INTRODUCTION
Measles is a highly contagious disease usually seen in childhood. It can prove fatal and is primarily controlled by vaccination (1). In this study, the authors aimed to determine the seroprevalence of measles antibodies in children six years and under in Eastern Turkey and to identify the relationship between measles seroprevalence and several socio-demographic characteristics, and to develop the best vaccination policy for measles.

The study sample consisted of 840 children, up to six years of age, from three provinces (Erzurum, Erzincan and Kars). The cluster sampling method was used for selecting subjects of a predetermined number in the rural and urban areas (2, 3). A composite index was used to determine the socio-economic level of the family (4).

METHOD
The vaccination status of measles was obtained from vaccination cards: children were categorized as vaccinated, unvaccinated and unknown (if no vaccination status was known). All vaccinated children had one measles vaccine after nine months. The data, in this study, were obtained from 767 (91.3%) children. Measles specific IgG antibodies were screened qualitatively by enzyme linked immuno-sorbent assay (ELISA) test (Virotech kits) (5–7). For statistical analysis chi-square was used.

RESULTS
The numbers of subjects selected for sampling is presented in Table 1. The several socio-demographic characteristics of subjects are shown in Table 2. Positive seroprevalence was detected in 59.4% of children younger than six years. Table 3 shows the distribution of measles seroprevalence by several socio-demographic characteristics. Although the mean rate was around 50–80%, seroprevalence rates by provinces were 48% (Erzurum), 79.9% (Erzincan) and 73.7% (Kars).

Measles antibodies were detected in 58.7% of the children younger than one year, whereas rate after one year of age was between 56.3% and 63.8%. The seroprevalence was not affected by gender, sibling size and socio-economic status (p > 0.05). While seroprevalence increased with educational level of mother and father, there was statistically significant correlation with the educational level of mothers (p < 0.01). It was 67.5% and 65.3%, respectively, in urban and rural areas (p < 0.01). Positive seroprevalence was detected in 63.4%, respectively, in vaccinated and unvaccinated children.
DISCUSSION

In Turkey, a single-dose measles vaccine at nine months of age is being administered, as recommended by the World Health Organization (WHO). Of children included in this study, 59.4% were seropositive. According to the results in the present study, the optimal strategy for measles immunization in Turkey may be to administer a second dose of measles vaccine at 18 months of age with the diphtheria-tetanus-pertussis vaccine, in addition to a catch-up campaign.

There was no difference in positive seroprevalence rate with respect to socio-economic status, sibling size and educational level of fathers. There was a significant difference in seroprevalence rate in respect to educational level of mothers, settlement area and vaccination status.

All vaccinated children in the study had one measles vaccine after nine months of age. Of them, 63.4% were seropositive.

This study showed that the two-dose schedule is successful in achieving high levels of immunity. The routine measles vaccination schedule in Turkey can be changed to a two-dose vaccination schedule. A catch-up vaccination campaign covering children aged one to six years could be conducted, irrespective of vaccination status.

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Table 3: Measles seroprevalences for 456 children aged 0-6 years by socio-demographic characteristics in three cities of Eastern Turkey

| Characteristic          | Number | Positive seroprevalence (%) | p     |
|-------------------------|--------|-------------------------------|-------|
| Age (months)            |        |                               |       |
| < 12                    | 91     | 58.7                          | > 0.05|
| 12–23                   | 103    | 56.3                          |       |
| 24–35                   | 104    | 63.8                          |       |
| 36–47                   | 60     | 58.8                          |       |
| 48–59                   | 55     | 57.9                          |       |
| 60–72                   | 43     | 62.3                          |       |
| Gender                  |        |                               |       |
| Boy                     | 250    | 61.3                          | > 0.05|
| Girl                    | 206    | 57.4                          |       |
| No of siblings          |        |                               |       |
| # 3                     | 389    | 61.1                          | > 0.05|
| > 3                     | 67     | 51.5                          |       |
| Educational level       |        |                               |       |
| of mothers              |        |                               |       |
| No literacy             | 83     | 49.1                          | < 0.01|
| Primary school          | 285    | 61.8                          |       |
| Secondary-high school   | 79     | 62.7                          |       |
| University              | 9      | 81.8                          |       |
| Educational level       |        |                               |       |
| of fathers              |        |                               |       |
| No literacy             | 27     | 45.8                          | > 0.05|
| Primary school          | 171    | 61.5                          |       |
| Secondary-high school   | 208    | 58.6                          |       |
| University              | 50     | 66.7                          |       |
| Socio-economic status   |        |                               |       |
| High                    | 119    | 64.7                          | > 0.05|
| Moderate                | 299    | 59.4                          |       |
| Low                     | 38     | 63.5                          |       |
| Settlement area         |        |                               |       |
| Urban                   | 185    | 67.5                          | < 0.01|
| Suburban                | 173    | 50.4                          |       |
| Rural                   | 98     | 65.3                          |       |
| Vaccination status      |        |                               |       |
| Vaccinated              | 343    | 63.4                          | < 0.05|
| Unvaccinated            | 49     | 49.0                          |       |
| Unknown                 | 13     | 59.0                          |       |