ECONOMIC RESEARCH FORUM

منتدى البحوث الاقتصادية

2018

working paper series

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Working Paper No. 1206

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Working Paper 1206

June 2018

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First published in 2018 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

The literature on children's health inequalities in refugee camps in Jordan remains sparse. We noticed a marked height difference between Palestinian children living in the refugee camps and children of the remaining population in Jordan. Children living in refugee camps are significantly shorter than the rest of the children in the hosting population. This paper explores the drivers of the height gap, measured by the height for age z-score, among children residing in refugee camps and the non-camp residents. A Blinder- Oaxaca decomposition is used to quantify the sources of the inequalities between the two groups into two components; one that is explained by regional differences in the level of the determinants, and another part that is explained by differences in the effect of the determinants of the child nutritional status. Our results suggest that the endowment effect dominates the coefficients effect. More specifically, the height gap is mainly driven by wealth disparities between the two groups. Poverty alleviation programs such as conditional cash transfers and microfinance to camps' residents are likely to reduce the child malnutrition gap.

JEL Classifications: I14; J13; J15

Keywords: Child malnutrition, Refugees, Camps, Blinder-Oaxaca decomposition, Jordan.

ملخص

لا تزال الأدبيات المتعلقة بعدم المساواة الصحية للأطفال في مخيمات اللاجئين في الأردن قليلة. لاحظنا فرقًا واضحًا بين الأطفال الفلسطينيين الذين يعيشون في مخيمات اللاجئين وأطفال باقي السكان في الأردن. فالأطفال الذين يعيشون في مخيمات اللاجئين أقصر بكثير من بقية أطفال السكان المستضيفين. تستكشف هذه الورقة العوامل الدافعة لفجوة الارتفاع، والتي يتم قياسها من خلال الارتفاع بالنسبة للعمر، عند الأطفال المقيمين في مخيمات اللاجئين والسكان غير المقيمين في المخيمات. ونستخدم تحليل ببليندر- أواكساكا لتحديد مصادر عدم المساواة بين المجموعتين بتقسيمهم إلى مكونين، أحدهما للتفسير من خلال الاختلافات الإقليمية في مستوى المحددات، والآخر للتفسير من خلال الاختلافات في تأثير محددات الوضع الغذائي للطفل. تشير نتائجنا إلى أن تأثير الوهب يسود على تأثير أي معامل. وبشكل أكثر تحديدًا، فإن فجوة الارتفاع ترتكز بشكل رئيسي على التفاوت في الثروة بين المجموعتين. من المرجح أن تقلل برامج التخفيف من حدة الفقر، مثل التحويلات النقدية المشروطة والتمويل الأصغر إلى سكان المخيمات، من فجوة سوء التغذية لدى الأطفال.

1. Introduction

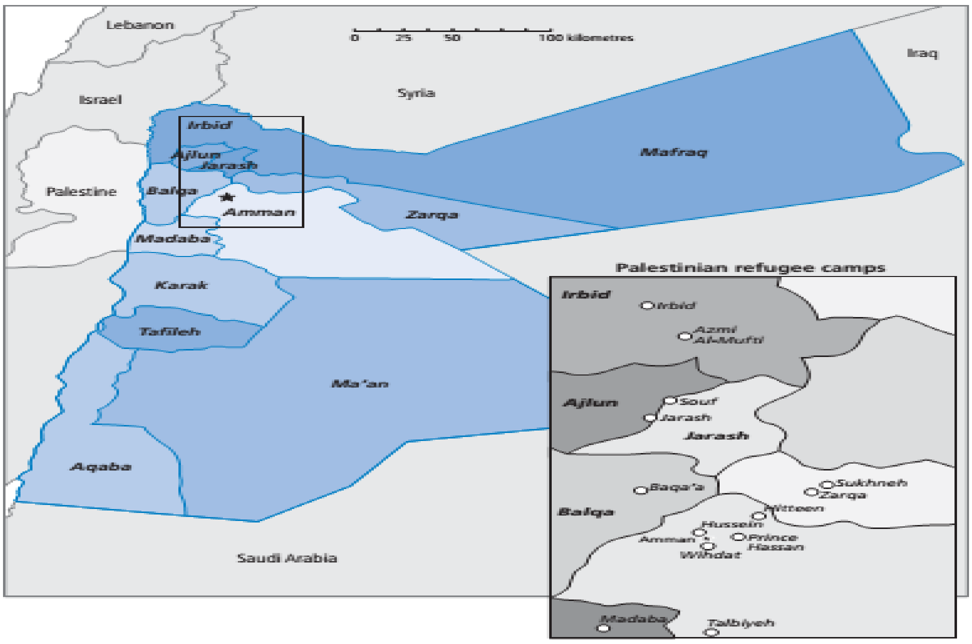
Eliminating health inequalities is widely viewed as a key objective of the health system. According to the 2012 Jordan Population and Family Health Survey (JPFHS), which is part of the Demographic and Health Survey program, 8% of the children in Jordan are stunted or chronically malnourished (height-for-age below -2 standard deviation). Although chronic malnutrition among children is relatively low in Jordan, it is characterized by considerable disparities across regions (Sharaf & Rashad 2015) as well as disparities between children in the Palestinian refugee camps and the remaining population.

The average child nutrition outcomes in the Palestinian refugee camps are significantly worse than the remaining population. Malnutrition in early life is worrying, as it has severe consequences on the well-being of individuals as well as national development. It has irreversible consequences such as low height for age which is linked to individual's productivity and future earnings (Grantham-McGregor et al. 2007; Böckerman & Vainiomäki 2013).

The primary objective of this study is to investigate the drivers of the height gap between children living in the Palestinian refugee camps and the rest of the population in Jordan. From the policy perspective, it is important to know to what extent the inequalities say in maternal education is responsible for the observed inequalities in child nutritional status.

According to the United Nations Relief and Work Agency (UNRWA), more than 2 million registered Palestine refugees live in Jordan. They displaced to Jordan following the Arab-Israeli wars in 1948, 1967 and the subsequent Israeli occupation of the West Bank and the Gaza Strip. There are ten official Palestinian refugee camps in Jordan hosting around 370,000 Palestine refugees. In addition to three camps that were originally concentrations of Palestinian and recognized by the Jordanian government as camps, but are viewed as unofficial camps by UNRWA. Figure 1 provides a map of Jordan with Palestinian refugee camps. The square shows the distribution of camps across Jordan.

Figure 1: Map of Jordan with Palestinian refugee camps



Source: Tiltnes, Å. A., & Zhang, H. (2013). Progress, challenges, diversity: Insights into the socio-economic conditions of Palestinian refugees in Jordan. FAFO.

Pooled regression models ignore the fact that the slope of the coefficients might differ for different population subgroups, as the degree of correlation between the explanatory variables and the explained variable may vary differently across population subsets (Babu et al. 2016). To account for this, we use Blinder-Oaxaca technique to explain the difference in height between children in the refugee camps and the rest of the population. Blinder-Oaxaca decomposition has been originally developed to study discrimination and disparities in labor market outcomes. Lately, it has been extensively use in investigating socioeconomic disparities in health (Joe et al. 2009; Van de Poel & Speybroeck 2009; Chen & Vargas-Bustamante 2011; Jiménez-Rubio & Hernández-Quevedo 2011; Ouyang & Pinstrup-Andersen 2012; Vargas Bustamante et al. 2012; Kumar & Singh 2013; Liu et al. 2013; Villani & Mortensen 2014; Cavatorta et al. 2015; Sharaf & Rashad 2015; Arteaga et al. 2017). This decomposition technique determines how much of the height gap is due for example to disparities in access to clean water versus disparities in maternal education. However, the main merit of the Blinder-Oaxaca analysis is that it decomposes the gap in the outcome variable into two parts; group differences in the level of the determinants, Xs, and group differences in the level of the coefficients, βs, which results from behavioral difference or discrimination.

Determining whether the refugee children height between refugee children and children of the hosting population is attributable to differences in the level of the determinants, or to differences in the effects of the determinants would guide intervention measures aimed at reducing health disparities. If the refugee-non-refugee children height gap is due to the differences in the effect of the determinants, then, behavioral and awareness programs would be relevant interventions, while redistribution policies that improve the level of the determinants among refugee camps residents would not be effective in reducing health disparities, since the effect of these interventions are weaker among refugees.

The Blinder-Oaxaca methodology is commonly applied to childhood malnutrition inequalities. For example, Van de Poel and Speybroeck (2009) have used Blinder-Oaxaca analysis to decompose the gap in children's average height-for-age Z-score between Scheduled Castes and Tribes and the remaining Indian population. In China, Ouyang and Pinstrup-Andersen (2012) looked at the anthropometric measures of Chinese ethnic minorities. Joe et al. (2009) and Kumar and Singh (2013) applied Blinder-Oaxaca decomposition to decompose the gap in childhood undernutrition between poor and non-poor. Sharaf and Rashad (2015), as well as Liu et al. (2013), used the analysis to explain urban-rural differential in child height.

The literature on children health in refugee camps in Jordan remains very limited. We are aware of only two studies studying child health. Using representative cross-sectional surveys of Syrian refugees, Hossain et al. (2016) assessed the health and nutritional status of Syrian refugees in Iraq, Jordan, and Lebanon. They suggested that the prevalence of severe malnutrition among young children was less than 5 % in all samples. However, the anemia prevalence is high particularly in Jordan. It is likely that the help of international development organizations and donor agencies has maintained the prevalence of acute malnutrition at low levels (Zureiqat & Shama 2015). In another recent study, Jabbar and Zaza (2014) indicated that children in the Zaatari refugee camp in Jordan are more distressed and showed symptoms of anxiety and depression in comparison to the control group. To the best of our knowledge, the current study is the first to examine the inequality in nutrition status between refugee children and the remaining population, using Blinder-Oaxaca decomposition in Jordan. The study is timely and germane given the current refugee crisis in the Middle East as well as the rest of the world.

The results suggest that the endowment effect dominates the coefficients effect. More specifically, the height gap is mainly driven by wealth disparities between the two groups.

Poverty alleviation programs such as conditional cash transfers and microfinance to camps' residents are likely to reduce the child malnutrition gap.

The paper is organized as follows: The data and methodology are described in the next section. Section 3 presents the results, which are discussed in Section 4.

2. Data and Methods

This study uses data on children's nutritional status for a nationally representative sample of 5,851 children from the latest round of JPFHS conducted in the year 2012. The survey was implemented by the national Department of Statistics and funded by the Jordanian government and the U.S. Agency for International Development (USAID). The JPFHS gives reliable estimates on various demographic and health indicators such as fertility, mortality and maternal and child health. The sample is representative of the country, as a whole, and for each 12 governorates of the country, and for people living in refugee camps. A primary sampling unit is identified as refugee clusters if refugees represent 80% of the total population or more of the cluster. Sixty-one refugee clusters were sampled out of 431 clusters. The data collection and fieldwork were carried out between 9 September and 20 December 2012 (Department of Statistics [Jordan] and ICF International 2012).

The sample design has been taken into account throughout the entire analysis by taking clustering into account as well as weight for each observation. Anthropometric data were collected from children aged 0-4 using height boards. The outcome variable of interest is measured by height-for-age Z-score (a continuous variable). The height-for-age Z-score (HAZ) is measured by the deviation from the median value of the reference population for the same sex and age divided by the standard deviation in the reference population. The reference population used by the 2012 JPFHS is the World Health Organization reference population.

The analyses include a set of HAZ determinants that are widely used in the literature and in line with the UNICEF conceptual framework of the determinants of child undernutrition (UNICEF 2013). The independent variables can be divided into three main categories: variables that represent household economic affluence and hygienic living environment; variables that measure women's access to maternity care; and finally, variables that indicate mother and child characteristics.

The economic status of households is measured by wealth index, which is based on the household level of assets ownership such as a private car as well as dwelling characteristics such as the type of floor. We control for mother's nutritional status, as mothers with poor nutritional status are expected to give birth to underweight children and are less effective in the breastfeeding process. Inadequate access to safe drinking water is consistently linked with acute respiratory infections and diarrheal diseases (UNICEF & World Health Organization 2015). A dummy variable for access to safe water is included. Quality medical care during pregnancy lowers the risks associated with pregnancy. In addition, it monitors women's nutritional status and provides women with the necessary information on adequate feeding practices. A binary variable is included to control for regular access to antenatal care.

With regard to child characteristics, child sex, age, whether the child had a risky birth interval (defined as a birth-to-birth interval of less than 24 months), and whether the child is a twin have been incorporated in our model. Child sex variable is included to account for gender bias and norms in nutritional practices. A dummy variable for whether the child is a twin is included in the analysis, as it places a pressure on mother as well as on the budget of low-income families.

This Blinder-Oaxaca technique decomposes the gap in the HAZ between camps and non-camps children across the whole sample into two components; a component that is due to disparity in the level of the determinants of the HAZ (covariates effect) between the two groups, and another component that is due to the disparity in the effect of these determinants (coefficients effect) between the two groups. For example, if HAZ $_i$, our outcome variable, is affected by a single variable, x, and we have two groups, camp and non-camp residents, then the HAZ for the camp and non-camp children are given by equations (1) and (2) respectively.

$$\text{HAZ}_i^{camps} = \beta^{camps} x_i + \varepsilon_i^{camps} \tag{1}$$

$$\text{HAZ}_i^{non-camps} = \beta^{non-camps} x_i + \varepsilon_i^{non-camps} \tag{2}$$

Thus, the camp and the non-camp gap in the mean HAZ ($\text{HAZ}^{non-camps} - \text{HAZ}^{camps}$), is given as in Equation (3).[4]

$$\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \beta^{non-camps} x^{non-camps} - \beta^{camps} x^{camps} \tag{3}$$

Where $x^{non-camps}$ and x^{camps} are the explanatory variable at their means for the camp and non-camp residents. The overall camp and non-camp residents gap could be decomposed into a gap that is attributable to difference in the level of the covariates, X's, and a gap that is attributable to difference in coefficients, $\beta's$ as in Equations (4) and (5):

$$\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \Delta x \beta^{camps} - \Delta \beta x^{non-camps} \tag{4}$$

$$\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \Delta x \beta^{non-camps} - \Delta \beta x^{camps} \tag{5}$$

Where $\Delta x = x^{non-camps} - x^{camps}$ and $\Delta \beta = \beta^{non-camps} - \beta^{camps}$. The decomposition equation could be re-written as in Equation (6):

$$\begin{aligned} \text{HAZ}^{non-camps} - \text{HAZ}^{camps} &= \Delta x \beta^{camps} + \Delta \beta x^{camps} + \Delta \beta \Delta x \\ &= E + C + CE \end{aligned} \tag{6}$$

Where the overall camp and non-camp gap in children's nutritional status consists of the gap in endowment (E), and the gap between coefficients (C), and the interactions (CE). The $\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \Delta x \beta^{camps} - \Delta \beta x^{non-camps}$ is equal to (E+(C+CE)) and $\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \Delta x \beta^{non-camps} - \Delta \beta x^{camps}$ is equal to (E+CE)+C).

The Blinder-Oaxaca decomposition could be considered a special case of a more comprehensive decomposition equation (7).

$$\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \Delta x (D\beta^{non-camps} + (I - D)\beta^{camps}) + \Delta \beta (x^{non-camps}(I - D) + x^{camps} D) \tag{7}$$

Where D is a matrix of weights, and I is an identity matrix. When x is a scalar, the identity matrix would be equal to one. In such case, if the weight (D) equals zero, equation (7) would yield equation (4), and if D equals one, then we will get equation (5) (O'donnell *et al.* 2008). However, other economists suggest different weights.

For example, Reimers (1983) suggests weighting the gap in x by using the average mean, $\beta^* = \frac{1}{2}\beta^{non-camps} + \frac{1}{2}\beta^{camps}$, while Cotton (1988) suggests weighting the β by the relative groups sizes, $\beta^* = \frac{n_{non-camps}}{n_{non-camps}+n_{camps}}\beta^{non-camps} + \frac{n_{camps}}{n_{non-camps}+n_{camps}}\beta^{camps}$. Furthermore, suggests using the pooled regression coefficients β^p in weighting the difference in x, $\text{HAZ}^{non-camps} - \text{HAZ}^{camps} = \Delta x \beta^p + (x^{non-camps}(\beta^{non-camps} - \beta^p) + (x^{camps}(\beta^p - \beta^{camps})$.

3. Econometric results

Table 1 provides descriptive statistics of the key variables. It displays the overall stunting level in Jordan, as well as the level of stunting by residence in refugee camp areas. The table indicates that the aggregate stunting among children in Jordan is relatively low. Eight percent of the children are stunted, and 2% are extremely stunted. This represents a decline in the stunting prevalence from 12% of children under five in 2002 to 8% in the year 2012. However, the table suggests that there are notable differences in stunting by residence in camp areas. Refugees in camps are generally poorer than the rest of population. They are likely to fall into either the lowest or the second wealth quintiles. The table suggests that 70% of the refugee households are in the poorest two wealth quintiles. Irrespective of the refugee status, a small fraction of

[4] Assuming exogeneity, the conditional expectations of the error terms in equations 1 and 2 are zero.

women had no education. However, there is a notable difference in the percentage of men and woman attaining higher education between camp and non-camp areas. The majority of women in Jordan have never been employed. However, unemployment is higher among refugees. They are less likely to be engaged in professional work than women in non-camp areas. 8 in 10 households in Jordan live in urban areas. All refugee camps are in urban areas. More specifically, they are located in the northern governorates.

Table 1: Mean of the determinants across groups

	Non-camp residents	**Camp residents**	**Total population**
% of Malnourished Children	7.6	9.6	7.7
Wealth Index			
Poorest	22.53	42.25	23.31
Poorer	21.94	27.66	22.16
Middle	21.64	18.33	21.51
Richer	19.66	9.17	19.25
Richest	14.22	2.59	13.77
Maternal education			
no education	2.11	1.93	2.11
Primary	6.25	9.72	6.39
Secondary	59.64	70.67	60.07
Higher	32	17.68	31.43
Child Sex			
Male	52.02	53.2	52.07
Female	47.98	46.8	47.93
Mother's age			
15-19	1.8	2.15	1.82
20-24	14.1	14.6	14.12
25-29	29.08	26.66	28.98
30-34	.2644	.2649	.2644
35-39	18.17	19.36	18.22
40-44	9.02	9.58	9.04
45-49	1.4	1.16	1.39
Child age			
0	18.29	18.66	18.31
1	20.23	17.91	20.14
2	20.19	21.2	20.23
3	20.34	21.39	20.39
4	20.94	20.83	20.94
Husband's education level			
no education	.98	2.06	1.02
primary	10.94	16.69	11.17
secondary	62.85	65.48	62.95
higher	25.22	15.77	24.85
Mother's occupation			

no work	85.49	91.29	85.72
professional	11.1	4.7	10.85
clerical	1	0.48	0.98
sales	0.2	0.78	0.23
agriculture	0.36	0.24	0.35
household	0.5	0.49	0.5
services	0.76	1.65	0.8
skilled	0.52	0.38	0.52
Place of residence			
urban	80.7	100	81.46
rural	19.3	0	18.54

Source: Authors' calculation based on DHS data.

Table 2 shows threefold decomposition. It decomposes the gap in children HAZ into three components; one due to the difference in the level of determinants, a gap due to the difference in the effect of the coefficients and a gap due to the interaction. The first section of Table 2 provides the mean HAZ in the camp and non-camp areas. There is a significant and notable difference ($p < 0.001$) in the HAZ means between children in refugee camps and children in non-camp areas. In average children living in the refugee camps are shorter than the remaining children by 0.23 standard deviation. The second section of Table 2 decomposes the gap in the HAZ means into difference due to the difference in endowments, the difference due to the difference in coefficients and difference in the interaction. The endowment gap provides the average increase in refugee children height if they had the same level of determinants as citizens. The height increase of 0.14 is due to the differences in the level of determinants. The difference in coefficients (0.07) presents the change in refugee children's height when using the citizen children's coefficients with the current level of refugee children determinants. The interaction part shows the simultaneous impact of the inequalities in the magnitude of the determinants as well as coefficients (Jann 2008). The threefold decomposition in Table 2 indicates that the difference in HAZ means is mainly explained by the difference in the level of the determinants (endowment effect) rather than the variance of the effect of the coefficients. The gap in endowments covers most of the gap in HAZ.

Table 2: Differential in HAZ between camp and non-camp children

	Coef.	Std. Err.	z	P>z	[95% Confidence Interval]	
Differential in HAZ score						
No Camp	-0.370	3.296	-11.240	0.000	-0.435	-0.306
Refugees Camp	-0.604	6.579	-9.190	0.000	-0.734	-0.475
Difference	0.234	7.359	3.180	0.002	0.090	0.379
Decomposition						
Endowments	0.140	6.729	2.090	0.037	0.009	0.273
Coefficients	0.070	7.329	0.960	0.337	-0.074	0.214
Interaction	0.023	6.698	0.340	0.731	-0.108	0.155
Sample Size=	6038					

Table 3 presents the twofold decomposition with alternative weights. The first two columns correspond to decomposition as suggested in Equations 1 and 2, where the matrix of weights (D) has a diagonal of weights equals 0 and equals one respectively. The Reimers, Cotton, and Neumark decomposition are provided in the last three columns respectively. There is no major variation in the decomposition results according to the decomposition method used. In other words, the results do not vary based on the decomposition method used. Regardless of the decomposition used, the variation in the means of the determinants, the explained variation, are always responsible for the vast bulk (about 70%) of the gap in children height.

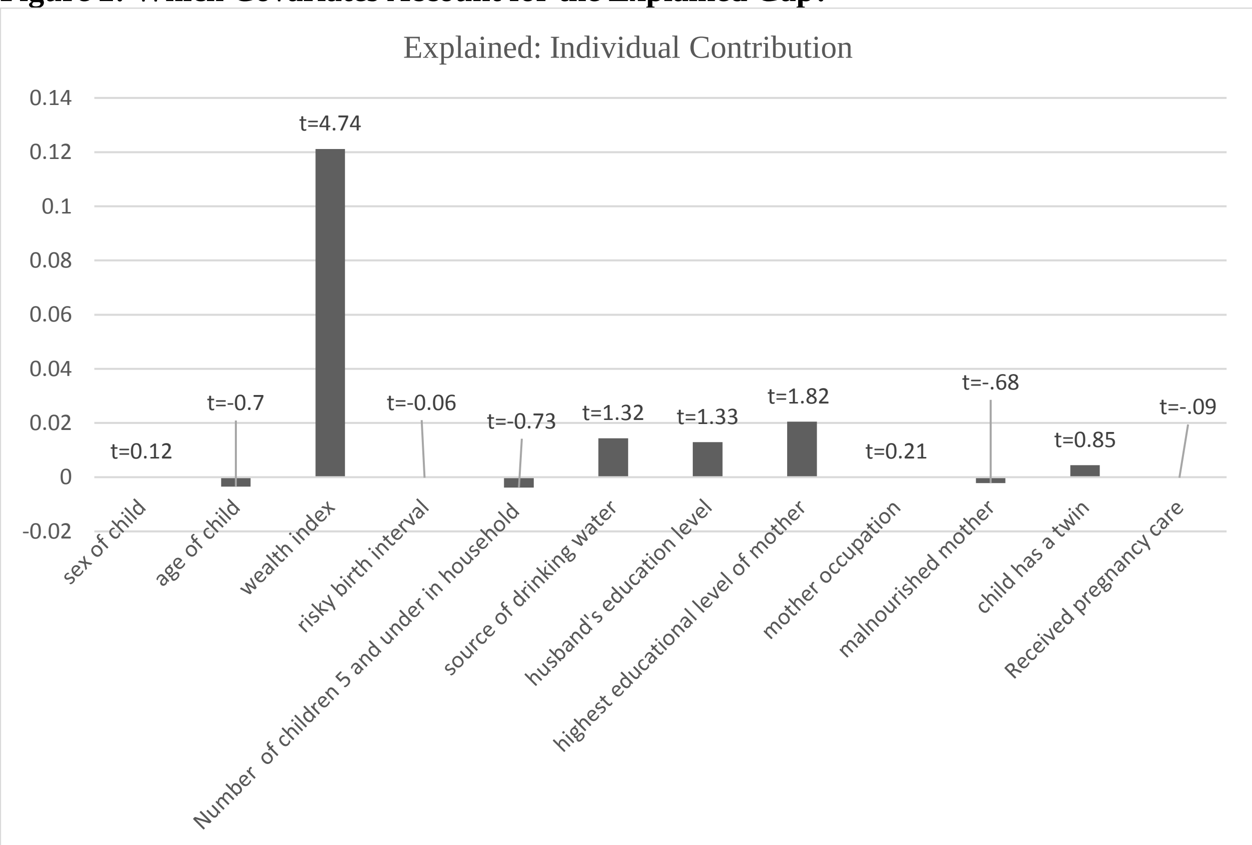
Table 3: Decomposition using different weights

D:	0	1	0.5	0.957	*
Unexplained (U){C+(1-D)CE}:	5.323	7.037	6.180	6.964	6.827
Explained (V) {E+D*CE}:	17.614	15.900	16.757	15.973	16.110
% unexplained {U/R}:	23.200	30.700	26.900	30.400	29.800
% explained (V/R):	76.8	69.3	73.1	69.6	70.2

Note: D in 4th column = relative frequency of high group
* reference: pooled model over both categories

The Blinder-Oaxaca decomposition can provide the individual contribution of each factor. Figure 2 shows the individual contribution to the explained difference using Neumark's approach. We restrict our attention to the explained variation since the unexplained difference was not significant. The figure uncovers that refugee children are at a disadvantage overall determinants of children nutrition status since the contribution of covariates is positive. The figure suggests that economic deprivation, in the form of limited assets ownership, has the largest impact that accounts for the height gap between refugee children and the remaining population in Jordan. Mother's education level has a statistically significant impact (t-statistics at the top of each bar) at 10% level of significance. However, it has a tiny contribution to the overall gap. The remaining factors have no significant impact at any conventional level of significance.

Figure 2: Which Covariates Account for the Explained Gap?



Source: Authors' calculation.

4. Discussion and conclusion

In this study, we examine what explains the difference in height between children in refugee camps and the rest of the population. Given the current refugee's crisis, this is a critical question from the policy point of view. We explore the underlying proximate, demographic and socioeconomic factors that account for the height disadvantage, using a Blinder-Oaxaca decomposition. The value of applying Blinder-Oaxaca analysis is that it unmasks the source of the nutritional disparities (lack of resources versus discrimination or behavioral response).

The results of the Blinder-Oaxaca decomposition reveal that the disadvantage in child height is mainly explained by the difference in the distribution of the determinants of child nutritional status among refugee children and the rest of population rather than by differences in their effect. Poverty, in the form of low asset-based economic status, among refugees is the main driver of the height disadvantage among refugee children. It accounts for the bulk of the height gap.

Our findings are in line with the limited literature on the health and nutrition outcomes of refugees. In line with the results of Hossain et al. (2016), our data indicate that the level of severe malnutrition among children is comparatively low among refugee children in Jordan. Several previous studies have suggested that the observed malnutrition gap is mainly explained by differences in basic endowments such as economic status and maternal education rather than inequalities in their effects (Joe et al. 2009; Van de Poel & Speybroeck 2009; Ouyang & Pinstrup-Andersen 2012; Mussa 2014; Headey et al. 2015).

Despite that a detailed policy proposal is beyond the scope of this study, there is no ambiguity in providing policy directions for policymakers in Jordan. Poverty alleviation programs such as conditional cash transfers programs and microfinance to camps' residents are likely to shrink the malnutrition gap.

It is important to note that the nutritional situation among refugees is not necessarily sustainable. Jordan is mainly an importer of food products that expose the country to food price shocks. Imports cover 96% of Jordan's total cereals consumption and more than 60% of its meat consumption. Also, Jordan is vulnerable to food insecurity due to degradation of agricultural land, self-insufficiency in food products, and water scarcity which places Jordan as one of the five most water - deficit countries in the world. The influx of the Syrian and Iraqi refugees has aggravated the problem. It placed an additional pressure on the Jordanian infrastructure, health sector, and public expenditure.

The current study is not free from limitations. Even though we control for a broad range of variables, the usual caveats of causal inference using cross-sectional data hold for this analysis.

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