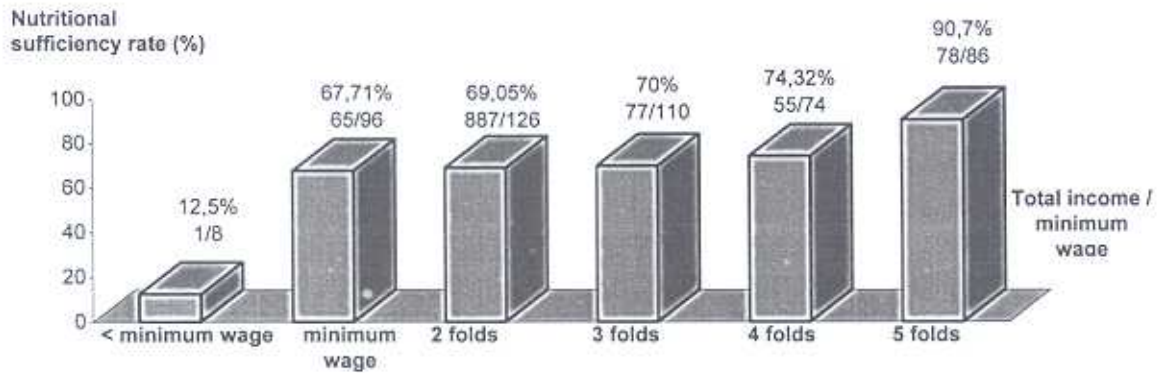


Figure 5. The relation between the nutritional sufficiency rate and the total income in terms of minimum wage.

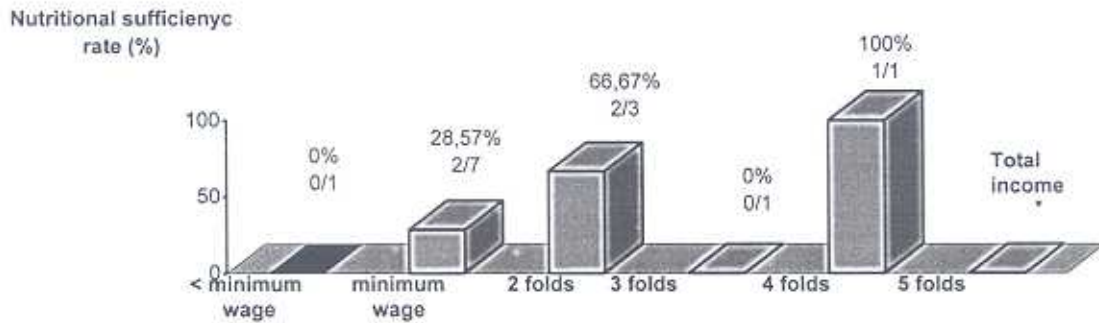


Figure 6. Nutritional sufficiency rate of the children whose mothers are illiterate with respect to the total monthly income (\*No case).

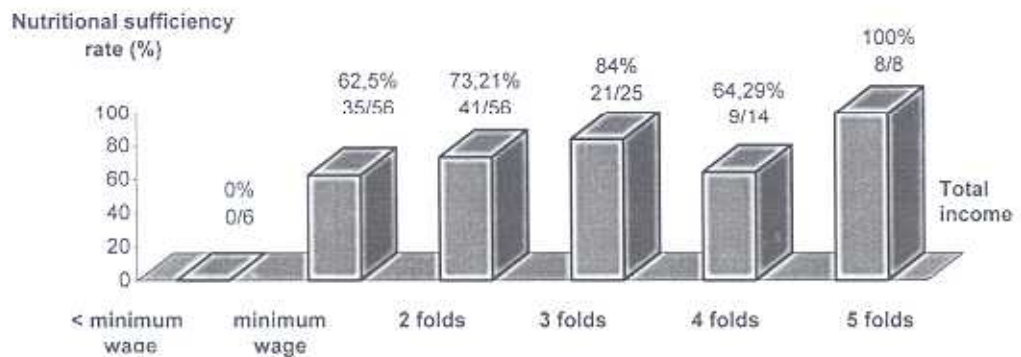


Figure 7. Nutritional sufficiency rate of the children whose mothers are graduated from primary school (5 years) with respect to the total monthly income ( $p < 0,05$ ).

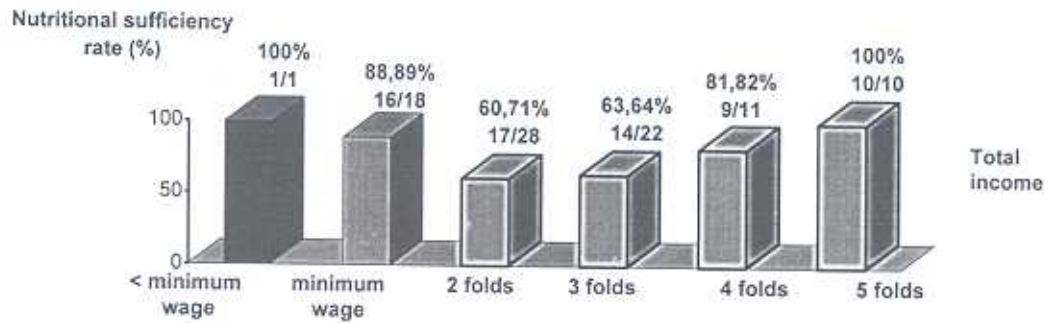


Figure 8. Nutritional sufficiency rate of the children whose mothers are graduated from primary school (8 years) with respect to the total monthly income.

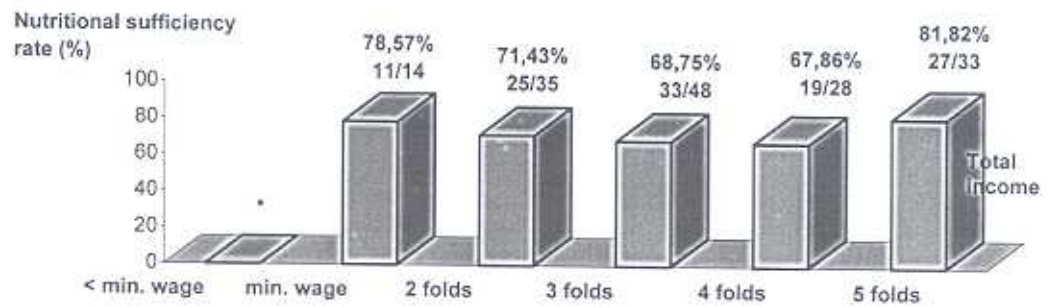


Figure 9. Nutritional sufficiency rate of the children whose mothers are graduated from secondary school with respect to the total monthly income (\*No case) ( $p>0.05$ ).

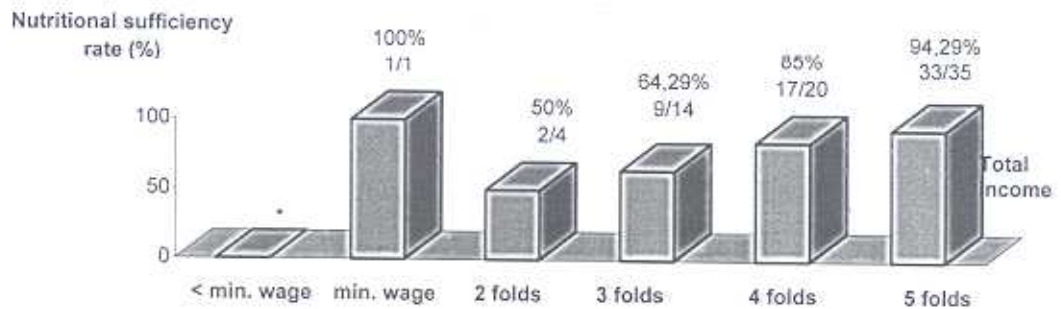


Figure 10. Nutritional sufficiency rate of the children whose mothers are graduated from university with respect to the total monthly income (\*No case) ( $p<0.05$ ).



## DISCUSSION

In this study, the socio-economical status of the families and the child nutrition were analysed in Izmir, an overpopulated city, in Turkey. The results were consistent with the literature (6-14), and could be obtained in every society.

Although 27.40% of the cases were nutritionally insufficient, none of the families were aware of this nutritional problem. The selection of the cases from these children who were referred to a University hospital might have contributed to this high ratio. However, this fact shows us the reality of a big social problem we have come across to.

The ideal marriage age for the mother to have a nutritionally sufficient child is between 26-30 years according to our findings. In the age groups below 26-30 years, the number of children increases and the time spent for each child decreases. Therefore the mother can not give sufficient attention to her children. When the mother's marriage age increases, although the socio-economical factors are sufficient enough, the nutritional factors in the intrauterine period become more important than the extra uterine period. Although all the socio-economical parameters were good enough for these old age group in our study population, since we did not ask about the birth-weight of the children, we could not support this hypothesis.

When we investigated the economical parameters between the nutritionally sufficient and insufficient groups, we found great differences. The number of households are nearly the same in both groups, and there is no significant relation in this parameter. Monthly total income is  $408 \pm 11$  \$ in the nutritionally sufficient group and  $315 \pm 12$  \$ in the nutritionally insufficient group. However, monthly nutritional expenditure was  $154.9 \pm 3.8$  \$ in the nutritionally sufficient group and  $132.8 \pm 4.6$  \$ in the other group (Table I). These findings were relevant with the literature (14-17). The difference between the monthly

total income was about 95 \$, but the difference between the monthly nutritional expenditure was only 22 \$. This result shows us that, besides a sufficient nutrition, there are some other factors effecting the child's nutritional status, such as infections, poor sanitation, etc. In our study, we have not investigated the sanitation and environmental factors.

Another important finding is that, when the mother's income increases, the child's monthly nutritional cost/family's monthly nutritional expenditure increases ( $p < 0.001$ ). However, when the father's income increases the child's monthly nutritional cost/the family's monthly nutritional expenditure decreases ( $p < 0.01$ ). This result shows us that the mother's income has primarily been spent for the child's nutrition.

When we investigate the relation of monthly income based on minimum wage and its folds and the mother's educational level with nutritional sufficiency rate, we have not enough cases for illiterate and primary school (8 years) groups. In case of the primary school (5 years) and university-graduated mothers, if the family's monthly total income increases, it has directly reflected to child's nutrition, but the secondary school-graduated mothers do not reflect the income increase to the child's nutrition. This group is mostly effected by the modern life's adverts and unconscious consumption is governing them and their families. This result shows us to reorganise the society's consumption economy. Additionally, if the education is given in ideal conditions and the conservational culture is protected, and if the mother's income increases with the minimum wage and its folds, nutritional sufficiency ratio increases. However, there is no great difference in nutritional sufficiency in the minimum wage's two folds and three folds range. This indicates that, in this income group, child's nutrition is not effected positively. If the income is five folds of the minimum wage level (556.7 \$/month), this is directly reflected to child's nutrition.

The nutritional sufficiency rate of the children among the group of mothers who were illiterate and had income in the range of minimum wage was 2/7 (28.57). They have a 6 year old and a 7 year old child respectively. Because the children were not at breast-feeding age, it would have given us more significant results to evaluate their nutritional status. (%). The ratio of these mothers in our total population was

2/500 (0.4%). We think that it should be deeply investigated how they feed their children as we call this "art of motherhood". We expect these findings will show us new directions about how to educate the mothers in poor socio-economical conditions in terms of child nutrition. The realisation of this study in the whole country's urban and rural areas will show new directions to the state's politics about child nutrition.

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