# A REFLECTION OF SOCIAL INEQUALITY: CHILDHOOD MALNUTRITION IN TURKEY[1]

# SOSYAL EŞİTSİZLİĞİN BİR YANSIMASI: TÜRKİYE'DE ÇOCUKLUK DÖNEMİNDE YETERSİZ BESLENME

TUĞBA ADALI*
SABAHAT TEZCAN**

## ABSTRACT

Malnutrition among children has been on the decrease in Turkey for the last two decades. The proportion of underweight children under age five has decreased from 9.5 percent in 1993 to 2.8 percent in 2008. One of the aims of the Millenium Development Goals (MDG) was to halve, between 1990 and 2015, the proportion of people who suffer from hunger. Not having hunger as a problem in its public health agenda, Turkey reached beyond the target of halving the chronic malnutrition indicator. However, malnutrition remains an important problem, since one in ten children is still stunted. Even more importantly, inequalities persist among subpopulations. Our findings showed that the proportion of stunted children is higher in the Eastern region of Turkey – a region typically characterized by poorer socio-economic indicators. The proportion of stunted children is as high as 22 percent for households with the lowest household wealth levels. Our study focused on the changes in childhood chronic malnutrition over time for main demographic regions and wealth levels to see how inequalities evolved over time. We further attempted to identify the risk groups of childhood chronic malnutrition from the latest available Demographic and Health Survey (DHS) data. We aimed to provide insight for policy implementation.

KEYWORDS: malnutrition, inequality, concentration index, DHS, Turkey

[1] This paper has been prepared for the global thematic consultation on Addressing Inequalities in the Post-2015 Development Agenda in October, 2012. This earlier verison of the paper can be found at https://www.worldwewant2015.org/node/291330. We wish to thank Prof. Dr. Banu A. Ergöçmen and Assoc. Prof. Dr. İlknur Yüksel-Kaptanoğlu for their valuable feedback on the previous and current versions of our paper.

*Dr., Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, D Blok 5. Kat, Sıhhiye, Ankara. tadali@hacettepe.edu.tr
**Prof. Dr., Emekli öğretim üyesi, Hacettepe Üniversitesi Tıp Fakültesi Halk Sağlığı Ana Bilim Dalı, Sıhhiye, Ankara. sabahatt@hacettepe.edu.tr
Received on/Makale gönderim tarihi: July 14, 2015/14 Temmuz 2015
Accepted on/ Makale kabul tarihi: September 28, 2015/28 Eylül 2015

## ÖZET

Türkiye'de son 20 yıldır çocukluk dönemi yetersiz beslenme azalmaktadır. Düşük kilolu çocukların oranı 1993 yılında yüzde 9,5 iken, 2008 yılında yüzde 2,8'e gerilemiştir. Binyıl Kalkınma Hedefleri'nden bir tanesi 1990 ve 2015 yılları arasında açlığın yarı yarıya azaltılması olarak belirlenmiştir. Türkiye'de açlık, halk sağlığı gündeminde bir sorun olarak yer almazken, Türkiye kronik yetersiz beslenme göstergesini yarı yarıya düşürerek söz konusu hedefin ötesine geçmiştir. Bununla birlikte, yetersiz beslenme, her on çocuktan birinin yaşına göre kısa olmasının gösterdiği üzere halen bir sorun olarak göze çarpmaktadır. Daha da önemlisi, alt nüfus grupları arasında eşitsizlikler gözlenmektedir. Bulgulara göre yaşına göre kısa olan çocukların oranı, genellikle sosyo-ekonomik göstergeler açısından daha dezavantajlı konumda bulunan Doğu bölgesinde daha yüksektir. Yaşına göre kısa olan çocukların oranı en düşük refah düzeyindeki hanelerde yüzde 22'ye kadar yükselmektedir. Bu çalışmada çocukluk dönemi yetersiz beslenmenin zaman içinde değişimi demografik bölgeler ve refah düzeyleri ayrımında incelenmektedir; böylece eşitsizliklerin zaman içindeki değişimi gözlenebilmektedir. Buna ek olarak çocukluk dönemi yetersiz beslenmenin risk grupları da verisine erişilebilen son Türkiye Nüfus ve Sağlık Araştırması kullanılarak belirlenmeye çalışılmıştır. Bulguların politika yapıcılıkta yararlı olması hedeflenmiştir.

ANAHTAR KELİMELER: yetersiz beslenme, eşitsizlik, yoğunlaşma endeksi, TNSA, Türkiye

## INTRODUCTION

Malnutrition in childhood negatively affects development (Bredenkamp et al., 2014). It paves the way for disease, contributing to infant and child mortality. Because of this cruciality, the eradication of extreme poverty and hunger was designated to be the first item of the Millennium Development Goals. The target was to halve, between 1990 and 2015, the proportion of people who suffer from hunger. As for Turkey, hunger has never been on the public health agenda of the country (TR PM SPO, 2010). Turkey has shown significant improvements regarding mother and child health, especially in the last few decades. Maternal and under five mortality rates have decreased dramatically with the legalization of contraception and abortion; widening of antenatal and delivery services, and higher immunization coverage. Along with these changes, the proportion of under-weight children under age five has also decreased; from one in ten children in 1993 to 3 percent in 2008. With this decrease, Turkey succeeded beyond the MDG target of halving this indicator. However, there is more to focus on regarding malnutrition.

Despite the low prevalence of underweight children, one in ten children is still stunted in Turkey (HUIPS, 2009). Stunting; meaning shortness for age, is a condition reflecting poor environmental conditions and the cumulative effects of poor dietary and infections starting with birth, resulting in a failure to reach growth potential. Affecting about 162 million children around the world, it does not only present physical problems, but may also slow down the mental development of children (WHO, 2014). Furthermore, it is known to be associated with higher morbidity and mortality, lower success in education, and less productivity in adulthood (Monteiro et al., 2010).

Literature from developing countries shows that malnutrition is a vicious cycle. Malnutrition succeeds low birth weight, and low birth weight succeeds maternal malnutrition (Omilola, 2010); and children who suffered malnutrition in childhood grow to be mothers suffering from malnutrition. This does not hold for Turkey where adult malnutrition is rare, with only 1.6 percent of mothers classified as thin (BMI<18) in 2008 (HUIPS, 2009). This does not necessarily mean that adults have balanced diets of good quality. While cheap, energy-dense and nutrient-poor foods may have a negative effect on child growth, they may cause adults to gain extra weight; causing paradoxical pairs of overweight mothers and growth retarded children (Jehn and Brewes, 2009). This phenomenon, as Jehn and Brewes (2009) suggested, is observed in the higher income countries among DHS countries from Africa, Americas and Asia. As a matter of fact, the leading nutrition related problem in Turkey for adults is obesity (BMI>30), with a prevalence of 24 percent for mothers aged 15-49 (HUIPS, 2009).

The regional and wealth distribution of stunted children exposes the major problem regarding this indicator: Inequalities. Inequalities on child growth begin as early as birth. Previous analysis from Turkey showed that size at birth was significantly associated with stunting in children under age 5 (Yiğit et al., 2010). Even when controlling for this variable, children who live in the Eastern part of Turkey and in poorer households were found to carry larger burdens of malnutrition problems (Yiğit et al., 2010). These disparities indicate the necessity for a new agenda on childhood malnutrition in Turkey.

Inequalities in childhood malnutrition among geographic regions and household wealth levels are well documented in the literature. Many countries maintain a degree of heterogeneity between its states or regions due to different ethnic or religious groups, economic development, geography or climate. All these are reflected on socio-economic indicators as well as health indicators. Related studies from Cambodia (Hong et al., 2006a), Nigeria (Omilola, 2010); India (Singh, 2011); Bangladesh (Hong et al., 2006b) and Uganda (Ssewanyana and Kasirye, 2012a) controlled for region in their analysis on childhood malnutrition, recognizing its relevance.

In Turkey, the East region is traditionally the most disadvantaged region, with the highest levels of infant mortality and fertility. The West region, on the other hand, traditionally performs the best in terms of socio-demographic indicators, covering the largest metropolitan area in Turkey-Istanbul. However, the distinct behavior of West seems to be converging with the other regions recently, except for the Eastern region. Regional poverty rates by

relative poverty thresholds based on income (calculated according to 60 percent of median income in Turkey) vary by a great extent. The poverty rate in two subregions of the East are 12.3 and 27.5 (in Central East Anatolia and South East Anatolia respectively); compared to 4.9 in İstanbul and 3.3 in West Marmara, both part of the West region (Doğan, 2014).

Wealth inequalities in stunting were observed in many developing countries such as India, Bangladesh, Malawi, Nigeria, Uganda and Cambodia (Kanjilal et al., 2010; Subramanyan et al., 2010; Mussa, 2011; Omilola, 2010; Ssewanyana and Kasirye, 2012b; Hong et al., 2006; Van de Poel et al., 2008) studied data from 47 DHS countries, concluding that stunting disproportionately affected the poor. Barros et al. (2010) found that stunting and overweight were usually twice as prevalent for the poor than the rich all around the world. Ssewanyana and Kasirye (2012a) found that 70 percent of inequalities in stunting was explained by wealth inequalities in their study from Uganda. Previous studies from Turkish DHS data also showed the significance of household wealth in childhood stunting (Yiğit et al, 2010).

Recent literature also suggests the persistence of existing inequalities. Van de Poel et al. (2008) suggested that reducing the overall rate of malnutrition did not translate into a reduction in inequality. Bredenkamp et al. (2014), focusing specifically on changes over time, emphasized that the global pattern suggested a persistence of inequalities, despite the achivements against undernutrition.

This study examined changes in childhood malnutrition indicators in Turkey through the last 15 years in the basis of regions and household wealth. Emphasis was made on the changes in inequalities over time. Further findings on childhood chronic malnutrition from the last Turkey DHS were presented to identify risk groups for policy purposes.

## DATA AND METHODS

Data for this study were employed from the Turkey Demographic and Health Surveys (TDHS), 1993, 1998, 2003 and 2008 (from here will be referred to as TDHS-1993, TDHS-1998, TDHS-2003 and TDHS-2008 respectively). All four surveys were conducted by the Hacettepe University Institute of Population Studies with the collaboration of the Ministry of Health General Directorate of Mother and Child Health. Macro International Inc.; UNFPA and USAID; Turkey State Planning Organization and European Union; Turkey State Planning Organization were the other collaborators in the TDHS-1993; TDHS-1998; TDHS-2003 and TDHS-2008 respectively.

The surveys aimed to provide data on fertility, mortality, family planning and maternal and child health. Data was collected through face-to-face interviews with ever-married women of reproductive ages (15-49), except for TDHS-1998 where all women regardless of marital status were interviewed. A household questionnaire preceded the women's questionnaire, enabling the recording of household and household member characteristics, as well as the determination of eligible women for individual interviews.

The TDHSs share similar sample designs; a weighted, multi-stage, stratified cluster design was employed to ensure a nationally representative sample that would allow analysis for urban and rural areas, as well as the five main demographic regions of the country (namely West, South, Central, North and East). Details of the sample implementation are in Table 1.

Heights and weights of women and children under the age of five were measured at the end of each interview. These measurements provided the data for the calculation of malnutrition indicators for children, which were calculated in comparison to a reference group defined by the US National Center for Health Statistics, and accepted by the Center for Disease Control and World Health Organization. Van de Poel et al. (2008) showed that the use of the newer standard of child growth for assessing childhood malnutrition – the WHO 2006 Child Growth Standards – actually increased average malnutrition; however, estimates of socioeconomic inequality remained unaffected.

**Table 1 Sample implementation for the Turkey Demographic and Health Surveys**

| | TDHS-1993 | TDHS-1998 | TDHS-2003 | TDHS-2008 |
|---|---|---|---|---|
| Completed number of household interviews | 8,622 | 8,056 | 10,836 | 10,525 |
| Household response rates | 96.8 | 93.8 | 92.9 | 88.4 |
| Completed number of ever-married women interviews | 6,519 | 6,152 | 8,075 | 7,405 |
| Women's response rates | 95 | 90.6* | 95.6 | 92.5 |
| Number of U5 children | 3,724 | 3,565 | 4,533 | 3,857 |
| Children with heights measured | 3,193 | 2,845 | 4,074 | 2,801 |
| Children with weights measured | 3,256 | 2,990 | 4,154 | 2,972 |

* Includes both ever-married and never-married women, as opposed to other surveys that are based on ever-married women only.

Although analysis mainly focused on stunting, three indicators in total are used in this paper to assess childhood malnutrition: Height-for-age, weight-for-height and weight-for-age. The height-for-age variable is generally used to indicate past or chronic malnutrition, showing linear growth retardation. It can be traced back to pregnancy, and is closely related to frequent infections and chronic disease. Children who are two standard deviations below the median value of the reference population are defined as stunted. Weight-for-height is an indicator used to determine acute malnutrition, easily affected by recent infections and diarrhea, fluctuating seasonally. A child is said to have acute malnutrition if his/her value is below two standard deviations of reference median, and is defined as wasted. The weight-for-age index is a rather composite index, summarizing both chronic and acute malnutrition. Children under two standard deviations of reference

median have the risk of growing to be stunted or wasted if not fed better; and they are defined as underweight (HUIPS, 1999).

Changes in these three indicators were assessed from TDHS-1993 to TDHS-2008. Low-high ratios and the concentration index were calculated to assess the changes in wealth inequalities over time, as explained in O'Donnell et al. (2008). The concentration index takes values between -1 and 1; and the closer to -1, the deeper the disadvantage for the poor (Kanjilal et al., 2010). When used for a coverage type variable, the closer the value gets to 1, the more in favor the indicator is for the rich (Barros et al., 2010).

Changes in time were assessed for regions and household wealth. Five regions were defined in each survey, which are known to differ in health indicators, as explained earlier. Household wealth variables were calculated by factor analysis. An index was calculated for each household based on the ownership of certain assets, which were then classified into quintiles. This indicator is widely used in studies from DHSs, and is explained in detail in Rutstein and Johnson (2005).

This paper further aimed to focus on nutritional inequalities through the height-for-age variable as its dependent variable from the most recent DHS data set in Turkey (TDHS-2008). One reason for this preference is the very low levels of acute malnutrition in Turkey. The other reason is that chronic malnutrition dominates the literature for the analysis of malnutrition; because it is not affected by seasonal fluctuations or other temporal effects as acute malnutrition indicators are.

Prevalence of stunting was calculated for a set of selected covariates that aim to help determine the groups most affected by this problem. Logistic regression analysis was performed to assess the significance of wealth and region with their dual presence, controlling for the selected covariates. All employed covariates are mentioned as relevant in the literature, and they were also found to be significant in earlier work from TDHS-2008: Education of mother, age of child, birth order, size at birth, and breastfeeding (Yiğit et al., 2010). The logistic regression model was built with stunting as the dependent variable, and an interaction term was added for breastfeeding and age, for breastfeeding's association with stunting can change with age (e.g. Marquis et al. 1997 mentioned reverse causality for the breastfeeding of toddlers, suggesting children were not stunted because they were breastfed, but rather breastfed because they suffered from poor growth or health). Also, according to the WHO (2012), the age of the child modifies the interpretation of the findings regarding chronic malnutrition; stunting reflects "failing to grow" for children under the age of 2 or 3, and "having failed to grow" for older. Complex sample features were taken into account in the calculations, using the Complex Sample Module of SPSS 18.

## RESULTS

According to the findings of the Turkey Demographic and Health Surveys 1993-2008, the proportions of stunted, underweight or wasted children have

decreased dramatically in the last 15 years (Table 2). The proportions of underweight or wasted children decreased by about 70 percent during this period; and the proportion of stunted children decreased by 46 percent. This indicates that Turkey will have already fulfilled the MDG target before 2015.

**Table 2 Changes in malnutrition indicators from the Turkey Demographic and Health Surveys**

| | Stunted (height-for-age) | | | | Under-weight (weight-for-age) | | | | Wasted (weight for height) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1993 | 1998 | 2003 | 2008 | 1993 | 1998 | 2003 | 2008 | 1993 | 1998 | 2003 | 2008 |
| Turkey | 18.9 | 16.0 | 12.2 | 10.3 | 9.5 | 8.3 | 3.9 | 2.8 | 3.0 | 1.9 | 0.7 | 0.9 |
| **Region** | | | | | | | | | | | | |
| West | 10.2 | 9.9 | 5.5 | 7.6 | 4.8 | 3.8 | 1.9 | 1.0 | 2.6 | 1.5 | 0.7 | 0.9 |
| South | 14.8 | 13.5 | 10.4 | 7.6 | 6.8 | 8.9 | 2.8 | 3.0 | 1.4 | 2.2 | 0.4 | 0.0 |
| Central | 18.8 | 11.6 | 9.5 | 4.5 | 7.0 | 5.4 | 2.9 | 2.1 | 1.8 | 1.3 | 0.8 | 0.5 |
| North | 12.9 | 12.8 | 13.0 | 7.0 | 6.4 | 4.8 | 2.2 | 2.8 | 1.4 | 1.6 | 0.7 | 1.5 |
| East | 33.3 | 30.0 | 22.5 | 21.0 | 19.7 | 17.1 | 7.7 | 5.8 | 5.9 | 2.9 | 0.8 | 1.5 |
| *Low-high ratio for E-W* | *3.3* | *3.0* | *4.1* | *2.8* | *4.1* | *4.5* | *4.1* | *5.8* | *2.3* | *1.9* | *1.1* | *1.7* |
| **Household wealth level*** | | | | | | | | | | | | |
| Highest | 5.1 | 4.1 | 3.4 | 2.1 | 4.2 | 2.1 | 1.3 | 0.6 | 2.3 | 2.3 | 0.4 | 1.1 |
| High | 8.8 | 8.7 | 3.9 | 2.5 | 3.9 | 3.1 | 1.0 | 1.4 | 2.6 | 0.2 | 0.3 | 1.1 |
| Middle | 18.3 | 12.0 | 10.1 | 7.9 | 8.0 | 5.8 | 2.4 | 1.8 | 2.4 | 2.2 | 1.1 | 0.6 |
| Low | 26.9 | 20.7 | 13.2 | 10.8 | 11.1 | 10.3 | 5.1 | 1.9 | 2.5 | 2.2 | 0.3 | 0.7 |
| Lowest | 34.4 | 26.7 | 25.0 | 22.0 | 20.4 | 15.4 | 7.8 | 6.9 | 4.6 | 2.2 | 1.2 | 1.0 |
| *Low-high ratio for L-H* | *6.7* | *6.5* | *7.4* | *10.5* | *4.9* | *7.3* | *6.0* | *11.5* | *2.0* | *1.0* | *3.0* | *0.9* |
| *Concentration index for wealth* | *-0.29* | *-0.29* | *-0.36* | *-0.39* | *-0.32* | *-0.34* | *-0.37* | *-0.40* | *-0.14* | *-0.08* | *-0.19* | *-0.44* |

*The household wealth variables are the authors' own calculations for 1993 and 1998 and may lack a degree of comparability due to differences in asset questions.

Chronic malnutrition is most common in the East, and is less of a problem in the Western and Central regions, with the former being home to the largest city in Turkey - Istanbul; and the latter including Ankara, the capital. Two out of every ten children are stunted in the East, compared to less than 8 percent in other regions. Marked differences are observed for the household wealth quintiles. The proportion of children with chronic malnutrition is ten times higher for the poorest households, compared to the wealthiest households. The same patterns are observed for weight-for-age variable as well.

As for changes from 1993 to 2008; the most remarkable improvement was observed between 1998 and 2003 for all three indicators. Different patterns are observed for the changes in inequalities for regions: The highest decrease was observed in the Eastern region for the proportion of stunted

children. One in three children was stunted in 1993, compared to one in five children in 2008. For underweight children, the largest percentage decrease was observed for the Western region, the 5 percent prevalence dropped to 1 percent in 15 years (corresponding to a 79 percent decrease). The largest absolute decrease was observed for the East, where the levels are the highest; the proportion of underweight decreased by 13.9 percentage points. There is no distinct pattern for high-low ratios calculated from the East and West.

**Table 3 Proportion of stunted children by selected characteristics**

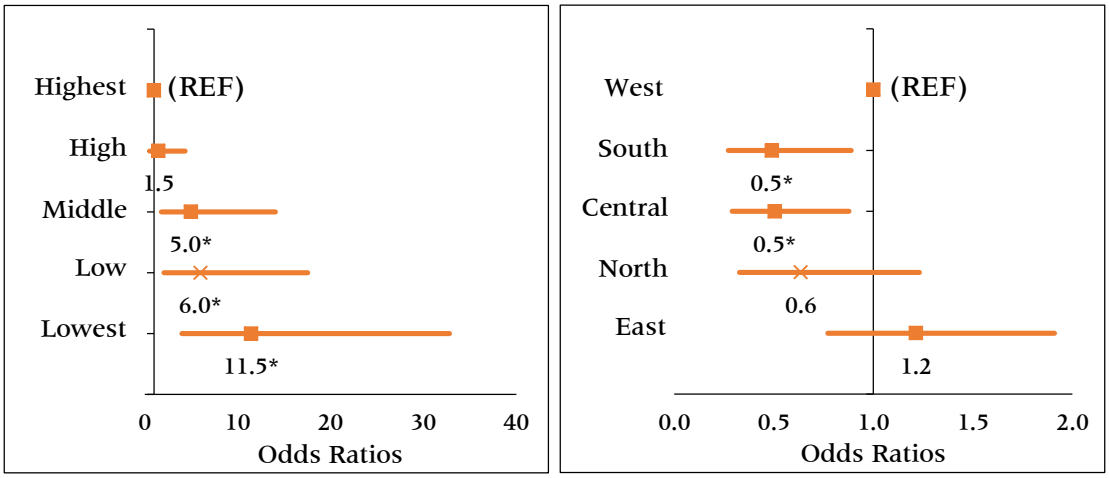
| | Percent distribution of children by characteristic | Proportion of stunted children within subgroups | Unweighted N |
|---|---|---|---|
| **Education of mother** | | | |
| No educ./pri incomp. | 22.3 | 22.6 | 787 |
| First level pri. | 48.3 | 8.0 | 1,311 |
| Second level pri. | 9.2 | 6.4 | 252 |
| High school and up | 19.1 | 4.2 | 451 |
| **Age of child** | | | |
| Less than 2 years of age | 41.2 | 8.6 | 1,077 |
| Age 2 and up | 58.8 | 11.4 | 1,656 |
| **Birth order** | | | |
| 1 | 45.1 | 6.7 | 916 |
| 2-3 | 12.9 | 10.3 | 1,232 |
| 4-5 | 6.9 | 14.4 | 400 |
| 6+ | 35.1 | 22.5 | 253 |
| **Size at birth according to mother** | | | |
| Very small | 11.4 | 19.3 | 369 |
| Small | 13.7 | 16.0 | 383 |
| Average or up | 74.9 | 8.0 | 2,046 |
| **Breastfeeding for children under 2** | | | |
| Less than 1 year | 24.4 | 9.4 | 273 |
| 1 year and above | 11.8 | 16.9 | 132 |
| Currently breastfeeding | 63.8 | 6.6 | 671 |
| **Breastfeeding for children 2+** | | | |
| Less than 1 year | 37.0 | 10.5 | 628 |
| 1 year and above | 60.3 | 11.4 | 981 |
| Currently breastfeeding | 2.7 | 24.6 | 45 |

However, a rather distinct pattern is observed for household wealth quintiles. The decrease in malnutrition by wealth quintiles is greater towards the richer. There is an increasing trend in the low-high ratios calculated from the poorest and wealthiest categories. The prevalence of stunted children was 7 times higher for the lowest wealth quintile in 1993 compared to the highest wealth quintile, and this factor is 11 in 2008. The computed concentration index values agree with the finding that gaps did not disappear during this 15 year period, they even deepened. The values of the concentration index

decreased over time, from -0.29 in 1993 to -0.39 in 2008 for household wealth quintiles for stunting. For acute malnutrition, the concentration index took values from -0.32 in 1993 to -0.40 in 2008.

Table 3 shows other covariates related to childhood chronic malnutrition, a subset of variables that were previously found significant for Turkey (Yiğit et al., 2010). Descriptive analysis showed that the children of less educated mothers, children who were above 2 years of age, who were born at higher birth orders and who were small at birth were disadvantaged in terms of the prevalence of stunting. Breastfeeding produced different results for children 0-1 and 2-4; while the former portrayed the highest stunting prevalence for children who were breastfed for over a year; the latter had its maximum for children who were breastfed at survey date. The sex of child was not included in the analysis because findings from Yiğit et al.'s (2010) work showed that it is not a determinant of stunting of children in Turkey, although descriptive analysis showed a non-significant difference in favor of boys.

**Figure 1 Odds ratios and confidence intervals of stunting by household wealth and regions, controlling for selected covariates**




The results of the logistic model for children showed region and wealth to be significant determinants of childhood chronic malnutrition (the results of the full model are presented in the appendix). The odds of stunting increase with decreasing wealth level controlling for other variables; and are significantly higher for middle, low and lowest wealth groups compared to the highest wealth group (Figure 1). However, although the odds of stunting are higher in the East compared to the West when other covariates are considered, this difference is not significant. In fact, odds of stunting are significantly higher in the West than the Southern and Central regions. Mother's education, birth order, size at birth, breastfeeding and its age interaction were also significant, and the model had a Nagelkerke $R^2$ value of 0.20. Odds ratios were significantly different between the first two levels of education. Children of 2$^{nd}$ or 3$^{rd}$ birth orders were at 1.6 times higher odds of stunting compared to children of the 1st birth order. Odds were significantly higher for children who

were described as being small or very small at birth by their mothers compared to those who were described as average or up.

## CONCLUSION AND DISCUSSION

This study focused on inequalities in childhood malnutrition in Turkey. Findings showed that the proportion of stunted children, under-weight children and wasted children decreased considerably in Turkey. They were 10 percent, 3 percent and 1 percent, respectively, as of 2008. Given the low levels of wasted and underweight children, we drew our conclusions mainly on the stunting indicator.

The findings showed persisting inequalities in childhood malnutrition despite decreasing overall levels. As Garcia (2012) and Hong and Betancourt (2006) discuss, fast economic growth or greater national wealth does not guarantee reductions in inequalities of childhood malnutrition and health care, and effort should be made so that overall reductions would not mask these disparities. The wide presence of these issues justifies inequality to be one of the foci of the post MDG agenda. As Wagstaff and Watanabe (1999) argue, the goals and targets of international agencies should include the reduction of malnutrition among the *poor*, rather than solely committing to population averages.

In a world of improving health indicators, inequalities begin as early as childhood ages, or even at birth. Children with lower birth weights tend to have higher odds of developing chronic malnutrition. Stunting in childhood is associated with higher morbidity and mortality, lower educational achievement, and reduced productivity in adulthood (Monteiro et al. 2010). Thus inequality at birth is actually preserved all the way to adult ages.

The significance of size at birth as a determinant of stunting indicates that policies to eliminate childhood malnutrition should start in pregnancy. Antenatal care should be universal for mothers, and health personnel should ensure that pregnant women are informed about nutrition through pregnancy, breastfeeding and infant nutrition. The World Health Organization currently promotes exclusive breastfeeding for the first 6 months of life, and then its continuance with suitable supplements. The median duration of breastfeeding in Turkey increased from 11.9 to 15.7 months from TDHS-1993 to TDHS-2008. However, exclusive breastfeeding should be further promoted in Turkey, the median duration of which was only 1.8 months in 2008.

There are visible differences in the levels of malnutrition in terms of regions in Turkey. Such differences are observed for settlement type (urban and rural) as well, but their effects are not visible when region is accounted for; given 40 percent of the rural population resides in the East. Health indicators differ visibly for this region. The infant mortality rate per thousand births for this region was 26 in TDHS-2008, as opposed to the overall average of 17. Almost one in three births are given at home, and one in three children are not fully vaccinated (HUIPS, 2009). Economic disadvantages are also apparent. According to TURKSTAT, 52 percent of the poor in Turkey live in

this region (TURKSTAT, 2012a). Furthermore, half of all stunted children live in the East, corresponding to over 330,000 children. The second large population of stunted children is in the West region, corresponding to about 160,000 children (according to the Address Based Population Registration System figures of 2008; TURKSTAT 2015).

Poverty is directly related to health indicators. There is a major population in Turkey with very little or no access to primary health care (UNDP, 2012). Economic status is also strongly associated with children's nutritional status; poor households usually have less access to food (Mussa, 2011). Household wealth status is assumed to be a good proxy for economic status, also affecting childhood malnutrition through access to food and healthcare (Hong et al. 2006). The role of household wealth is documented in many studies focusing on inequalities as mentioned earlier. It was significant as a determinant of stunting even after controlling for a large selection of variables in the multivariable model in this study.

It follows that policies to improve health indicators for the disadvantaged and eliminate gaps should target at reducing the gaps between different economic groups, while accounting for regions. There has been major improvement in economic growth indicators in Turkey in the past years. The 2011 Gini coefficient, on the other hand, is 0.404 (TURKSTAT, 2012b), above the European Union average of 0.305 in 2011 (EUROSTAT, 2012). The experience of Brazil shows that implementing redistributive policies work well for reducing the Gini coefficient; changing the shape of this country's very skewed income distributions (Monteiro et al., 2010). Improvements in income inequalities reflect on living conditions and health indicators; Monteiro et al. (2010) showed that inequality measures in stunting improved along with improving income distribution.

Turkey has been spending more on health; health expenditure per person has doubled from 2001 to 2007 (Kılıç, 2012). Furthermore, the Ministry of Health considers infant and child feeding an important public health issue. An 'Infant and Child Feeding Program for 6-24 Month-olds' program was launched in 2007, that included training programs for health personnel all over Turkey (TR Ministry of Health, 2012). The program was designed to provide nutrition training for parents as well as supplements for children when necessary. It was underlined that growth should be evaluated at each health facility visit, so that appropriate measures could be taken as soon as growth retardation was detected. The program intends to eliminate acute and chronic malnutrition for children under 5 in Turkey. Results from the upcoming DHS in 2013 may shed light on how successful the program has been. Direct measures such as interventions at health facility visits would most certainly be helpful for children with malnutrition, however, still missing children who would not be taken to health facilities by their parents.

Providing universal education for women will be empowering and will increase their chances of employment, and it was linked to childhood malnutrition in previous research (Hong and Mishra, 2006; Monteiro et al., 2010; Omilola, 2010). As Omilola (2010) suggests for Nigeria, increasing education of women will help increase their involvement in household

decisions; which in turn should increase investments on their children's health and schooling. The Turkey Ministry of Education has already implemented a project for increasing the primary school attendance of young girls in collaboration with UNICEF in 2006-2007 (TR Ministry of Education, 2012). Currently, there is another project in progress called "Project for Increasing Enrollment Rates Especially for Girls (ISEG)", by the Ministry of Education, in collaboration with the European Union. Improvements in women's education are apparent from DHS data in Turkey, yet multivariable analysis showed that wealth effect does not disappear in stunting even when education is controlled for.

The Turkey Demographic and Health Surveys were not intended for the analysis of nutrition. Therefore further information on nutrition, such as daily calorie intake is unavailable. Furthermore, there are no questions on physical activity. Analysis was based on anthropometric measures and socio-demographic and bio-demographic variables. The findings would certainly be more valid in the presence of direct variables on nutrition.

This study provided evidence for inequalities in childhood malnutrition, which can lead to disadvantages in adulthood for those affected by inequalities. The risk groups identified in this study will help direct intervention programs through groups who need them and improve the efficiency of policy implementation.

## REFERENCES

Barros, F. C., Victora, C. G., Scherpbier, R., & Gwatkin, D. (2010). Socioeconomic inequities in the health and nutrition of children in low/middle income countries. *Revista de Saúde Pública, 59*(4): 1-16.

Bredenkamo, C., Buisman., L.R., Van de Poel, E. (2014). Persistent inequalities in child undernutrition: evidence from 80 countries, from 1990 to today. *International Journal of Epidemiology, 43*(4): 1328-1335.

Doğan, E. Türkiye'de yoksulluğun ölçülmesi. (2014). *T.C. Kalkınma Bakanlığı Uzmanlık Tezi*. Nisan 2014, Ankara.

EUROSTAT. (2012). *Gini coefficient*. Retrieved October 18, 2012, from http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Hacettepe University Institute of Population Studies. (2009). *Turkey Demographic and Health Survey 2008*. Ankara: Hacettepe University Institute of Population Studies, TR Ministry of Health General Directorate of Mother and Child Health, TR Prime Ministry State Planning Organization.

Hong, R., & Mishra, V. (2006). Effect of wealth inequality on chronic under-nutrition in Cambodian children. *Journal of Health, Population and Nutrition, 24*(1): 89-99.

Hong, R., Banta, J. E., & Betancourt, J. A., (2006). Relationship between household wealth inequality and chronic childhood under-nutrition in Bangladesh. *International Journal for Equity in Health, 5*(15).

Jehn, M., & Brewis, A., (2009). Paradoxical malnutrition in mother–child pairs: Untangling the phenomenon of over- and under-nutrition in underdeveloped economies. *Economics and Human Biology, 7*(1).

Kanjilal, B., Mazumdar, P. G., Mukherjee, M., & Rahman, M. H., (2010). Nutritional status of children in India: household socio-economic condition as the contextual determinant. *International Journal for Equity in Health, 9*(19): 1-13.

Kılıç, B., (2012). Health financing (in Turkish: Sağlık Finansmanı) in *HASUDER Türkiye Raporu 2012*. Retrieved October 18, 2012, from http://hasuder.org.tr/anasayfa/images/stories/dosyalar/salk_politikalar_1.pdf.

Monteiro, C. A., Benicio, M. H. D. A., Conde, W. L., Konno, S., Lovadino, A. L., Barros, A. J. D., & Victoria, C. G., (2010). Narrowing socioeconomic inequality in child stunting: the Brazilian experience, 1974-2007. *Bulletin of the World Health Organization, 88*(4): 305-311.

Mussa, R., (2011). Explaining Urban Rural Malnutrition Inequality in Malawi, in *Conference on Measuring National Income, Wealth, Poverty, and Inequality in African Countries*. Cape Town, South Africa.

Mussa, R., (2011). Intrahousehold and interhousehold child nutrition inequality in Malawi. *Munich Personal RePEc Archive Paper, 33498*.

Omilola, B., (2010). Patterns and trends of child and maternal nutrition inequalities in Nigeria. *International Food Policy Research Institute (IFPRI) Discussion Paper 00968*.

Pebley, A. R., & Goldman, N., (1995). Social inequality and children's growth in Guatemala. *Health Transition Review, (1)*20.

Popkin, B., & Gordon-Larsen, P., (2004). The nutrition transition: worldwide obesity dynamics and their determinants. *International Journal of Obesity 28*(3): 2-9.

Rutstein, S.O., & Jonhson, K., (2004). The Wealth Index. *DHS Comparitive Reports No: 6*. Calverton: ORC Macro.

Singh, A., (2011). Inequality of opportunity in Indian children: the case of immunization and nutrition. *Population Research and Policy Review 30*(6): 861-883.

Ssewanyana, S., & Kasirye, I., (2012). Addressing the Poor Nutrition of Ugandan Children. *EPRC Policy Brief, 19*.

Ssewanyana, S., & Kasirye, I., (2012). Causes of health inequalities in Uganda: Evidence from the Demographic and Health Surveys: 1995-2006. *CSAE Conference 2012: Economic Development in Africa*. Retrieved October 18, from https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=CSAE2012&paper_id=267.

Subramanyam, M. A., Kawachi, I., Berkman, L. F., & Subramanian, S., (2010). Socioeconomic inequalities in childhood undernutrition in India: analyzing trends between 1992 and 2005. *PloS one, 5(6): e11392.*

TR Ministry of Education, (2012). *Project for Increasing Enrolment Rates Especially For Girls (ISEG)*. Retrieved October 18, 2012, from http://kizlarinegitimi.meb.gov.tr/en.

TR Ministry of Health, (2012). *Promoting Breastfeeding and Baby Friendy Health Facilities Program and Supplemental Feeding Program (in Turkish: Anne Sütünün Teşviki ve Bebek Dostu Sağlık Kuruluşları Programı ve Tamamlayıcı Beslenme Programı)* Retrieved October 18, 2012, http://www.saglik.gov.tr/TR/belge/1-11574/anne-sutunun-tesviki-ve-bebek-dostu-saglik-kuruluslari-.html.

TR Prime Ministry State Planning Organization, (2010). *Millenium Development Goals Report, Turkey 2010*. Retrieved September 15, 2012, from http://www.undp.org.tr/publicationsDocuments/TR%202010%20MDG%20Report_TR.pdf: TR State Prime Ministry Undersecreteriat of State Planning Organization, Office of the United Nations Resident Coordinator.

TURKSTAT, (2012a). *Number of poors and regional poverty rates by relative poverty thresholds (calculated for Turkey) based on income (SR, Level 1)*. Retrieved October 18, 2012, http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=1394.

TURKSTAT, (2012b). *Gini coefficient by equivalised household disposable income (Turkey, Urban, Rural, SR, Level 1)*. Retrieved October 18, 2012 http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=1369.

TURKSTAT, (2015). *Population by province, age group and sex, 2007-2014.* Retrieved July 14, 2015 http://tuik.gov.tr/PreIstatistikTablo.do?istab_id=945.

Wagstaff, A. and Watanabe, N., (2009). Socioeconomic inequalities in child malnutrition in the developing world. *World Bank Policy Research Working Papers*.

Van de Poel, E., Hosseinpoor, A. R., Speybroeck, N., Van Ourti, T., & Vega, J., (2008). Socioeconomic inequality in malnutrition in developing countries. *Bulletin of the World Health Organization, 86*(4): 282-291.

World Health Organization. (2014). *WHA Global Nutrition Targets 2025: Stunting Policy Brief.* Retrieved July 14, 2015, from http://www.who.int/nutrition/topics/globaltargets_stunting_policybrief.pdf

Yiğit, E. K., Tezcan, S., Adalı, T., Özbaş, S., (2010). Nutritional Status of Mothers and Children in Turkey and the Prevelance of Obesity (in Turkish: Türkiye'de Annelerin ve Çocukların Beslenme Durumu ve Obezite Prevelansı) in Futher Analysis Study, Turkey Demographic and Health Survey 2008: Fertility, Reproductive Health and Ageing in Turkey *(Türkiye Nüfus ve Sağlık Araştırması 2008, İleri Analiz Çalışması: Türkiye'de Doğurganlık, Üreme Sağlığı ve Yaşlılık)*. Ankara: Hacettepe University Institute of Population Studies.

**Appendix:** Logistic regression output for stunting, TDHS-2008

| | Dependent variable = Stunting | | | |
|---|---|---|---|---|
| | | | Confidence interval for Exp(B) | |
| **Characteristics** | **p** | **Odds Ratio [Exp (B)]** | **Lower** | **Upper** |
| **Region** | | | | |
| West | . | 1.000 | . | . |
| South | 0.019 | 0.491 | 0.271 | 0.888 |
| Central | 0.016 | 0.504 | 0.290 | 0.877 |
| North | 0.179 | 0.636 | 0.328 | 1.232 |
| East | 0.402 | 1.213 | 0.771 | 1.909 |
| **Household wealth** | | | | |
| Lowest | 0.000 | 11.456 | 4.001 | 32.804 |
| Low | 0.001 | 5.992 | 2.047 | 17.543 |
| Middle | 0.003 | 4.980 | 1.766 | 14.045 |
| High | 0.498 | 1.455 | 0.489 | 4.327 |
| Highest | . | 1.000 | . | . |
| **Education of mother** | | | | |
| No educ./pri incomp. | 0.770 | 1.100 | 0.581 | 2.082 |
| First level pri. | 0.188 | 0.665 | 0.362 | 1.221 |
| Second level pri. | 0.581 | 0.783 | 0.328 | 1.871 |
| High school and up | . | 1.000 | . | . |
| **Age of child** | | | | |
| Less than 2 years of age | .000 | 0.253 | 0.120 | 0.532 |
| Age 2 and up | . | 1.000 | . | . |
| **Birth order** | | | | |
| 1 | . | 1.000 | . | . |
| 2-3 | 0.004 | 1.621 | 1.165 | 2.256 |
| 4-5 | 0.371 | 1.225 | 0.785 | 1.912 |
| 6+ | 0.293 | 1.279 | 0.807 | 2.025 |
| **Size at birth** | | | | |
| Very small | 0.000 | 2.231 | 1.561 | 3.188 |
| Small | 0.000 | 2.054 | 1.397 | 3.020 |
| Average or up | . | 1.000 | . | . |
| **Breastfeeding for children under 2** | | | | |
| Less than 1 year | 0.012 | 3.377 | 1.305 | 8.738 |
| 1 year and above | 0.000 | 8.892 | 3.490 | 22.654 |
| Currently breastfeeding | . | 1.000 | . | . |
| **Breastfeeding for children 2 and over** | | | | |
| Less than 1 year | . | 1.000 | . | . |
| 1 year and above | . | 1.000 | . | . |
| Currently breastfeeding | . | 1.000 | . | . |