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Child Growth and Refugee Status:

Evidence from Syrian Migrants in Turkey*

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Abstract

This study examines disparities in health and nutrition among native and Syrian-refugee children in Turkey. With a view toward understanding the need for targeted programs addressing child well-being among the refugee population, we analyze, in particular, the Turkey Demographic and Health Survey (TDHS). The TDHS is one of few data sets providing representative data on health and nutrition for a large refugee and native population. We find no evidence of a difference in infant or child mortality between refugee children born in Turkey and native children. However, refugee infants born in Turkey have lower birthweight and age-adjusted weight and height than native infants. When we account for a rich set of birth and socioeconomic characteristics that display substantial differences between natives and refugees, the gaps in birthweight and age-adjusted height persist, but the gap in age-adjusted weight disappears. Although refugee infants close the weight gap at the mean over time, the gap at the lower end of the distribution persists. The rich set of covariates we use explains about 35% of the baseline difference in birthweight and more than half of the baseline difference in current height. However, even after that, refugee infants' average birthweight is 0.17 standard deviations (sd) lower and their current height is 0.23 sd lower. These gaps are even larger for refugee infants born prior to migrating to Turkey, suggesting that remaining deficits reflect conditions in the source country prior to migration rather than deficits in access to maternal and child health services within Turkey.

Keywords: Syrian refugees, birthweight, anthropometric measures, forced displacement, Turkey

JEL Codes: J61, O15, F22, R23, R58

1. Introduction

Almost one percent of the world population was categorized forcibly displaced as of the end of 2011. The number of forcibly displaced people worldwide has also been increasing; it has more than doubled from 2011 to 2021, according to the UNHCR (2022). Of the 89.3 million forcibly displaced people worldwide at the end of 2021, 27.1 million were refugees, 4.4 million were Venezuelans displaced abroad, and 4.6 million were asylum seekers. About 41% of the forcibly displaced population worldwide are children under 18 (UNHCR, 2022). Of the refugees inclusive of displaced Venezuelans, 83% were hosted in low- and middle-income countries. Syria is the top source country, producing 27% of all refugees, and Turkey is the top destination country hosting 3.8 million refugees—most of whom are Syrians.

A less recognized feature of the Syrian population in Turkey is that a relatively large fraction of refugees are young. According to the Turkish Presidency of Migration Management (TPMM, 2022), 48.8% of Syrian refugees in Turkey were 18 or younger as of November 2022. The figures are comparable to what is observed in sub-Saharan Africa, reflecting both higher fertility and differential migration of families with children. Given the potential implications for long-term labor force participation as well as overall concerns for well-being, a substantial amount of scholarly attention has been focused on the provision of schooling to children. Through a process of community rather than camp settlement and the integration of refugees into the public school system, Turkey has had considerable success in ensuring schooling access to refugee children (Kirdar et al., 2022).

A singular focus on educational attainment among refugees, however, may not sufficiently account for the consequences of possible nutritional deficits in utero and early childhood. An extensive body of literature shows that access to quality nutrition may be an important complement to investments in education. Much of this literature focuses on the correlates of low body size, including birthweight, which is importantly influenced by both nutritional intake and exposure to disease. The medical literature finds that birthweight is strongly associated with mortality during the first year (Luke et al., 1993; Wilcox, 1993). In meta-analyses of studies from developing countries, Pelletier (1994) and McDonald et al. (2013) find that anthropometric deficits are also associated with child mortality. Other studies report that low birthweight is associated with adverse cognitive and health outcomes later in life (e.g., Barker, 1995; Godfrey and Barker, 2000; Steffensen et al., 2000). Almond et al. (2005) find that low birthweight also leads to higher medical costs. A growing literature in economics also establishes causal effects of birthweight using sibling or twin fixed effects (Behrman and Rosenzweig, 2004; Black et al., 2007; Conley and Bennett, 2000; Figlio et al., 2014). These studies find birthweight effects on school attainment, adult height, IQ, and earnings. Almond et al. (2018) review this literature and conclude that mild shocks in early life can indeed have substantial negative impacts both in the short and long run.

Despite the evidence of the consequences of poor nutrition in infancy and early childhood, considerably less attention has been given to possible nutritional deficits of refugee children. This weakness in the literature is, in some ways, understandable. In contrast to education, which is more or less directly under the control of the public sector, nutritional allocations to refugee (and other) children are largely governed by household behavior given resource availability. Nutrition and health behaviors are thus less directly subject to policy manipulation and also may be more difficult to evaluate or measure.

There is, of course, a literature that examines health differences between natives and economic migrants. However, the literature on the gaps between natives and refugees in child health is much more limited. Refugees differ from economic migrants regarding mother and child health in several important ways. First, refugees go through the traumatic effects of conflict and forced migration. These events could have long-term impacts on women's health, affecting their future infants' health. They could also affect pregnancies of women and infants exposed directly to conflict and the forced migration process (see, e.g., Mansour and Rees, 2012; Camacho, 2008). Second, refugees—fleeing war and forced to leave their jobs and part of their wealth at their origin—generally live in worse socioeconomic conditions and have poorer labor market outcomes than economic migrants and natives in the host countries (see, e.g., Demirci and Kirdar (2022) for Syrian refugees in Turkey and Brell et al. (2020) for refugees in Europe). Third, while economic migrants are often selected positively based on education and health (see, e.g., Florian et al., 2021), the selection is less likely to be positive for refugees fleeing a war. Finally, refugees might also face institutional barriers to accessing health services.

This paper uses the Turkey Demographic and Health Survey (TDHS) to assess the extent of nutritional and health-behavior deficits among refugee children. The 2018 round of the TDHS is the first dataset including birthweight and anthropometric measures for a nationally representative sample of native and Syrian-refugee children. This dataset also contains a rich set of socioeconomic characteristics that can be used to separate the direct refugee effects from the differences arising from disparities in socioeconomic conditions between natives and refugees. In addition, the dataset provides a rich set of outcomes on health behavior, including prenatal and postnatal care, vaccination, breastfeeding, and nutrition—which may help us interpret any observed differences in child health outcomes.

We find no evidence of a difference in infant or child mortality between refugee children born in Turkey and native children. However, refugee infants born in Turkey have lower birthweight and age-adjusted weight and height than native infants. When we account for a rich set of birth and socioeconomic characteristics, the gaps in birthweight and age-adjusted height persist, but the gap in age-adjusted weight disappears. Although refugee infants close the weight gap at the mean over time, the gap at the lower end of the distribution persists. The rich set of covariates we use explains about 35% of the baseline difference in birthweight and more than half of the baseline difference in current height. However, even conditioning on these characteristics, refugee infants' average birthweight is 0.17 standard deviations (sd) lower and their current height is 0.23 sd lower. These gaps are even larger for refugee infants born outside Turkey.

The differences between refugees born in Turkey and natives in birthweight and anthropometric outcomes are limited to the lower end of the distribution. No native-refugee gap exists above the mean level for any of the outcomes. After accounting for the covariates, refugee infants born in Turkey are 4.8 percentage points (pp) more likely to have low birthweight, 2.4 pp more likely to be underweight and 6.0 pp more likely to be stunted; however, they are not less likely to have high birthweight or be overweight or tall.

Differences in prenatal care behavior exist between native and refugee mothers even after accounting for the discrepancies in socioeconomics. These differences in prenatal care behavior explain a further 30% and 11% of the remaining gaps in birthweight and current height, respectively. Although refugees are less likely to take postnatal care, this difference does not help explain any residual gaps in anthropometric outcomes. No gap exists in vaccination behavior between natives and refugees after accounting for the covariates. However, the two groups display significant differences in breastfeeding and nutritional behavior.

Studies examining differences in child health between natives and refugees in low- and middle-income countries reach mixed results. Moss et al. (1992), using a small sample of Guatemalan and Salvadoran migrant children and Belizean natives, find that the gap in weight for age vanishes once socioeconomic differences are accounted for. Comparing Mozambican refugees and South African natives in a rural sub-district of South Africa, Hargreaves et al. (2004) report gaps in child mortality. Abdulrahim et al. (2019), using data from 31 Lebanese hospitals, find slightly lower birthweights for Syrian refugees than natives. Sing et al. (2005) find no difference in under-five mortality between Sudanese refugees and natives in Uganda. For Palestinian refugee children living in Jordan and Lebanon, Khwaja (2004) finds similar or lower infant and child mortality levels compared to their native counterparts. In contrast, the studies that analyze the child health gap between natives and refugees in the context of high-income Scandinavian countries generally report worse outcomes for refugee children (Dunlavy et al., 2012; Liu et al., 2019; Norredam et al., 2012).

A related literature examines the effects of internal forced displacement on child health. Comparing internally-displaced Rwandans with those who were not, Verwimp and van Bavel (2005) find higher mortality rates among children whose families were subject to forced migration. Avogo and Agadjanian (2010) find disadvantages for forced migrants relative to non-migrants in all outcomes but morbidity and immunization.

Our study differs from the above in low- and middle-income country contexts in that it is based on a nationally representative dataset. Among the above studies, only Verwimp and van Bavel (2005) use such a dataset, but that study does not compare refugees and natives and the dataset they use is not of the same depth as the DHS we use. Most of the above studies cover refugees in rural or camp settings, whereas the refugees in our study are urban residents. In addition, while the above studies focus on one issue (either mortality, birthweight, or weight for age), we provide a more comprehensive analysis of child health and growth including mortality, birthweight, and anthropometric outcomes. Moreover, we analyze how health behavior relates to these findings. Only Avogo and Agadjanarian (2010) include a comparable analysis of health behaviors. Finally, our study includes a careful investigation of how the gaps vary across the distribution of each outcome.

2. Brief Background Information

Refugees started arriving in Turkey as early as April 2011 after the civil war in Syria began. The Turkish government implemented an open-door policy for the refugee population and gave the Syrian refugees temporary residence permits mainly for health, work, and schooling purposes. The pace of the refugees' arrival gained momentum in 2013 as the war enraged. The number of refugees reached 2.5 million at the end of 2015 and 3.6 million at the end of 2018. Most refugees live in urban areas; according to the TDHS-2018, the share of refugees residing in camps was 4.3%.

In terms of demographics, Syrians are younger, less educated, and poorer than natives (Kirdar et al., 2022). Although the paid employment rate of Syrian men is not much lower than that of natives, the majority work in the informal sector (Demirci and Kirdar, 2022). WFP (2016) reports that 28.6% of Syrian refugees residing outside camps were food insecure and 93% were below the poverty line.

Before they arrived in Turkey, Syrian mothers and children faced poor health conditions in Syria. The civil war caused substantial destruction to the healthcare infrastructure in Syria and public health challenges—including serious maternal and child health problems. WHO (2013) reports that in 2013, two years after the start of the civil war, at least 35% of the country's public hospitals were out of service, and 70% of the health workforce in some provinces left the country.

Turkey implemented a generous health care policy toward Syrian refugees. Registered Syrian refugees have universal health coverage, and health care services offered to Syrian refugees with this coverage are the same as the health services provided to the Turkish population. Essentially, all Syrian refugees in Turkey can use preventive and emergency services for free, and registered refugees have access to public primary, secondary, and tertiary health care services free of charge.

Turkey's health care system displays the characteristics of an average upper-middle-income country. Aygun et al. (2021) report that the number of physicians, nurses, midwives, and nurses per 1,000 in Turkey in 2011 (before the refugees started arriving) was close to the corresponding averages for upper-middle-income countries. The infant mortality rate in Turkey was 13.9 per 1,000 births in 2011, also similar to the average level for upper-middle-income countries (15.0).

Figure 1 compares birthweight and anthropometric outcomes in Syria and Turkey before the war using the TDHS-2008, the 2009 Syria Family Health Survey, and the 2006 Syria Multiple Indicator Cluster Survey. Panel (A) shows that birthweight distributions in Syria and Turkey before the war were highly similar. However, panel (B) displays small differences in height and weight by age in favor of Turks over Syrians. These minor differences imply that the significant gaps we report between natives and refugees based on the TDHS-2018 do not result from pre-existing conditions.

3. Data and Empirical Strategy

The Turkey Demographic Health Survey (TDHS) is conducted every five years. The survey collects detailed information about women's demographic characteristics and fertility history and several measures of child health and growth. In this study, we use the 2018 round of TDHS—which includes a representative sample of Syrian refugees residing in Turkey, in addition to the native sample. The first module of the survey, known as the household roster data, collects the essential demographic characteristics of each member of the visited house. The second module of the survey gathers more detailed information about marriage and fertility history as well as child and women's health for the sample of household members who are 15- to 49-year-old women.

We focus on children of the 15-49 year-old mothers in the survey. We observe several anthropometric measures in the data for each child born in the last five years preceding the survey, including birthweight, current height, and weight. Birthweight is measured in grams. We use both this measure and its standardized z-score. In addition, we use age-specific (measured in months) standardized versions of the current weight and height. These current weight and height standardizations are based on the corresponding mean and standard deviation statistics obtained from the WHO and provide the current weight and height in terms of z-scores for each age. The dataset also provides a rich set of control variables detailed below.

To understand the effect of refugee status on birthweight and anthropometric measures of children, we estimate the following equation

$$y_i = \alpha_1 + \beta_1 * \text{refugee}_i + \boldsymbol{X_i'}\,\boldsymbol{\Gamma_1} + u_i, \qquad (1)$$

where y_i denotes the anthropometric measure of interest for child *i*. We analyze four outcomes: birthweight in grams, standardized birthweight in z-scores, standardized current weight in z-scores, and current height in z-scores. We measure the refugee status with the binary variable, refugee_i, and the key coefficient of interest in equation (1) is its coefficient, β_1. This coefficient shows the effect of the refugee status on the outcome of interest compared to natives, holding other covariates constant. In the equation, $\boldsymbol{X_i'}$ denotes the vector of covariates and u_i is the error term for child *i*.

The vector $\boldsymbol{X}$ includes a wide set of control variables. We group these variables into six categories and add them into the regressions sequentially. We define each group as follows: 1) *birth characteristics* including dummies for the baby's sex, birth order, and twin status (single, twin, or triplet), the time passed since last birth (less than 18 months, 19–24 months, 25–30 months, 31–36 months, and more than 36 months), mother's age at birth (ages 13-15, 16–18, 19–21, 22–25, 26–30, 31–35, 36–39, 40–43, and 44–49), and the duration of pregnancy in months; 2) *mother characteristics* including dummies for mother's education (no education, incomplete primary, complete primary, incomplete secondary, complete secondary, incomplete high school, and high school or more) and smoking status (never, irregularly smoke, and regularly smoke); 3) *mother size* including her height and body mass index; 4) *environmental characteristics* including dummies for the birth region (at the NUTS-1 level), type of birth place (province center, district center, and village), and access to safe water and safe sanitation; 5) *household characteristics* including dummies for each household size value, household head's sex, and partner's education categories; and 6) *household wealth* in the form of quintile dummies. For all control variables, we use a separate dummy variable for missing status whenever needed.

We also estimate equation (1) as a linear probability model for indicators of specific categories of anthropometric outcomes of interest. In particular, we analyze whether the baby has a low birthweight (less than 2500 grams) or high birthweight (more than 4000 grams), whether the child is underweight (the current weight is lower than two sd of the average weight) or overweight (the current weight is above the two sd of the average weight), and whether the child is stunted (the current height is lower than two sd of the average height) or tall (the current height is above two sd of the average height).

The TDHS also elicits information about access to health care in the prenatal and postnatal period, vaccination, breastfeeding, and nutritional take-in for subsets of children. We use this information for two purposes: 1) to explore whether native and refugee children differ in access to health care or nutritional support, and 2) to understand whether the gap in the anthropometric measure of interest changes after controlling for these variables. For the first purpose, we estimate the following equation:

$$z_i = \alpha_2 + \beta_2 * \text{refugee}_i + \boldsymbol{X_i'}\,\boldsymbol{\Gamma_2} + e_i, \quad (2)$$

where z_i denotes the health care or nutritional measure of interest, refugee_i denotes the refugee status, $\boldsymbol{X_i'}$ is the set of control variables, and e_i is the error term for child *i*. We employ the same set of control variables $\boldsymbol{X}$ in estimating equations (1) and (2).

Let $\boldsymbol{Z}_i'$ denote the matrix of z_i's. We use the information carried by the matrix $\boldsymbol{Z}$ by adding them as new control variables to equation (1) and by estimating the parameters of this new equation for each group of health care or nutrition-related control variables separately:

$$y_i = \alpha_3 + \beta_3 * \text{refugee}_i + \boldsymbol{X}_i' \boldsymbol{\Gamma_3} + \boldsymbol{Z}_i' \boldsymbol{\Pi} + v_i. \quad (3)$$

The vector $\boldsymbol{Z}$ includes five different groups of variables**.** First, the set of *prenatal health care* characteristics includes dummies for whether any prenatal care is received, whether the number of prenatal-care visits is four or more (the minimum number of visits suggested by health authorities in Turkey), whether iron tablets are taken during pregnancy, whether the prenatal care is given by a health care specialist (a doctor, nurse, or midwife), whether the care is given at a health care facility (hospital, maternity house, family or migrant health center), whether the first visit is in the first, second, or third trimester, and dummies for various pregnancy health checks. Second, the set of *postnatal health care* characteristics includes dummies for whether a postnatal check is received, whether the postnatal check is received within the first month after delivery, whether the place of the care is a health care facility, and whether a health care specialist gives the care. Third, the set of *breastfeeding* characteristics includes dummies for the time of starting breastfeeding (started within an hour after the delivery or not) and the status of breastfeeding by age. Fourth, *vaccination* characteristics include dummy variables indicating whether the child is fully vaccinated. Finally, *nutritional* characteristics consist of dummies for protein intake and baby formula or milk intake by age. Children who ate milk, yogurt, or cheese in the last 24 hours preceding the survey are considered to have consumed a milk product. Children who ate an egg, meat, chicken, or fish in the last 24 hours preceding the survey are considered to have consumed protein. Details of the prenatal care, vaccination, breastfeeding, and nutritional characteristics are provided in the Online Data Appendix.

Since the TDHS includes information on birthweight and the anthropometric measures of children born in the last five years preceding the survey, our analysis focuses on this group of children. We also restrict the refugee sample to children born in Turkey. We adopt this restriction because we observe the full set of control variables for this group. Nonetheless, we also analyze an alternative sample that also includes refugee infants born outside of Turkey by employing a narrower set of control variables.

We estimate equation (1) using the full sample of children born within the last five years to the women in our sample. However, the data force us to use smaller samples to estimate equations (2) and (3) because the prenatal care, postnatal care, and breastfeeding characteristics are available only for the most recent child delivered by each woman in the previous five years and the vaccination and nutritional outcomes are available only for children born within the last three years preceding the survey.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 compares the birthweight and anthropometrics of native and refugee children. Refugee infants weigh almost 200 grams less at birth than native infants, and their birthweight is 0.26 sd lower. The native-refugee gap is more acute in current height (0.48 sd) than in current weight (0.16 sd). In addition, the smaller native-refugee gap in current weight than birthweight (0.16 vs. 0.26 sd) suggests that the difference in birthweight narrows over time.

When we examine the birthweight distribution in more detail, we observe that the difference exists at the median and lower percentiles but not at the higher percentiles. For instance, refugee infants weigh 300 grams less at the 10th and 25th percentile and 200 grams less at the median; however, their weight is not different from that of natives at the 75th and 90th percentiles. Similarly, the native-refugee gap is 0.42 sd at the 10th percentile, 0.40 sd at the 25th percentile, but 0.28 sd at the median. No gap remains at the 75th and 90th percentiles.

The patterns of the gaps in the anthropometric variables are somewhat different. For current weight, the gap is smaller but remains steady over the distribution. For current height, as for birthweight, the gap reduces at higher percentiles; however, unlike for birthweight, it persists at the higher percentiles. In terms of sd, the height gap is a substantial 0.74 at the 10th percentile, 0.53 at the 25th percentile, and 0.51 at the median, but it reduces to 0.38 at the 75th percentile and 0.25 at the 90th percentile.

These observed differences in birthweight and anthropometric outcomes could partially result from the socioeconomic differences between refugee and native households. Hence, in Table 2, we examine how the socioeconomic characteristics of the two groups compare. Regarding birth characteristics, an important difference is in the duration of pregnancy. Refugee women have, on average, a longer duration of pregnancy. In addition, due to higher fertility rates of refugee mothers, the birth order variable is on average higher for refugee children. For the same reason, the time gap with the preceding birth is more likely to be shorter for refugee children. Also, the mean age of refugee mothers at birth is about three years lower.

Regarding environmental characteristics, refugee children are more likely to be born in southern and eastern Turkey. They are also more likely to be born in province centers and less likely to be born in villages. Refugee mothers have lower levels of educational attainment. The incidence of smoking is higher for native than refugee mothers. A remarkable difference exists in household wealth; 81.5% of refugees are in the lowest quintile. Regarding household characteristics, refugee households are bigger. They have on average 7.3 members compared to 5.3 for native households. Refugee households are also more likely to be headed by females. Summary statistics on health care and nutritional characteristics are provided in Data Appendix Tables A1 and A2.

4.2 Regression Results

4.2.1 Main Outcomes

Table 3 shows how the gaps in birthweight and anthropometric outcomes between native children and refugee children born in Turkey change as we gradually control for additional sets of covariates. As shown in panel (A), the baseline birthweight gap of 187 grams drops to 164 grams once we account for the differences between natives and refugees in birth characteristics. The gap decreases to 160 grams as we further add mother characteristics and to 147 grams once we also control for mother size. Adding household wealth makes the most significant reduction in the gap. This finding is not surprising as the household wealth of natives and refugees substantially differs, as shown in Table 2. After adding all sets of covariates, the baseline gap of 187 grams reduces to 121 grams. In terms of sd, the native-refugee gap falls from 0.263 to 0.171 once we control for all sets of covariates. In other words, the native-refugee differences in birth and socioeconomic characteristics explain about 35% of the birthweight gap. Nonetheless, although we account for a rich set of background characteristics, the native-refugee gap persists. This result suggests either that being a refugee has a direct effect on birthweight or that some unobserved measures affecting birthweight and differing significantly between natives and refugees are missing (or both). Given the rich set of covariates we use and the large remaining gap in birthweight in column (6), our findings strongly suggest a direct effect of being a refugee on birthweight.

Panel (C) of Table 3 shows that the baseline native-refugee gap in current weight of 0.157 sd narrows to 0.085 once we account for birth characteristics and reduces further to 0.068 and loses its statistical significance when we also control for mother characteristics. The gap becomes 0.03 sd when we add the mother body size controls and is virtually zero when we control for all sets of covariates. In other words, we find no evidence of a direct impact of being a refugee on current weight; the differences in the covariates explain all of the differences in the current-weight gap. In addition, in each column in Table 3, the native-refugee gap in current weight is smaller than the gap in birthweight—suggesting a narrowing of the weight gap over time after birth.

By contrast, as shown in panel (D), the native-refugee height gap remains even after controlling for all sets of covariates. This likely results from current height reflecting nutritional or health access during infancy that may not be readily measured by socioeconomic status at the time of the survey. Consistent with this fact, we observe that the baseline gap in sd of current height (0.483) is much higher than that for current weight (0.157). As column (3) shows, controlling for birth and mother characteristics and mother size explains one-third of the gap. Controlling for all sets of characteristics explains more than half of the baseline gap.

Next, we examine extreme outcomes of birthweight and children's anthropometric measures. Panel (A) of Table 4 shows that Syrian infants born in Turkey are 7.3 pp more likely to have low birthweight than native infants. This gap reduces to 4.8 pp when we adjust for the differences between natives and refugees in all sets of covariates. In contrast, panel (A) also shows that no native-refugee gap in high birthweight exists at the baseline or after accounting for the covariates. These results align with our findings in Table 1 that a gap exists in birthweight at the median and low percentiles but not at high percentiles.

Panel (B) of Table 4 shows that Syrian under-five children are 2.4 pp more likely to be underweight after accounting for the differences in the background covariates. However, no evidence exists of a difference in the probability of being overweight. Panel (C) indicates that refugee children are 10.9 pp more likely to be stunted at the baseline; however, this gap reduces to 6.0 pp after accounting for the covariates. However, we observe no evidence of a difference at the upper end of the distribution; refugee children are not less likely to be tall.

4.2.2 Gaps over the Distribution

The above analysis documents how the mean gap changes when we account for various sets of covariates. However, as shown in Table 1, the gaps in birthweight and anthropometric characteristics vary significantly over the distribution. For instance, a gap in birthweight does not exist at high percentiles (the 75^{th} and 90^{th}). Hence, here, we conduct a more nuanced analysis of the gaps by examining them over their respective distributions. We summarize this distribution using the hazard, which is most commonly applied in the analysis of duration data. The advantage of a hazard approach for examining distribution effects is that an increased hazard at low levels does not impose restrictions at higher levels. On the other hand, with a density or distribution function, early increases must be compensated with decreases at higher levels so that the density integrates to one.

Consider the case of birthweight in grams. In each case, the running variable is birthweight (as opposed to time in a duration-based analysis). We define intervals of birthweight: [0, 1500), [1500, 2000), [2000, 2500), [2500, 3000), [3000, 3500), [3500, 4000), [4000, .). The hazard rate at each interval is defined as having a birthweight within that interval conditional on having a birthweight higher than the maximum of the preceding time interval. For instance, a child that is 1200 grams fails in the first period; a child that is 1800 grams survives the first period but fails in the second period, and so forth. A child that is more than 4000 grams is right-censored.

Figure 2 shows the results with and without the covariates used. A native-refugee gap in hazard rates exist for birthweights less than 2500 grams. (Table 1 shows that 2500 grams correspond to the 25th percentile for refugees.) Moreover, the magnitude of the gap is larger when the birthweight is lower than 2000 grams. In this case, the odds of failure for refugees are about two times as much as that for natives. Similarly, when birthweight is defined in sd, we observe a gap for intervals below the mean. In this case, compared to the case with birthweight in grams, the gap persists for a more extended subset of the distribution, as the mean birthweight is about 3000 grams. It is also interesting to note that the hazard rate is lower for refugees at birthweights above one standard deviation. As a result, we see similar levels for refugees and natives at the top of the distribution in Table 1, which cumulates the higher initial hazard rates with lower later hazard rates for refugees. For example, Table 1 shows that the 90th percentile of birthweight is equal for natives and refugees both in terms of grams and sd. The patterns are similar for current height and weight. For both variables, a gap in the hazard rates exist below two sd in Figure 2. Moreover, the gap below three sd is larger for both variables.

4.2.3 Health Inputs

Table 5 shows the baseline native-refugee gaps in prenatal care, postnatal care, vaccination, and nutrition outcomes and how these gaps change as we account for the differences in their background characteristics. Panel (A) shows that, once we account for the covariates, no native-refugee gap remains in receiving prenatal care , but the gap in receiving prenatal care at least four times persists. In addition, no gap exists in receiving iron tablets even at the baseline.

Conditional on receiving prenatal care, no difference exists in taking it from a health specialist. We observe a large gap, 14 pp, in receiving prenatal care early (in the first trimester) at the baseline; however, this gap disappears after accounting for the covariates. We also see large gaps, even after controlling for covariates, in receiving several types of health checks, such as mother weighing, blood pressure, collection of urine or blood samples, and receiving an abdominal test or tetanus injection. We attribute this to the fact that these tests are more likely to be given in private healthcare centers, which are used more frequently by natives. On the other hand, the small baseline gap in receiving an ultrasound test—which is conducted at all types of healthcare facilities—vanishes after accounting for the covariates.

Panel (B) of Table 5 shows postnatal care outcomes. Even after accounting for the differences in covariates, refugees are 7.3 pp less likely to receive postnatal care. However, conditional on receipt of postnatal care, not much difference exists in the type of postnatal care received. Although there is weak evidence of a gap in receiving postnatal care by type of practitioner, its magnitude is trivial. Panel (C) provides the results about vaccination. At the baseline, refugee children are 10.5 pp less likely to be fully vaccinated. However, after accounting for the covariates, no evidence of a gap in full vaccination remains.

Panel (D) presents the estimates on breastfeeding. Even after accounting for the covariates, refugee children are 5.4 pp less likely to be breastfed for at least 6 months than native children. Panel (E) shows that refugee children also lag behind in certain nutritional take-ins. Refugee children 1- to 6-month-old are 14 pp less likely to receive baby formula and 5.7 pp less likely to eat protein (within the 24 hours preceding the survey date) after adjusting for the covariates. Similarly, children 7- to 36-month-old are 12 pp less likely to eat protein.

To assess whether differences in healthcare utilization help explain variation in anthropometric outcomes, we introduce health behaviors as predictors. Results, of course, need to be interpreted with caution as these are outcomes that may in fact be influenced by perceptions of the risk of poor nutritional outcomes. Table 6, which includes the youngest child born to each mother, shows that the native-refugee gap in birthweight decreases from 102 to 78 grams (by 31%) and becomes statistically insignificant at the conventional levels when we include the covariates for prenatal care. However, the magnitude of the remaining difference is certainly not small. This finding is impressive because we already account for a rich set of covariates, pointing to the importance of prenatal care in birthweight. Panel (D) shows that adding prenatal controls to the specification reduces the gap in current height from 0.253 to 0.224 sd (by about 11%). In contrast, controlling for postnatal care and breastfeeding does not reduce the gap, although native-refuge gaps exist in certain postnatal care and breastfeeding characteristics. This suggests that either postnatal care and breastfeeding characteristics do not matter much for age-adjusted height or that variation in such measures is already captured by the socio-economic measures.

Similarly, Table 7, which includes all children born within the last three years of the survey date, examines how the native-refugee gaps in current weight and height change with the inclusion of vaccination and nutrition controls. Panel (A) on current weight provides no findings worthy of note, as no gap exists before the inclusion of vaccination and nutrition controls. Panel (B) shows that including the vaccination controls does not significantly affect the age-adjusted height. However, including nutrition controls reduces the height gap from 0.265 to 0.234 sd (by 12%).

We replicate Figure 2 including the health care and breastfeeding characteristics in Appendix Figure A1 and the nutritional and vaccination characteristics in Appendix Figure A2. We are primarily interested in whether these additional controls can account for the large gaps at the bottom of the distributions of birthweight and anthropometric measures, shown in Figure 2, more than they can account for the gaps at the mean. However, Appendix Figures A1 and A2 show that the gaps at the bottom of the distributions persist.

4.2.4 Refugee Children born in Turkey vs. born in Syria

Our analysis so far included only refugee children born in Turkey because environmental and household characteristics and household wealth conditions that a child was born into when the family was in Syria are not observed. However, comparing births in Syria and births in Turkey among refugees can be informative about how much time spent in a conflict zone during pregnancy and afterward matters in children's birthweight and anthropometric measures. We thus include refugee children born in Syria as a separate group and compare both the refugee children born in Turkey and the refugee children born in Syria with native children. Our analysis here adjusts for covariates on birth and mother characteristics and mother size (which are also available for children born in Syria).

Figure 3 displays that the birthweight gap for refugee children born outside Turkey is larger than the gap for refugee children born in Turkey. The gap for refugee children born outside Turkey is about 0.4 sd at the baseline and does not change much with the addition of covariates.

In contrast, the gap for refugee children born in Turkey is about 0.26 sd at the baseline and reduces to 0.21 sd with the addition of covariates.

The patterns are similar for current weight and height. While the baseline gap in sd for current weight is 0.157 for refugee children born in Turkey, it is 0.306 for refugee children born outside Turkey. In addition, the gap in sd for refugee children born in Turkey reduces from 0.157 to 0.036 and becomes statistically insignificant with the addition of covariates. In contrast, the gap for refugee children born outside Turkey persists even after accounting for covariates, although it reduces from 0.306 to 0.189. The baseline gap in sd for current height is 0.483 for refugee children born in Turkey but 0.729 for those born outside Turkey. The difference in gaps persists even after accounting for covariates; it reduces to 0.325 for the former group and 0.580 for the latter.

4.2.5 Refugee Children born in Turkey by Country of Conception and Trimester

The literature points to the detrimental effects of stress exposure during pregnancy—particularly in the first trimester (see, e.g., Camacho, 2008). Here, we examine how native-refugee gaps in birthweight and anthropometric measures of refugee children vary by exposure to war during pregnancy. In this analysis, we take the sample of native children and refugee children born in Turkey and separate refugee children into two groups in two different ways: whether they spent the first trimester in Syria and whether they spent any time during pregnancy in Syria. Table 8 gives the results by the country of the first trimester in panel (A) and the country of conception in panel (B). In both panels, both refugee groups have lower birthweight and current height than natives, whereas only refugees who were conceived in Syria or spent the first trimester in Syria have lower current weight than natives, after accounting for the covariates.

The results in the previous subsection about the differences between refugee children born in Turkey and born in Syria could result from institutional differences between Syria and Turkey. The results in this subsection suggest that the experience of a civil war rather than the differences between two countries may be an important predictor of child growth. When we compare the two refugee groups to see if birthweight and anthropometric outcomes are associated with time spent in the conflict zone, we observe that refugee children who spent their first trimester in Syria or were conceived in Syria have much lower current height and weight. Quantitatively, Table 8 indicates that current weight and height are 0.48 and 0.44 sd lower for the refugee children conceived in Syria than the refugee children conceived in Turkey. On the other hand, no evidence of a difference in birthweight exists. We check the robustness of these findings by placing upper limits on the time in Turkey since conception so that we can compare women who arrived in Turkey after conception and women who conceived relatively soon after arriving in Turkey. The estimates in Appendix Table B1 show that the results are robust.

Here, we also revisit Figure 2 to see if the large gaps observed at the bottom of the birthweight and anthropometric measure distributions stem from a higher probability of this part of the distributions including refugee children conceived in Syria. For this purpose, we replicate Figure 2 by excluding the children who spent their first trimester in Syria in Appendix Figure A3 and the children conceived in Syria in Appendix Figure A4. The results show that the exclusion of these children changes the results very little.

4.2.6 Heterogeneity by Years in Turkey

A potentially important variable in refugee children's growth outcomes is the duration of residence of their mothers in Turkey at the time of birth and at the time of the measurement of the anthropometric outcomes (which is the survey date). A longer time in Turkey not only allows women to overcome any traumatic effects of the war and forced migration but gives them time to become more familiar with the health care system in Turkey. Therefore, in an alternative specification, we interact the refugee status with the mother's residence duration at the time of each birth in estimating the native-refugee differences in birthweight and with that at the time of measurement for anthropometric outcomes. Since birthweight measurements are for the year children are born, they exhibit calendar year variation, unlike current weight and height measurements. Hence, we estimate a further specification—only for birthweight—where we use year-of-arrival dummies in addition to the duration of residence. The results, given in Appendix Table B2, indicate no evidence of a significant variation in the native-refugee gaps by the duration of residence in Turkey.

4.3 Robustness Checks

4.3.1 Missing Data

Our dependent variables are missing for some observations. Birthweight is missing for 4.2% of native and 15.0% of refugee children, and current height (weight) is missing for 23.7% (21.1%) of native and 13.0% (12.1%) of refugee children. However, for all observations, qualitative information on the baby's size at birth (very large, large, average, small, very small) is available. Hence, using the quantitative measurements for each dependent variable that is non-missing, we generate the means for each qualitative size. Then, for observations for which quantitative measurements are missing, we assign the mean based on the qualitative size. We repeat our primary analysis (given in Table 3) using this sample of observations with imputed data. The results in Appendix Table B3 show that the patterns of the estimates and the estimated gaps are highly similar.

4.3.2 Potential Sample Selection via Infant Mortality

A difference in mortality rates between native and refugee children would cause a sample selection bias in our estimates for birthweight and anthropometric outcomes. Therefore, we examine the infant mortality gaps between the two groups. Appendix Table B4 shows no difference in infant mortality rates either at the baseline or after controlling for the covariates. Although infant mortality is a rare event and our sample size is not very large, the lack of evidence of a gap is not only due to a lack of precision; the refugee-native gap coefficients are negative after accounting for the covariates. Thus, differential mortality selection is not likely to be an important factor in comparisons of refugee and native health in our context.

4.3.3 Potential Self-Selection in Migration

The worse outcomes in birthweight and anthropometric measures among refugees could partly result from a negative selection in terms of health outcomes in the migration decision to Turkey. In our forced migration context, we would expect selection to be less likely. In fact, Ferris and Kirişci (2016) report that most refugees stated that they left Syria for security reasons and chose Turkey as their destination due to the ease of transportation. Nonetheless, we check for potential selection in educational outcomes by comparing the educational attainment of adults in the 2009 Syria Family Health Survey (SFHS) and the 2018 THDS. We would expect any health selection to be correlated with the educational selection. As a 9-year gap exists between the datasets, we compare the same birth cohorts in the two datasets. In addition, since most Syrian refugees in Turkey originate from the northern provinces, we weight the Syrian provincial averages in the 2009 SFHS by the distribution of province of birth of Syrian refugees in Turkey. Appendix Table B5 shows that the educational distributions in the two countries are quite similar.

5. Conclusion

Refugee infants born in Turkey have lower birthweight and age-adjusted weight and height than native infants. When we account for a rich set of birth and socioeconomic characteristics that display substantial differences between natives and refugees, the native-refugee gaps in birthweight and age-adjusted height persist, but the gap in age-adjusted weight disappears. In other words, refugee infants, on average, close the weight gap over time. The rich set of covariates we use explains about 35% of the baseline difference in birthweight and more than half of the baseline difference in current height. However, even after that, refugee infants' average birthweight is 0.17 sd lower and their current height is 0.23 sd lower. These gaps are even larger for refugee infants born outside Turkey.

The differences between refugees born in Turkey and natives in birthweight and anthropometric outcomes are limited to the lower end of the distribution. In addition, the gap gradually widens as we move toward the lower end of the distribution for each outcome. No native-refugee gap exists above the mean level for any of the outcomes. After accounting for the covariates, refugee infants born in Turkey are 4.8 pp more likely to have low birthweight but not less likely to have high birthweight. Similarly, refugee infants are 2.4 pp more likely to be underweight and 6.0 pp more likely to be stunted; however, they are not less likely to be overweight or tall.

Certain differences in prenatal care (such as the frequency of checks and type of checks) persist between native and refugee mothers, and these differences in prenatal care explain a further 30% of the remaining variation in birthweight. The differences in prenatal care behavior also explain part of the current height gap. Although refugees are less likely to take postnatal care, this does not seem to be important for the gaps in anthropometric outcomes. We find no differences in vaccination behavior between natives and refugees after accounting for the covariates. Important differences in breastfeeding and nutrition behavior also exist between the two groups, and these differences explain part of the remaining gap in current height.

Overall, the results suggest that, at least conditional on household economic resources, Syrian refugee children are well-served by the Turkish public health system, broadly construed. Refugees are differentially represented among households with low economic resources, but that points more towards a need for continued expansion of economic opportunities than a need for targeted health and nutritional programs per se. We do find some evidence that any deficits reflect the migration process under stressful conditions rather than refugee status per se. Finally, our results point, in particular, to the deficits at the lower end of the distribution. There is perhaps less need for a generalized program and more need to identify refugees at high risk for low birth weight or other early-child deficits.

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TABLES

Table 1: Summary Statistics of Birthweight and Anthropometric Measures

	Birth weight (in grams)		Birth weight (standardized)		Current Weight (standardized)		Current Height (standardized)	
	Natives	Refugees	Natives	Refugees	Natives	Refugees	Natives	Refugees
A) Basic Descriptives								
Mean	3140	2953	0.110	-0.153	0.181	0.024	-0.249	-0.732
Standard Deviation	639	779	0.897	1.094	1.072	1.171	1.221	1.518
10th percentile	2300	2000	-1.069	-1.491	-1.170	-1.320	-1.740	-2.480
25th percentile	2800	2500	-0.367	-0.789	-0.500	-0.670	-1.040	-1.570
Median	3200	3000	0.194	-0.087	0.170	0.040	-0.270	-0.780
75th percentile	3500	3500	0.616	0.616	0.820	0.720	0.520	0.140
90th percentile	3900	3900	1.177	1.177	1.510	1.360	1.230	0.980
B) Probability of Extreme Outcomes								
Very Low (< 2 s.d.)	0.119	0.192	-	-	0.015	0.038	0.060	0.169
Very High (> 2 s.d.)	0.052	0.040	-	-	0.046	0.040	0.034	0.044
Number of observations	2638	1331	2638	1331	2174	1376	2102	1363

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. Sampling weights at the mother level are used in tabulations. The standardized outcomes are in terms of z-scores. The extreme outcomes are defined as follows. The birth weight is classified as very low (high) if it is lower than 2500 gram (higher than 4000 gram). The current weight and height are classified as very low (high) if the standardized current weight and height are lower (higher) than two standard deviations of the average weight and height, respectively.

Table 2: Summary Statistics of Control Variables

	Natives	Refugees
Birth Characteristics		
Baby Sex		
Boy	0.499	0.532
Girl	0.501	0.468
Twin Status		
Single	0.970	0.972
Twin	0.028	0.025
Triplet	0.002	0.002
Duration of Pregnancy		
7 months or before	0.026	0.023
8 months	0.134	0.047
9 months or more	0.840	0.923
Birth Order		
1st birth	0.325	0.302
2nd birth	0.319	0.243
3rd birth	0.206	0.174
4th birth	0.081	0.111
5th or later births	0.069	0.170
Timing of the Preceding Birth		
Last 18 months	0.119	0.217
Last 19-24 months	0.106	0.201
Last 25-30 months	0.088	0.145
Last 31-36 months	0.093	0.134
More than 36 months	0.583	0.298
Mother Age at Birth (mean)	27.59	24.37
Environmental Characteristics		
Birth Region		
West	0.409	0.193
Central	0.132	0.072
South	0.140	0.357
North	0.052	0.000
East	0.256	0.377
Type of Birth Region		
Province center	0.477	0.720
District center	0.360	0.274
Sub-district or village	0.159	0.006
Access to safe water	0.971	0.999
Access to safe sanitation	0.985	0.993

	Natives	Refugees
Mother Characteristics		
Mother Education		
No education	0.100	0.115
Incomplete primary	0.048	0.053
Complete primary	0.246	0.350
Incomplete secondary	0.028	0.160
Complete secondary	0.188	0.140
Incomplete high school	0.065	0.044
Complete high school or more	0.326	0.133
Mother Smokes		
Never	0.800	0.929
Irregularly	0.058	0.037
Regularly	0.140	0.034
Mother Size		
Mother Weight (mean in cm)	157.9	156.7
Mother BMI (mean)	27.8	27.2
Household Wealth		
Household Wealth		
1st quintile	0.100	0.815
2nd quintile	0.210	0.163
3rd quintile	0.226	0.014
4th quintile	0.235	0.007
5th quintile	0.229	0.000
Household Characteristics		
Household Members (mean)	5.300	7.332
Female Household Head	0.062	0.081
Partner Education		
No education	0.019	0.107
Incomplete primary	0.027	0.073
Complete primary	0.235	0.351
Incomplete secondary	0.123	0.150
Complete secondary	0.380	0.230
Complete high school or more	0.212	0.080
Number of Observations	2,755	1,566

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceeding the survey. The refugee sample is restricted to children who were born in Turkey. Sampling weights at the mother level are used in tabulations.

Table 3: Refugee-Native Differences in Birthweight and Anthropometric Measures

	Baseline	Group 1 (Baseline + Birth Char.)	Group 2 (Group 1 + Mother Char.)	Group 3 (Group 2 + Mother Size)	Group 4 (Group 3 + Environment Char.)	Group 5 (Group 4 + Household Char.)	Group 6 (Group 5 + Household Wealth)
A) Birth Weight (in grams) (N=3,969)							
Syrian refugee born in Turkey	-187.464***	-164.446***	-160.493***	-146.829***	-159.677***	-157.138***	-121.573***
	[29.578]	[30.309]	[30.863]	[30.686]	[32.973]	[34.772]	[45.656]
R-squared	0.016	0.200	0.212	0.226	0.241	0.250	0.250
B) Standardized Birth Weight (N=3,969)							
Syrian refugee born in Turkey	-0.263***	-0.231***	-0.225***	-0.206***	-0.224***	-0.221***	-0.171***
	[0.042]	[0.043]	[0.043]	[0.043]	[0.046]	[0.049]	[0.064]
R-squared	0.016	0.200	0.212	0.226	0.241	0.250	0.250
C) Standardized Current Weight (N=3,550)							
Syrian refugee born in Turkey	-0.157***	-0.085*	-0.068	-0.030	-0.023	-0.016	-0.002
	[0.044]	[0.048]	[0.050]	[0.049]	[0.056]	[0.059]	[0.077]
R-squared	0.005	0.030	0.033	0.079	0.090	0.100	0.101
D) Standardized Current Height (N=3,465)							
Syrian refugee born in Turkey	-0.483***	-0.376***	-0.363***	-0.323***	-0.369***	-0.360***	-0.230**
	[0.056]	[0.061]	[0.063]	[0.061]	[0.072]	[0.079]	[0.101]
R-squared	0.030	0.050	0.055	0.105	0.118	0.131	0.133
Dummies for							
Gender, twin status, pregnancy duration, mother's age		yes	yes	yes	yes	yes	yes
Birth order and duration since the preceeding birth		yes	yes	yes	yes	yes	yes
Mother education and smoking behaviour			yes	yes	yes	yes	yes
Mother's height and body mass index				yes	yes	yes	yes
Place of birth region, type of birth region					yes	yes	yes
Safe water, safe sanitation					yes	yes	yes
Household size, household head's sex, partner's education						yes	yes
Household wealth quintiles							yes

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. Each cell shows the coefficient estimate of the Syrian refugee dummy for the specified outcome. The associated standard errors are displayed in parentheses. Each column displays results for a different group of control variables as specified at the bottom of the table. The standardized outcomes are in terms of z-scores. Sampling weights at the mother level are used. Standard errors are clustered at the mother level. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 4: Refugee-Native Differences in Extreme Birthweight and Anthropometric Outcomes

	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)
A) Birth Weight (N=3,969)	Low birth weight		High birth weight	
Syrian refugee born in Turkey	0.073***	0.048**	-0.012	-0.015
	[0.015]	[0.022]	[0.008]	[0.014]
R-squared	0.010	0.216	0.001	0.051
B) Current Weight (N=3,550)	Underweight		Overweight	
Syrian refugee born in Turkey	0.023***	0.024**	-0.006	0.016
	[0.006]	[0.012]	[0.008]	[0.015]
R-squared	0.005	0.068	0.000	0.038
C) Current Height (N=3,465)	Stunted		Tall	
Syrian refugee born in Turkey	0.109***	0.060***	0.010	0.017
	[0.012]	[0.022]	[0.007]	[0.014]
R-squared	0.031	0.099	0.001	0.044

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. Each cell shows the coefficient estimate of the Syrian refugee dummy from a linear probability model for the specified outcome. Low birth weight is defined as having birth weight lower than 2500 gram and high birth weight as the one larger than 4000 grams. The child is considered as underweight (overweight) if the standardized current weight is lower (higher) than two standard deviations of the average weight. The child is considered as stunted (tall) if the standardized current height is lower (higher) than two standard deviations of the average height. See notes to Table 3 for the sample restrictions and regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 5: Refugee-Native Differences in Health Care, Vaccination, and Nutrition

	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)
Panel A: Prenatal Care (N=3,222)		
Prenatal care taken	-0.0233***	0.0204
Visited at least four times	-0.2524***	-0.1015***
Iron tablets received	0.0164	0.0841***
Conditional on prenatal care taken		
Given by a health specialist	0.0005	0.0024
Given in a health facility	-0.0052**	-0.0011
First visit in the first trimester	-0.1416***	-0.0159
First visit in the second trimester	0.1090***	0.0158
First visit in the third trimester	0.0326***	0.0001
Mother weighted	-0.3586***	-0.2684***
Blood pressure measured	-0.2598***	-0.2114***
Urine sample given	-0.2267***	-0.1530***
Blood sample given	-0.2246***	-0.1307***
Ultrasound test received	-0.0272***	-0.0151
Abdominal test received	-0.3004***	-0.1472***
Tetanous injection received	-0.5079***	-0.4139***
Panel B: Postnatal Care (N=3,214)		
Postnatal care taken	-0.1219***	-0.0730***
Conditional on care taken		
Given by a health specialist	0.0011	0.0059*
Given in a health facility	-0.0013	-0.0004
Given in the first month after delivery	0.0112	0.0197
Panel C: Vaccination (N=1,762)		
Fully Vaccinated, 12-35 months	-0.1050***	0.0507
Panel D: Breastfeeding (N=3,222)		
Never breastfed	0.0359***	0.0184
Breastfed within an hour after delivery	0.0008	0.0241
Breastfed at least 6 months, 7-60 months	-0.0645***	-0.0540*
Panel E: Nutritional Take-in (N=2,662)		
Baby formula, 1-6 months	-0.1668***	-0.1444**
Baby formula, 7-36 months	-0.0212	-0.0201
Milk product, 1-6 months	0.0445	-0.0059
Milk product, 7-36 months	-0.0671***	0.0330
Protein, 1-6 months	-0.0456***	-0.0579*
Protein, 7-36 months	-0.3101***	-0.1236***

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The samples in panels (A), (B), and (D) include the youngest child born in the previous five years for each mother. The samples in panels (C) and (E) include children born in the previous three years for each mother. The refugee sample is restricted to children who were born in Turkey. For some outcomes, the number of observations is smaller than the reported one because of additional conditioning and missing values. Each cell shows the coefficient estimate of the Syrian refugee dummy for the specified outcome. Each column displays results for a different group of control variables. See notes to Table 3 for the list of control variables in each group and for other details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 6: Refugee-Native Gaps in Birthweight and Anthropometric Measures, Controlling for Health Care and Breastfeeding Characteristics

	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)	Group 7 (Group 6 + Prenatal Health Care Char.)	Group 8 (Group 6 + Postnatal Health Care Char.)	Group 9 (Group 6 + Breastfeeding Char.)
A) Birth Weight (in grams) (N=3,007)					
Syrian refugee born in Turkey	-203.603***	-102.173**	-78.288	--	--
	[30.140]	[49.608]	[51.363]		
R-squared	0.019	0.242	0.255	--	--
B) Standardized Birth Weight (N=3,007)					
Syrian refugee born in Turkey	-0.286***	-0.143**	-0.110	--	--
	[0.042]	[0.070]	[0.072]		
R-squared	0.019	0.242	0.255	--	--
C) Standardized Current Weight (N=2,675)					
Syrian refugee born in Turkey	-0.147***	0.013	0.028	0.006	-0.014
	[0.051]	[0.085]	[0.091]	[0.086]	[0.085]
R-squared	0.004	0.120	0.125	0.124	0.132
D) Standardized Current Height (N=2,604)					
Syrian refugee born in Turkey	-0.434***	-0.253**	-0.224**	-0.262**	-0.308***
	[0.064]	[0.102]	[0.110]	[0.103]	[0.102]
R-squared	0.023	0.137	0.150	0.140	0.178
Dummies for					
Full set of controls from Table 3		yes	yes	yes	yes
Number of prenatal visits, timing of first prenatal visit			yes		
Place and person giving prenatal care			yes		
Iron tablets, several types of prenatal care tests			yes		
Timing of postnatal care				yes	
Place and person giving postnatal care				yes	
Timing of starting breastfeeding					yes
Duration of breastfeeding					yes

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample is restricted to the youngest child born in the previous five years for each mother due to data availability. The refugee sample is restricted to children who were born in Turkey. Each cell shows the coefficient estimate of the Syrian refugee dummy for the stated outcome and regression specification. The standardized outcomes are in terms of z-scores. See notes to Table 3 for other details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 7: Refugee-Native Gaps in Anthropometric Measures Controlling for Vaccination and Nutritional Characteristics

	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)	Group 10 (Group 6 + Vaccination Char.)	Group 11 (Group 6 + Nutritional Char.)
A) Standardized Current Weight (N=2,443)				
Syrian refugee born in Turkey	-0.134**	0.003	-0.007	-0.005
	[0.055]	[0.094]	[0.094]	[0.094]
R-squared	0.003	0.130	0.134	0.135
B) Standardized Current Height (N=2,175)				
Syrian refugee born in Turkey	-0.514***	-0.254**	-0.265**	-0.234*
	[0.070]	[0.122]	[0.122]	[0.121]
R-squared	0.031	0.152	0.222	0.208
Dummies for				
Full set of controls from Table 3		yes	yes	yes
Fully vaccinated			yes	
Taking protein, milk, baby formula				yes

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample is restricted to children born in the previous three years due to data availibility. The refugee sample is restricted to children who were born in Turkey. Each cell shows the coefficient estimate of the Syrian refugee dummy for the stated outcome and regression specification. he standardized outcomes are in terms of z-scores. See notes to Table 3 for other details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table 8: Refugee-Native Gaps in Birthweight and Anthropometric Measures by Country of First Trimester and Country of Conception

	Standardized Birth Weight		Standardized Current Weight		Standardized Current Height	
	Baseline	Full	Baseline	Full	Baseline	Full
Panel A) Trimester Country						
Syrian refugee spent trimester in Syria (a)	-0.383**	-0.231	-0.637***	-0.481***	-0.789***	-0.534***
	[0.153]	[0.162]	[0.117]	[0.133]	[0.175]	[0.194]
Syrian refugee spent trimester in Turkey (b)	-0.261***	-0.160**	-0.126***	0.033	-0.458***	-0.202**
	[0.042]	[0.064]	[0.046]	[0.077]	[0.057]	[0.103]
Difference (b-a)						
Estimate	0.122	0.071	0.511***	0.514***	0.332*	0.332*
S.E.	[0.155]	[0.154]	[0.119]	[0.117]	[0.178]	[0.178]
Number of Observations	3,940	3,940	3,518	3,518	3,432	3,432
Panel B) Conception Country						
Syrian refugee conceived in Syria (a)	-0.229**	-0.142	-0.583***	-0.432***	-0.862***	-0.624***
	[0.111]	[0.119]	[0.093]	[0.118]	[0.133]	[0.163]
Syrian refugee conceived in Turkey (b)	-0.275***	-0.166***	-0.112**	0.049	-0.436***	-0.185*
	[0.043]	[0.064]	[0.047]	[0.078]	[0.059]	[0.103]
Difference (b-a)						
Estimate	-0.046	-0.024	0.471***	0.481***	0.427***	0.439***
S.E.	[0.114]	[0.107]	[0.096]	[0.096]	[0.137]	[0.139]
Number of Observations	3,914	3,914	3,495	3,495	3,409	3,409

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. In each panel, the refugee sample is further restricted and divided into two groups as defined in the title of the panel. Each cell shows the coefficient estimate of the specified Syrian refugee dummy for the specified outcome. The associated standard errors are displayed in parentheses. The standardized outcomes are in terms of z-scores. See notes to Table 3 for details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

FIGURES

Figure 1: Pre-war Values of Birthweight and Anthropometric Outcomes in Turkey and Syria

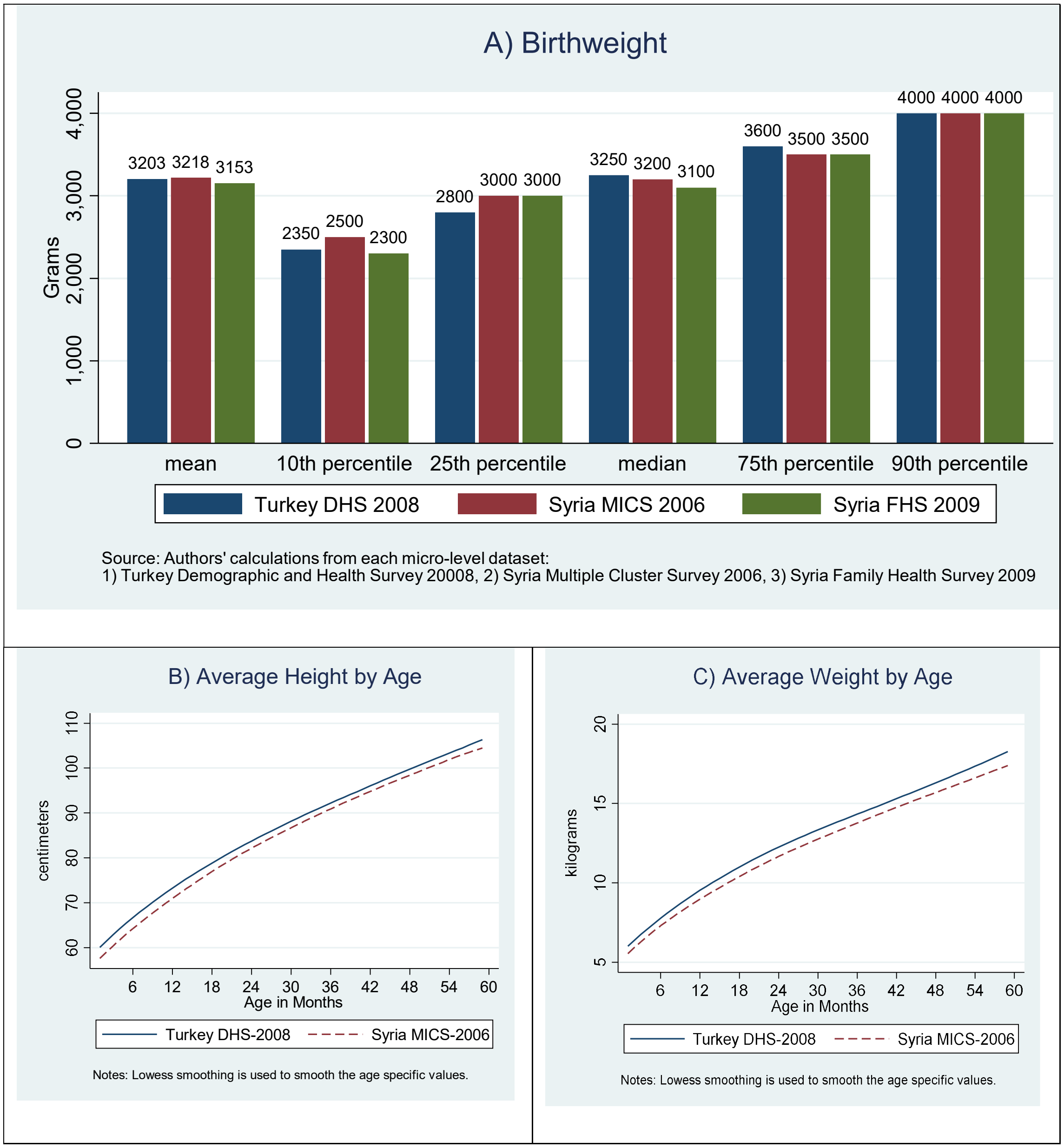
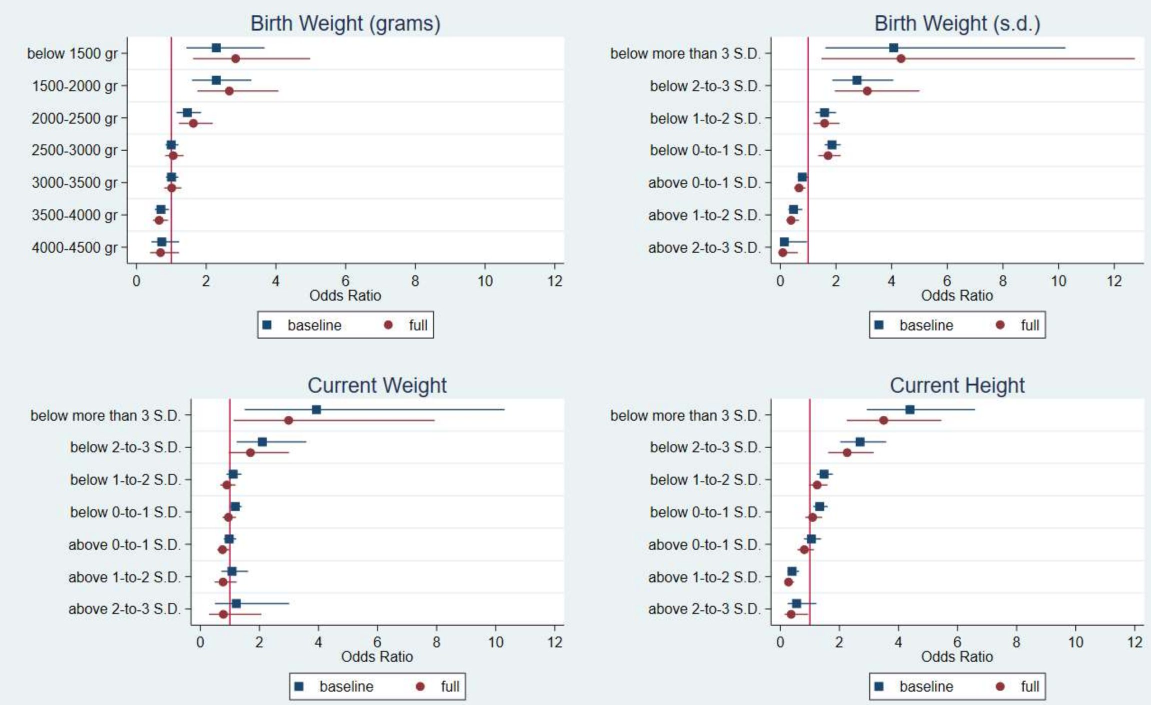
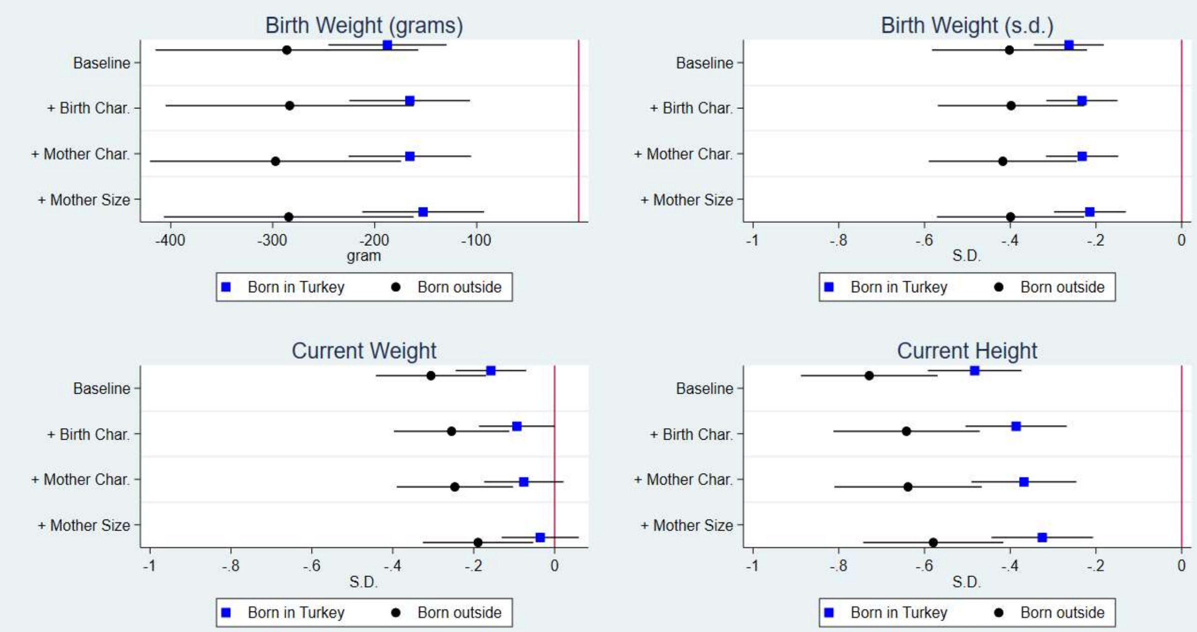


Figure 2: Distributional Analysis of Birthweight and Anthropometric Measures



Notes: The data come from the 2018 wave of the Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. Each dot shows the odds ratio of the Syrian refugee dummy for the specified outcome. The associated bars display 95 percent confidence intervals. The vertical line displays the odds ratio at 1. The full model includes the list of all control variables displayed in Table 3. Sampling weights at the mother level are used.

Figure 3: Refugee-Native Gaps in Birthweight and Anthropometric Measures by Refugees' Birth Country



Notes: a) The data come from the 2018 wave of the Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The numbers of observations are 4224, 3881, and 3796 for the analyses of birthweight, current weight, and current height, respectively. Each dot shows the coefficient estimate of the Syrian refugee dummies for the specified outcome and regression specification. The associated bars display the 95 percent confidence intervals. Sampling weights at the mother level are used. Standard errors are clustered at the mother level. The vertical line displays point 0. See Table 3 for the list of control variables in each group.
b) The p-values for the difference between the point estimates of birthweight for refugees born in and outside Turkey are 0.145, 0.063, 0.037, and 0.036, respectively. The p-values for the difference between the point estimates of current weight for refugees born in and outside Turkey are 0.037, 0.023, 0.015, and 0.024, respectively. Finally, the p-values for the difference between the point estimates of current height for refugees born in and outside Turkey are 0.004, 0.003, 0.002, and 0.002, respectively.

Not for Print Publication

DATA APPENDIX

Definition of Born in Turkey: Since this information is not available in the data module focusing on women, we obtain it from the household roster by merging the datasets. For a small group of refugee infants who were currently not alive or did not live with their mother at the survey time (60 refugee infants), we do not have the information about their country of birth. We infer their birthplace by comparing the infants' date of birth with the date of their mothers' arrival in Turkey—both of which are available in year-month-day format. Accordingly, 34 infants out of 60 are born in Turkey and the remaining infants are born outside.

Definition of Full-Vaccination: Based on the vaccination scheme in Turkey, children are supposed to complete three doses of polio and DPT, one dose of tuberculosis, three doses of hepatitis B, and the first dose of oral polio vaccines by the end of 12 months and additionally one dose of measles and varicella, the second dose of oral polio, two doses of hepatitis-A vaccines by the end of 24 months. Thus, infants who are currently 13-to-24 months old and completed the first set of vaccines and those who are currently 25-to-36 months old and completed all listed vaccines are considered fully vaccinated in the analysis. In the regression analysis, we use dummy variables for each of the following cases as the set of vaccination-related control variables: for 1-to-12 months old children, for 13-to-36 months old and fully vaccinated children, and for 13-to-36 months old and not fully vaccinated children.

Table A1: Summary Statistics of Health Care Characteristics

	Natives	Refugees
Number of observations	2,168	1,057
Prenatal care taken		
Yes	0.965	0.939
No	0.035	0.058
Missing	0.000	0.003
Visited at least four times	0.901	0.649
Iron tablets received	0.816	0.833
Conditional on prenatal care taken		
Given by a health specialist	1.000	1.000
Given in a health facility	1.000	0.995
First visit in the first trimester	0.930	0.789
First visit in the second trimester	0.056	0.165
First visit in the third trimester	0.013	0.046
Mother weighted	0.927	0.568
Blood pressure measured	0.976	0.716
Urine sample given	0.920	0.693
Blood sample given	0.967	0.742
Ultrasound test received	0.984	0.957
Abdominal test received	0.616	0.316
Tetanus injection received	0.809	0.301
Postnatal care taken		
Yes	0.978	0.855
No	0.020	0.141
Missing	0.003	0.004
Conditional on postnatal care taken		
Given by a health specialist	0.998	0.999
Given in a health facility	0.997	0.996
Given in the first month after delivery	0.959	0.970
Fully Vaccinated (among 13-36 month-olds)		
Yes	0.601	0.496

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The statistics for prenatal and postnatal healthcare characteristics are for the youngest child born in the previous five years for each mother. The refugee sample is restricted to children who were born in Turkey. The vaccination characteristics are for children born in the previous three years and aged 13-to-36 months old by the survey time. Sampling weights at the mother level are used in tabulations. The number of observations for vaccination is 1052 for the native sample and 710 for the refugee sample.

Table A2: Summary Statistics of Nutritional and Breastfeeding Characteristics

	Natives	Refugees
Breastfeeding variables		
Never breastfed	0.025	0.060
Breastfed within an hour after delivery	0.777	0.777
Breastfed at least 6 months, 7-60 months	0.847	0.783
Nutritional take-in		
Baby formula, 1-6 months	0.341	0.174
Baby formula, 7-36 months	0.154	0.133
Milk product, 1-6 months	0.174	0.218
Milk product, 7-36 months	0.863	0.796
Protein, 1-6 months	0.046	0.000
Protein, 7-36 months	0.746	0.436

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The statistics for breastfeeding are for the youngest child born in the previous five years for each mother. The statistics for nutritional take-in are for children born in the previous three years. The refugee sample is restricted to children who were born in Turkey. Sampling weights at the mother level are used in tabulations.

APPENDIX TABLES

Table B1: Differences in Main Anthropometric Measures between Native and Refugee Children by Conception Place

	Standardized Birth Weight		Standardized Current Weight		Standardized Current Height	
	Baseline	Full	Baseline	Full	Baseline	Full
Panel A: Country of the First Trimester, excluding those with trimester spent in both countries						
Syrian refugee spent trimester in Syria (a)	-0.383**	-0.232	-0.637***	-0.482***	-0.789***	-0.537***
	[0.153]	[0.163]	[0.117]	[0.133]	[0.175]	[0.194]
Syrian refugee spent trimester in Turkey (b)	-0.275***	-0.170***	-0.112**	0.052	-0.436***	-0.179*
	[0.043]	[0.065]	[0.047]	[0.077]	[0.059]	[0.103]
Difference (b-a)						
Estimate	0.108	0.062	0.525***	0.534***	0.354**	0.358**
S.E.	[0.155]	[0.154]	[0.120]	[0.117]	[0.178]	[0.178]
Number of Observations	3,869	3,869	3,452	3,452	3,367	3,367
Panel B: Country of the First Trimester, comparison of a narrower window						
Syrian refugee spent trimester in Syria (a)	-0.383**	-0.247	-0.637***	-0.450***	-0.789***	-0.555***
	[0.153]	[0.168]	[0.117]	[0.138]	[0.175]	[0.208]
Syrian refugee spent trimester in Turkey (b)	-0.280***	-0.165**	-0.174**	-0.025	-0.555***	-0.325**
	[0.076]	[0.082]	[0.068]	[0.091]	[0.092]	[0.128]
Difference (b-a)						
Estimate	0.103	0.082	0.463***	0.425***	0.235	0.23
S.E.	[0.167]	[0.166]	[0.131]	[0.133]	[0.196]	[0.203]
Number of Observations	2,971	2,971	2,529	2,529	2,455	2,455
Panel C: Country of Conception, comparison of a narrower window						
Syrian refugee conceived in Syria (a)	-0.229**	-0.166	-0.583***	-0.417***	-0.862***	-0.669***
	[0.111]	[0.124]	[0.093]	[0.119]	[0.133]	[0.172]
Syrian refugee conceived in Turkey (b)	-0.280***	-0.160*	-0.174**	-0.031	-0.555***	-0.337***
	[0.076]	[0.082]	[0.068]	[0.091]	[0.092]	[0.127]
Difference (b-a)						
Estimate	-0.052	0.006	0.409***	0.386***	0.307*	0.332**
S.E.	[0.130]	[0.122]	[0.110]	[0.113]	[0.158]	[0.162]
Number of Observations	3,016	3,016	2,572	2,572	2,497	2,497

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. In each panel, the refugee sample is further restricted and divided into two groups as specified in the panel. In Panel B and C, the Syrian refugees in group b is restricted to children who were conceived within the first year after migration. Each cell shows the coefficient estimate of the specified Syrian refugee dummy for the specified outcome. The associated standard errors are displayed in parentheses. The standardized outcomes are in terms of z-scores. See notes to Table 3 for details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table B2: Differences in Main Anthropometric Measures between Native and Refugee Children, by Years in Turkey

	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)
A) At Birth	Birth Weight (in grams)		Standardized Birth Weight	
Syrian refugee born in Turkey	-127.844**	-66.957	-0.180**	-0.094
	[50.931]	[57.358]	[0.072]	[0.081]
Syrian refugee born in Turkey * Mother's years in Turkey at birth	-21.484	-19.771	-0.030	-0.028
	[15.001]	[13.018]	[0.021]	[0.018]
R-squared	0.017	0.251	0.017	0.251
Observations	3,969	3,969	3,969	3,969
B) At Birth, Controlling Arrival Year	Birth Weight (in grams)		Standardized Birth Weight	
Syrian refugee born in Turkey	-76.975	-6.183	-0.108	-0.009
	[62.531]	[68.769]	[0.088]	[0.097]
Syrian refugee born in Turkey * Mother's years in Turkey at birth	-2.654	-6.889	-0.004	-0.010
	[17.988]	[15.463]	[0.025]	[0.022]
R-squared	0.021	0.253	0.021	0.253
Observations	3,969	3,969	3,969	3,969
C) At Survey Time	Current Weight		Current Height	
Syrian refugee born in Turkey	-0.102	0.027	-0.368**	-0.172
	[0.114]	[0.125]	[0.154]	[0.170]
Syrian refugee born in Turkey * Mother's years in Turkey as of 2018	-0.013	-0.007	-0.027	-0.014
	[0.024]	[0.024]	[0.033]	[0.032]
R-squared	0.005	0.101	0.030	0.133
Observations	3,550	3,550	3,465	3,465

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. Each column in each panel shows the coefficient estimate of the Syrian refugee dummy and years in Turkey for the specified outcome and regression specification. The regressions in Panel B additionally control for the year of arrival of Syrian refugees with dummies. See notes to Table 3 for the sample restrictions, the full list of control variables and other details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table B3: Refugee-Native Differences in Birthweight and Anthropometric Measures with Imputed Data

	Baseline	Group 1 (Baseline + Birth Char.)	Group 2 (Group 1 + Mother Char.)	Group 3 (Group 2 + Mother Size)	Group 4 (Group 3 + Environment Char.)	Group 5 (Group 4 + Household Char.)	Group 6 (Group 5 + Household Wealth)
A) Birth Weight (in grams) (N=4,269)							
Syrian refugee born in Turkey	-198.716***	-195.709***	-190.565***	-179.341***	-187.709***	-182.064***	-143.733***
	[27.635]	[28.336]	[28.928]	[28.752]	[31.041]	[32.393]	[42.105]
R-squared	0.019	0.193	0.206	0.218	0.232	0.242	0.243
B) Standardized Birth Weight (N=4,269)							
Syrian refugee born in Turkey	-0.280***	-0.276***	-0.269***	-0.253***	-0.265***	-0.257***	-0.203***
	[0.039]	[0.040]	[0.041]	[0.041]	[0.044]	[0.046]	[0.059]
R-squared	0.019	0.193	0.206	0.218	0.232	0.242	0.243
C) Standardized Current Weight (N=4,301)							
Syrian refugee born in Turkey	-0.150***	-0.096**	-0.084*	-0.050	-0.045	-0.034	-0.016
	[0.038]	[0.041]	[0.043]	[0.043]	[0.049]	[0.052]	[0.068]
R-squared	0.005	0.025	0.028	0.068	0.077	0.086	0.087
D) Standardized Current Height (N=4,301)							
Syrian refugee born in Turkey	-0.478***	-0.398***	-0.386***	-0.354***	-0.385***	-0.379***	-0.260***
	[0.047]	[0.051]	[0.053]	[0.052]	[0.061]	[0.066]	[0.085]
R-squared	0.035	0.052	0.056	0.097	0.108	0.120	0.122
Dummies for							
Gender, twin status, pregnancy duration, mother's age		yes	yes	yes	yes	yes	yes
Birth order and duration since the preceeding birth		yes	yes	yes	yes	yes	yes
Mother education and smoking behaviour			yes	yes	yes	yes	yes
Mother's height and body mass index				yes	yes	yes	yes
Place of birth region, type of birth region					yes	yes	yes
Safe water, safe sanitation					yes	yes	yes
Household size, household head's sex, partner's education						yes	yes
Household wealth quintiles							yes

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. If the value of the dependent variable of interest is missing, it is imputed as the average value of dependent variable for the corresponding group of birth size, sex, and refugee status. Each cell shows the coefficient estimate of the Syrian refugee dummy for the specified outcome. The associated standard errors are displayed in parentheses. Each column displays results for a different group of control variables as specified at the bottom of the table. Sampling weights at the mother level are used. Standard errors are clustered at the mother level. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table B4: Differences in Mortality between Native and Refugee Children

	Baseline	Group 6 (Baseline + Full Set of controls from Table 3)
A) Died in the first week (N=4,229)		
Syrian refugee born in Turkey	0.0005	-0.0035
	[0.0035]	[0.0040]
R-squared	0.0000	0.3397
B) Died in the first 28 days (N=4,229)		
Syrian refugee born in Turkey	0.0030	-0.0026
	[0.0040]	[0.0052]
R-squared	0.0002	0.2823
C) Died within a year (N=3,271)		
Syrian refugee born in Turkey	0.0006	-0.0087
	[0.0059]	[0.0079]
R-squared	0.0000	0.2396

Notes: The data come from the 2018 wave of Turkey Demographic and Health Survey. Each cell shows the coefficient estimate of the Syrian refugee dummy from a linear probability model for the specified outcome. The samples in Panel A and B are restricted to children who were born two or more months before the survey. The sample in Panel C is restricted to children who were born thirteen or more months before the survey. The refugee sample is restricted to children who were born in Turkey. See notes to Table 3 for the list of control variables in each group and for other details of regression specification. Statistical significance: * 10 percent level, ** 5 percent level, *** 1 percent level.

Table B5: A Comparison of Educational Distributions of Syrians in Syria and Turkey

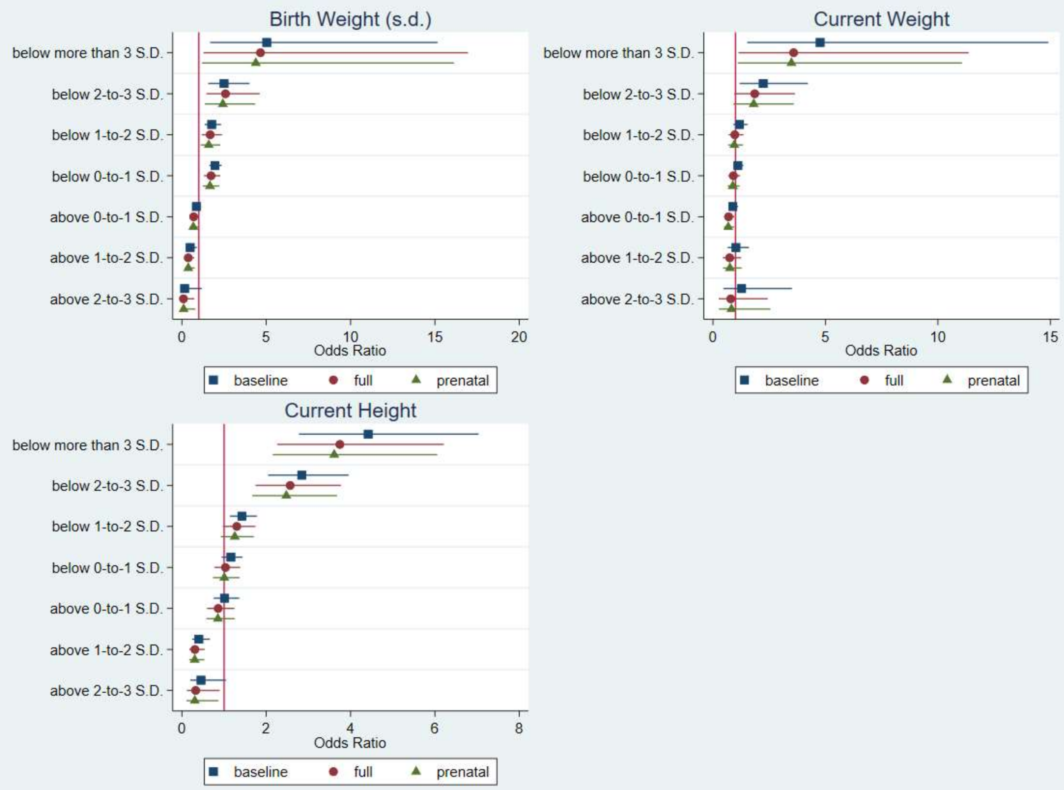
	A) 2018 Turkey DHS			B) 2009 Syria FHS		
Birth Cohort	Primary or Higher	Secondary or Higher	High School or Higher	Primary or Higher	Secondary or Higher	High School or Higher
1979-1988	0.799	0.327	0.160	0.765	0.256	0.112
1969-1978	0.770	0.291	0.131	0.750	0.199	0.117
1959-1968	0.553	0.240	0.116	0.619	0.220	0.142
1949-1958	0.450	0.248	0.143	0.460	0.165	0.105
1939-1948	0.272	0.128	0.078	0.356	0.128	0.085
1929-1938	0.166	0.033	0.000	0.198	0.058	0.040

Notes: The data comes from the Syrian sample of the 2018 Turkey Demographic and Health Survey in panel (A) and from the 2009 Syria Family Health Survey in panel (B). The table compares the educational attainment of selected birth cohorts in the two datasets. Since the Syrian refugees in Turkey are more likely to be from the northern provinces of Syria, the provincial means obtained from the 2009 Syria Family Health Survey are weighted according to the distribution of birth provinces of Syrians in Turkey. These weights also change by the birth cohorts. The youngest individual is 21 years old in the 2009-SFHS and 30 years old in the 2018-TDHS. The minimum age restriction (21) is imposed so that we can examine high school completion status without censoring.

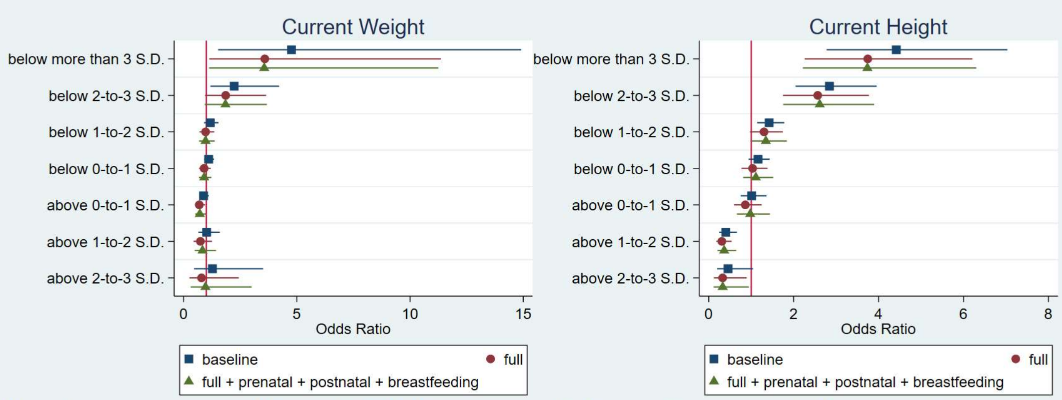
APPENDIX FIGURES

Figure A1: Distributional Analysis of Birthweight and Anthropometric Measures, Controlling for Health Care and Breastfeeding

Panel A: Controlling for Prenatal Care



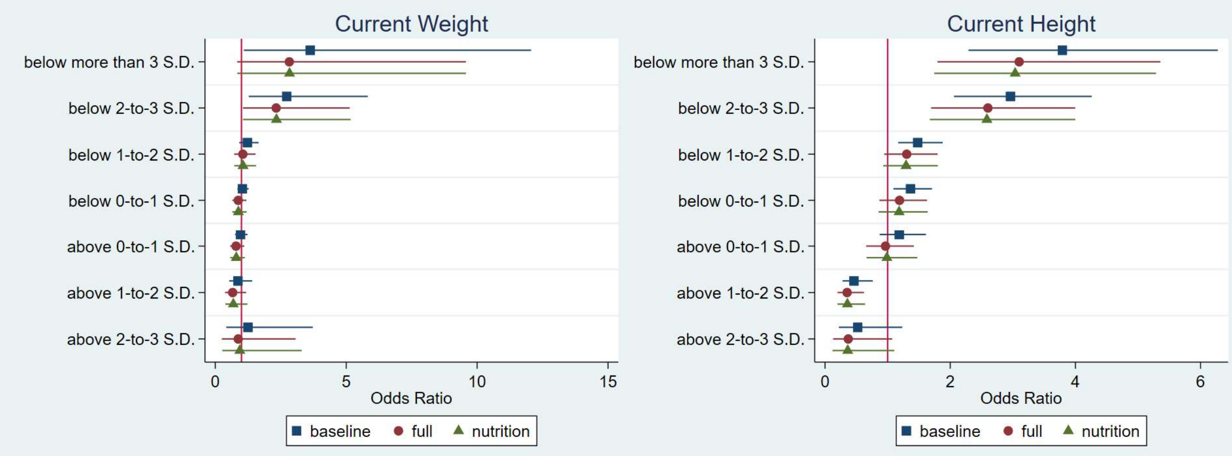
Panel B: Controlling for Prenatal Care, Postnatal Care, and Breastfeeding



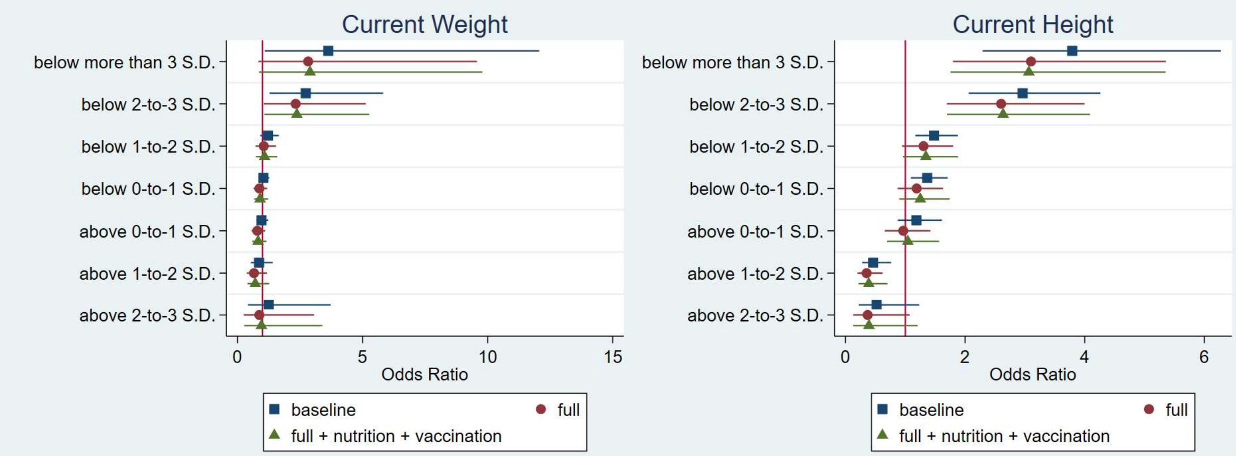
Notes: The data come from the 2018 wave of the Turkey Demographic and Health Survey. The sample includes the youngest children born in the previous five years for each mother. The refugee sample is restricted to children who were born in Turkey. Each dot shows the odds ratio of the Syrian refugee dummy for the specified outcome. The associated bars display 95 percent confidence intervals. The vertical line displays the odds ratio at 1. The full model includes the list of all control variables displayed in Table 3. The list of prenatal, postnatal, and breastfeeding variables is available in Table 6. Sampling weights at the mother level are used.

Figure A2: Distributional Analysis of Anthropometric Measures, Controlling for Nutrition and Vaccination

Panel A: Controlling for Nutrition

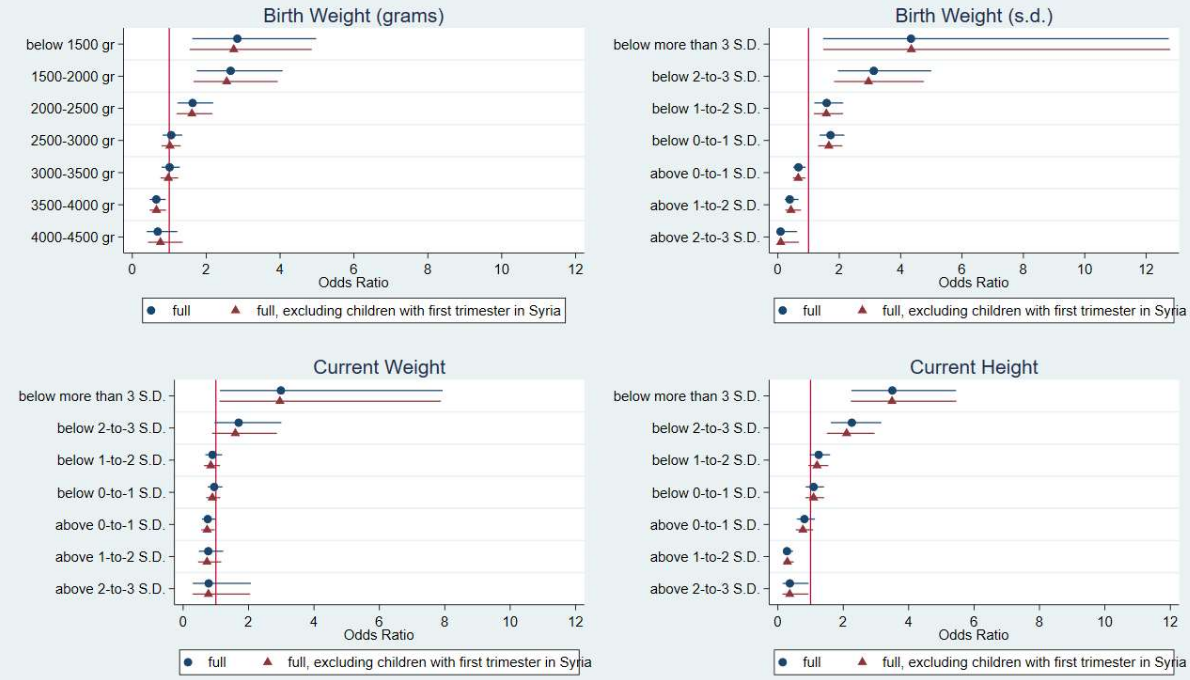


Panel B: Controlling for Nutrition and Vaccination



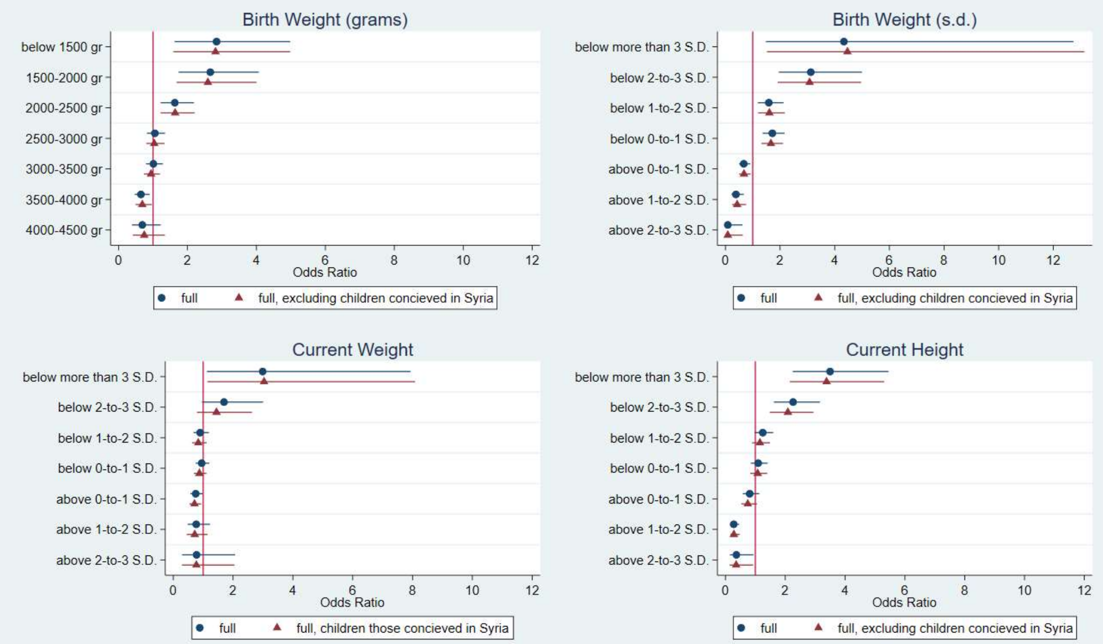
Notes: The data come from the 2018 wave of the Turkey Demographic and Health Survey. The sample includes children born in the previous three years for each mother. The refugee sample is restricted to children who were born in Turkey. Each dot shows the odds ratio of the Syrian refugee dummy for the specified outcome. The associated bars display 95 percent confidence intervals. The vertical line displays the odds ratio at 1. The full model includes the list of all control variables displayed in Table 3. The list of nutrition and vaccination characteristics is available in Table 7. Sampling weights at the mother level are used.

Figure A3: Excluding Children with First Trimester in Syria



Notes: The data come from the 2018 wave of the Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. The refugee children who had the first trimester of the pregnancy in Syria are also excluded from the sample for the analysis in this figure. Each dot shows the odds ratio of the Syrian refugee dummy for the specified outcome. The associated bars display 95 percent confidence intervals. The vertical line displays the odds ratio at 1. The full model includes the list of all control variables displayed in Table 3. Sampling weights at the mother level are used.

Figure A4: Excluding Children with any Time in Pregnancy in Syria



Notes: The data come from the 2018 wave of the Turkey Demographic and Health Survey. The sample includes babies born in the last five years preceding the survey. The refugee sample is restricted to children who were born in Turkey. The refugee children who were conceived in Syria are also excluded from the sample for the analysis in this figure. Each dot shows the odds ratio of the Syrian refugee dummy for the specified outcome. The associated bars display 95 percent confidence intervals. The vertical line displays the odds ratio at 1. The full model includes the list of all control variables displayed in Table 3. Sampling weights at the mother level are used.