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Adversities in Syria and their relation to their physical and mental health conditions as Syrian refugees in Turkey

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Abstract

The purpose of this paper is to examine the extent to which different health problems among Syrian refugees in Turkey can be traced back to three different conditions in Syria (Family Member Killed, House Damaged, and Income) as well as to Commonality among Neighbors back in Syria as well as in Turkey. As is common, the findings show their effects on mental health to be most common, especially among females, but also that (1) the effects on diseases and physical/mobility problems are also quite significant, (2) in most cases, the effects of income in Syria on Health adversities are positive, and (3) that some of these adverse effects have been growing over time since fleeing Syria.

KEYWORDS
conflict in Syria, effects of trauma, health outcomes, refugees

JEL CLASSIFICATION
H110; O15; D74

1 | INTRODUCTION: THE RELATION BETWEEN REFUGEE HEALTH AND THEIR PRIOR CIRCUMSTANCES

The health status of refugees is a subject of great interest and importance, both to the agencies providing health services to the refugees and to the citizens and their governments in the countries hosting refugees so as to prevent their diseases and other health problems from spreading to local populations. This accounts for the rapidly growing number of studies reporting statistics on the percentages of refugees in different countries of the world who suffer from various diseases and other health problems, especially mental ones. As noted in the literature review section (Section 2 below), several such studies have linked the health conditions of refugees in

the refugee-hosting countries back to the often-traumatic circumstances they had experienced in their country of origin, but these have largely been based on small, non-randomly selected and not necessarily representative samples.

The aim of the present study, therefore, is to fill some of the existing gaps in this literature by taking advantage of a much larger sample (consisting of 4,068 households and over 8,000 individual adults), which were randomly selected and representative of all Syrian refugees living outside of camps in Turkey[1] provided by the Health Assessment Survey of Syrian Refugees in Turkey (HASSRT) undertaken in 2018 by the World Health Organization (WHO). Since the trauma experienced by Syrians during the conflict in Syria was not random and naturally those affected exercised selection in whether or not to flee and, if so, in where to go, selection bias cannot be ruled out. Yet, the detailed information on the prior residential location and other conditions of the refugees back in Syria allows us to at least mitigate selection biases and to link the often-traumatic backgrounds of these refugees in Syria to their current health outcomes (including disease, physical mobility, and mental disease) in Turkey. Three important conditions back in Syria linked to each of the aforementioned health outcomes as refugees in Turkey are Family Member Killed in War, Income in Syria, and Damage to House in Syria. Still another relevant condition is the commonality between the neighbors of the refugees while still resident in Syria and then at the time of the survey in Turkey, which we call Commonality. Although each of these could be subject to self-selection issues arising from the non-random targeting of violence among the Syrian refugees, the controls we have used and the sensitivity analysis conducted serve to mitigate the influence of such biases. As a result, foremost among our contributions is to trace virtually every health adversity (often both its incidence and its severity) among the refugees back to one or more of these three conditions back in Syria and to Commonality. Among other interesting findings are those showing that the apparent impacts of these conditions differ both between males and females and by the length of time elapsed since the time the refugees fled Syria and the adversities they experienced there.

The paper is organized as follows. Section 2 provides a concise review of the relevant studies that provide the motivation for the present study. Section 3 provides some historical background on the conflict in Syria which has triggered the displacement of well over 12 million Syrians, almost half of whom have escaped as refugees, mostly to neighboring countries, Jordan, Lebanon, and Turkey (the latter alone with over 3.6 million). Section 4 outlines the empirical estimation methods, their scope and describes the data. Section 5 presents the empirical results, not only for the incidence of the adverse health outcomes of the Syrian refugees in Turkey, but also for their severity. For the most part, it does so separately for females and males and in some cases by the length of time since suffering the adverse conditions back in Syria. The paper is concluded in Section 6 which summarizes the findings, derives some policy implications, and identifies some relevant qualifications and useful areas for future research.

2 | RELEVANT LITERATURE ON REFUGEE HEALTH AND ITS LINKS BACK TO TRAUMATIC CONDITIONS

As early as 1997, Silove et al. (1997) reported the results of interviews with 40 asylum seekers in Australia from different countries showing that 37% of them were diagnosed with post-traumatic stress disorder (PTSD). Of those who said they had experienced traumatic events, the percentage was even higher and especially for females.[2]

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[1]The refugees living in camps accounted for only about 7% of the total number of Syrian refugees in Turkey. The random selection and representativeness of the HASSRT survey of Syrian refugees in Turkey are attributable to the careful multistage selection process used, first selecting the 15 provinces accounting for 90% of the total, and then neighborhoods within each selected province and finally random selection of those households within each neighborhood and province containing a married woman of age 15–69 and a male aged 15–69, then random selection of one individual within each group, with the sampling also adjusted to maintain representativeness after accounting for failure to answer the questions, and assuring balance by gender in the sample. See Mipratini et al. (2019) for details.

[2]For more recent evidence of this from around the world, see Jurado et al. (2017).

Notably, for Syrian refugees in the same country studied in this paper, that is, Turkey, Alpak et al. (2015), used a sample of 352 Syrian refugees in Turkey to show the percentage with PTSD to be high, and indeed to reach 71% for females who had witnessed at least two traumatic events (such as a killing, torture or sexual assault).[3] For both Syrian Internally Displaced Persons (IDPs) and refugees in the Netherlands, Al Ibraheem et al. (2017) constructed a quite sophisticated analytical model (a "Path Model") that starts with a multiplicity of conflict conditions that bring to them a variety of traumas which are then further filtered into a larger and more complex set of mental health conditions.

While the connection between such traumatic events and subsequent physical disease among refugees may be less obvious than in the case of mental disease, in the case of Syrian refugees at least, that connection to physical disease would seem to be especially plausible for the following reasons. First, according to an impressive review of such studies in Syria and surrounding countries, Quosh et al. (2013) had found the incidence of trauma to have been strongly associated with both mental *and* physical disease. Second, the link between trauma and disease spread has been identified most commonly in Aleppo and its surrounding area in Syria, where, not only were the traumatic events the greatest, but also all the hospitals and health centers were destroyed quite early in the conflict. Third, the more general shut-down of basic health services throughout Syria has allowed diseases to emerge and spread (Syrian Center for Policy Research, 2020). Consistent with these findings, for urban areas in Turkey, such as Ankara and Istanbul, Kaya (2019) pointed to the surprisingly large percentages of refugees resident there who had come from the city of Aleppo and its surrounding area, and who were also experiencing both mental *and* physical diseases.

Naturally, generalizing findings relating these traumatic events in Syria to the refugees in different countries or locations within countries can be rendered difficult by the selectivity in the locations of origin and destination of the refugees. Yet, despite the sharp differences in the characteristics of those allowed to migrate to the Netherlands and those remaining as IDPs in Syria, Al Ibraheem et al. (2017) has shown remarkable similarities in both health outcomes (both physical and mental) between the different kinds of destinations and the extent to which other personal circumstances might moderate some of the adverse health conditions to trauma in Syria. However, as the authors admitted, since the samples they studied were not at all selected randomly, essentially being self-selected under wartime conditions (indeed, with males far outnumbering females), the results could well be biased.

To the best of our knowledge, although unfortunately exclusively focused on mental health, the study which has gone furthest in tracing out the relation between experience with traumatic events during Syria's civil war and health outcomes as refugees is the aforementioned study of Georgiadou et al. (2018) of Syrian refugees in Germany. Notably, these authors showed that the number of traumatic events these refugees had experienced in Syria was significantly related to two mental problems, namely, PTSD and Depression. Yet, as with virtually all other studies cited here, shortcomings of this study were that the samples were small (typically below 250), unbalanced (with women seriously underrepresented), far from randomly selected, and with relatively low response rates (often 40% or less), suggesting that the results could be biased.[4]

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[3]Somewhat similar results have been reported for Syrian refugees in other countries. For example, Mitton (2018) pointed to the high percentage of Syrian refugees in Jordan with mental problems and the need for greater emphasis on the provision of mental health services to refugees there. Sirin and Rogers-Sirin (2015) pointed to the extremely high percentages of Syrian refugees suffering from mental problems in both Turkey and the United States. Javanbakht et al. (2019) have also shown the incidence of PTSD, anxiety, and depression to have been high in the United States and again especially among females. Furthermore, Georgiadou et al. (2018) have shown the incidence of at least one form of mental illness to have exceeded 30% of adult Syrian refugees in Germany. See also Chung et al. (2018) and Rizkalla and Segal (2018).

[4]There are also a number of studies focused on refugee children born in Turkey and thus who had not directly experienced trauma in Syria. Given the focus of the present paper on the effects of trauma on adults' health, however, such studies are not discussed here. Even for the few such studies that include a few children who may have been born in Syria, such as Ozer et al. (2016) and Oppedal, Ozer and Sirin (2018), these were based on very small samples and for children located in a single elementary school in a particular refugee camp in Gaziantep, Turkey.

The present study attempts to bridge these gaps by relating answers to a more limited set of questions about conflict-generated trauma in Syria to a broader set of health outcomes among Syrian refugees, by taking advantage of the WHO's aforementioned HASSRT, with its larger and more representative random sample of Syrian refugees, that allows us to analyze the effects on males and females separately, and even by the length of time between the traumatic and other events in Syria and the date of the HASSRT survey in Turkey, Turkey being the country hosting by far the largest number of Syrian refugees. This survey also allows us to control for other relevant factors, such as age, height, education, income, marital status, time in Turkey and geographic location in Syria and Turkey. Additional advantages of the HASSRT Survey are identified in Section 6.2 below.

While pointing to advantages of using HASSRT and thereby focusing on Syrian refugees in Turkey, this should not be interpreted as implying that the health conditions of Syrian refugees in Turkey are worse than those in Lebanon and Jordan. Indeed, those studies conducting such comparisons across countries, such as Kumar et al. (2018), Pernitez-Agan et al. (2019), Samari (2017) and El Arnout et al. (2019), have tended to show both their health and living conditions to be somewhat better in Turkey than in those other host countries.[5]

3 | BACKGROUND ON THE SYRIAN CONFLICT

The conflict in Syria started in 2011, having emanated from the string of Arab Spring events which began in Tunisia in January 2011 and soon spread to Egypt, Yemen, Bahrain, Morocco, Yemen, Libya, and Syria. In the case of Syria, what started as peaceful demonstrations relatively early in 2011 turned into violent repression, but subsequently triggering greater militancy on the part of various dissident groups. By late 2011, the conflict had become one, not only between the government and its opposition, but also between different religious and ethnic groups. Indeed, according to a UN inquiry in 2014, the number of different groups fighting in Syria at that time was said to be approximately 1,000 (Sirin & Rogers-Sirin, 2015). The violence has continued on and off over the years since then and has attracted armed intervention by Russia, Iran, Israel, the United States, and the Hezbollah from Lebanon. Peaks in the violence and flight as refugees occurred in early 2012, then mid-2013- mid-2015, and again in late 2019. Naturally, some regions in Syria, especially those hit by barrel bombing such as Aleppo, have received much greater devastation than other regions.

As noted above, the conflict has displaced more than 12 million Syrians, of whom almost six million have become refugees, making Syria the largest refugee source country in the world. Notably, this distinction was achieved soon after the arrival of Iraqi refugees in Syria (beginning in 2006) had made Syria the third largest refugee-hosting country in the world (UNHCR, 2012). The conflict in Syria has resulted in almost half a million Syrian deaths, causing a sharp reduction in life expectancy of Syrians in Syria from 70 to 56 (Mipatrini et al., 2019). Of the almost six million Syrian refugees, most have fled to Syria's neighboring countries, Lebanon, Jordan, and especially Turkey, which by itself has been hosting over 3.6 million of them (World Bank Group, 2017). While at first the Syrian refugees in Turkey were located in camps quite near the Syrian border, more recently they have been increasingly settled or re-settled out of camps into Turkey's cities and towns. Presently, there are Syrian refugees living in all 81 of Turkey's provinces. The flows of refugees into Turkey over time have followed the same time pattern of peaks and troughs as the conflict in Syria, with peaks in late 2011, early 2012, especially mid-2013-mid-2015. Hence, by mid-2018 when the WHO *Health Assessment Survey of Syrian Refugees in Turkey* was undertaken, most of the adult refugees had been living in Turkey for at least a couple of years.

The fact that political, religious, and ethnic differences remain large in Syria and neither the Syrian government nor the international community seems anywhere near being able to (a) resolve such differences, (b) get the country back together as a functioning state, or (c) welcome its many millions of refugees, suggests that the status quo

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[5]Samari (2017), however, does point to the greater language difficulties facing Syrian Arabs in Turkey than in the Arabic speaking countries which could make for greater depression levels of refugees in Turkey.

of the 3.6 million refugees in Turkey and over two million more in Lebanon and Jordan is likely to have to endure for some time. As such, this underscores the importance and continued urgency of identifying the many different dimensions of refugee care and support that will have to be met to prevent further humanitarian catastrophes from occurring in these and other refugee-hosting countries.

4 | ANALYTICAL FRAMEWORK: METHODS, DATA AND DESCRIPTIVE STATISTICS

4.1 | Analytical framework

Our analysis starts with a very simple model relating current health of individual refugee i (H_i) in time period t to environmental conditions (like trauma in time period t-1 (T_{it-1}) as well as income (Y_{it-1}) in country of origin but allowing also for the role of avoidance behavior (A) such as choosing to live in a location with high paying jobs, good environmental conditions or following a healthy diet or in a location that provides access to high-quality medical care (M) and in the refugee's location in the host country. Yet, since the components of A and M may well be endogenous, we cannot make any claims about causality of their effects. At most, we just include appropriate measures of these as control variables in circumstances where they are found to be independent of the measures for T and Y. The facts that smoking and dietary habits are hard to change and can be controlled for in this analysis and that access to free medical care has been given to all registered Syrian refugees in Turkey (Mipratini et al., 2019, p.4), serve to at least partially mitigate some of these concerns.

$$H = H(T, Y, A, M) \tag{1}$$

4.2 | Data

As noted above, the primary data set used in this paper comes from the impressive, large sample survey HASSRT obtained from a randomly selected sample of over 4,584 Syrian refugee households (with over 10,000 individuals) from out-of-camp sites[6] taken from the 15 Turkish provinces[7] with the largest numbers of refugees, and weighted so as to be nationally representative of all Syrian refugees in Turkey. Its health data show that some 15% of the adults indicated that they had experienced some type of disease symptoms in the last two weeks, and more importantly, that about 40% of them said that over the last 30 days they had experienced at least moderate degrees of distress and sadness, difficulty in concentrating, remembering things, moving around, taking care of themselves, carrying out their work or household activities, and sleeping.

Other strengths of the HASSRT survey are that (1) the adult women and men and children of both genders were selected from the same sample households and appropriate age groups so that they can be matched, (2) the sample was selected in such a way as to make sure that all those selected were capable of answering the questions and committed to being available, thereby assuring a remarkably high response rate of 90% (among households), (3) the multistage character of the random sampling methodology that ensured that the sample was representative of all out-of-camp refugees within the 15 provinces in Turkey from which the samples were selected, and (4) the very substantial attention given to training of field data collectors to assure high quality of the data collected (Mipatrini et al., 2019, p. 12–20).

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[6]Over 90% of the Syrian refugees in Turkey live out-of-camp and across all of Turkey's 81 provinces.

[7]More than 85% of Syrian refugees in Turkey live in the 15 provinces from which the HASSRT sample is taken.

While the information collected in many respects does not go beyond much of that collected from Syrian and other refugees from conflict in other parts of the world cited in Section 2 above, what is unique about this data source is that it contains information allowing the analyst to trace the pattern of each different type of health problem among the refugees back to information about their income, location, education level, height and traumatic experience (family members killed and damage to home) back in Syria, commonality among neighbors before and after fleeing to Turkey,[8] and to investigate the effects of at least some differences in the length of time since the occurrence of those traumatic and other experiences back in Syria.

For the health problems to be studied, the data source allows us to examine responses of each Syrian adult surveyed to three general types of health problems: diseases, physical and mobility problems and mental health problems, and to different conditions within each of these general types. Specifically, among diseases, we examine the determinants of some 11 different disease categories, four types of physical mobility problems, and six different mental health problems for females and males separately. For each of these categories, we can also examine the determinants of an overall measure of that category of health problems.

4.3 | Variables used and descriptive statistics

Table 1 provides a list of all the variables used in the analysis, along with the descriptive statistics on each. The variables are grouped into two broad categories, the health outcome variables treated as dependent variables in the analysis in the top part of the table, and the explanatory variables in the lower part of the table. As indicated, the list begins with the various Disease types, is followed by Physical and Mobility Problems, and finally Mental Health Problems. Then, in the lower part of the table is a list of explanatory variables, including three representing Conditions in Syria (Income in Syria, Damage to House in Syria and Family Member Killed), the aforementioned Commonality (of neighbors), individual characteristics, such as age, gender, education, height, marital status, months in Turkey, and locations in both Syria and Turkey (both urban/rural, and by province) and Commonality with Neighbors in both Syria and Turkey.

Because the incidence of traumatic events was not random across all parts of Syria and those in certain parts of Syria may have been more likely to go to Turkey (and even certain locations within Turkey) than to other refugee-hosting countries or to other parts of Syria as internally displaced persons (IDPs), we cannot deny the possible presence of some selection bias in our analysis. We have, however, tried to mitigate such selection and endogeneity biases by including various determinants of income, and controls for age, education, height and location in Syria which were determined well before their flight to Turkey. Because of the fact that almost two-thirds of the refugees came from Aleppo where the fighting was most intense, barrel bombing most common and the health services were most totally destroyed, we also include some interactions between location in Aleppo and other relevant variables to help mitigate the extent of selection bias. In the interest of space, we do not list the numbers of individuals in the sample by either governorate of origin in Syria or province of destination in Turkey from which the sample was selected, although we use dummy variables for these as controls to capture unobserved differences between these locations throughout our analysis. The provinces with the largest samples are three located along Turkey's border with Syria (Sanliurfa, Hatay, and Gaziantep) and also Istanbul (the largest city).

As can easily be seen in Table 1, the measures of disease presence are all binary (0,1), whereas the physical/mobility and mental health measures are measured in both binary terms and severity terms (measured on 1–5 scales). Those in the table, however, are largely limited to those in severity terms. Although all these measures are self-reported, the survey was designed in such a way as to make them as accurate as possible. For example, each randomly selected individual was interviewed via a questionnaire in a face-to-face interview, often with other

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[8]The relation between current health and commonality among neighbors before and after flight to Turkey could be either positive since common neighbors could be more supportive of each other and hence improve health or negative since they could also help spread existing health diseases and other health problems.

TABLE 1 List of all variables and descriptive statistics

	Descriptive statistics		
Dependent variables	**N**	**Mean**	**Standard deviation**
Disease incidence			
Non-chronic	6,975	0.0945	0.2925
Chronic	6,975	0.0146	0.12
Long-term disability requiring home care	6,975	0.0205	0.1417
Symptoms believed to indicate chronic disease	6,975	0.0097	0.0983
Cardiac disease	6,975	0.0181	0.1332
Diabetes	6,975	0.0199	0.1398
Cancer	6,975	0.0019	0.0431
Sexually transmitted disease	6,975	0.0033	0.0573
Asthma	6,975	0.0259	0.159
Chronic PULMONARY DISEASE	6,975	0.0083	0.0908
Oral/Tooth Disease	6,975	0.0224	0.1479
Severity of physical and mobility problems			
Difficulty in moving around	6,975	2.2619	1.1401
Pain or discomfort	6,975	2.2231	1.1367
Difficulty in self-care	6,975	2.1414	1.141
Difficulty in work or household activities	6,975	2.164	1.1396
Incidence of condition that limits ability to move	6,975	0.0184	0.1342
Severity of mental health problems			
Distress	6,975	2.3654	1.1439
Difficulty in concentrating	6,975	2.2948	1.1314
Depressive	6,975	2.2016	1.1547
Losing Interest in regular activities	6,975	2.1686	1.1467
Sleep disorders	6,975	2.2502	1.1599
Psychiatric disorders	6,975	0.0295	0.1693
Explanatory variables			
Age	6,975	31.5662	11.0296
Gender (Female)	6,975	0.4746	0.4994
Education	6,975	4.5811	1.7358
Marital status	6,975	0.8248	0.3802
Income in Syria (in logs)	6,155	8.4661	1.966
Damage to house in Syria	5,540	3.2866	0.9694
Family member killed in War	6,975	0.0495	0.2168
Months in Turkey	6,975	28.6533	25.9123
Commonality of residencies in Syria and Turkey	6,975	0.583	0.3265
Height	6,975	167.6301	8.9592
Urban location	6,396	0.7362	0.4407

Note: Dummy Variables for the sampled 15 Provinces in Turkey are also included.

Source of all data: WHO, 2018. Health Assessment Survey of Syrian Refugees in Turkey.

members of the interview team present to help make the responses credible. In the case of chronic disease, its incidence was measured as present only if the individual said it had been diagnosed by a doctor in the last two weeks. While potential for bias and measurement error may be greater in the case of severity of the physical and mental problems than in the case of their incidence, because the more serious problems are likely to be much more relevant and important as health outcomes, in subsequent tables we choose to report results using both incidence and severity measures where both are available. Even taking the scoring differences between these different kinds of health problems into account, one can see that the Incidence of disease among the Syrian refugees in Turkey is considerably lower than those of Physical/Mobility and Mental Health Problems. Of the diseases, the most common are non-chronic diseases, reported present in over 8% of the full sample. Among the Physical Mobility and Mental Problems, where present, they are on average somewhat above the minimum severity but without a great deal of variation from one type of problem to another, but varying considerably across individuals in the sample.

From the descriptive statistics on the explanatory variables at the bottom of the table, even though the sample is confined to adults over 15 years of age, the average age is only 31.49, 73% of whom are married. From the Gender entry one can see that, as a result of the care that was taken in designing the sample, the gender balance in the sample is perfect (the female share being exactly 50%), but with considerable variation within the sample by education, height, marital status, and income in Syria. Some 74% of the sample are located in what are regarded as urban areas within Turkey. Given the aforementioned relatively low age of the adult sample and relatively large number of months in Turkey (43.6), it is quite clear that for some of them, they had already spent a significant portion of their lives as refugees in Turkey and implying a relatively long time since the traumatic events back in Syria.

All the health variables were measured very close to the date at which the data were collected (June 2018) in Turkey. For this reason, we deem it relatively safe to assume the measures of conditions back in Syria to be exogenous to the measures of current health of the refugees in Turkey. While in other contexts it would be natural to assume the influence of income in Syria on current health of the Syrian refugees to be positive, in the present context we deem it possible that it could be negative since it could have led to obesity and ill-health or depression because of the loss of that income in refugee status. Yet, because those with higher incomes might have been less likely to flee as refugees, we are also concerned with selection bias which we try to control by using instruments like height, age and education to generate predicted education to generate predicted education as an alternative.

We have inspected the correlation matrix in each different set of specifications and omitted individual variables to mitigate collinearity problems and also checked for the robustness of the results across different specifications and eliminated those variables which would greatly reduce the number of observations because of missing observations. Since for the most part Syrian refugees have been free to move to their preferred location in Turkey, this explains why, as noted above, most of the refugees in Turkey are located either in provinces bordering Syria or in Istanbul or other urban areas with better access to well-paid jobs.

5 | EMPIRICAL RESULTS

Naturally for different dependent variables, that is, the different health outcomes and the way they are measured (incidence in Tables 2–4) and severity (in Tables 5 and 6) we shall use somewhat different specifications in our estimating equations and estimation procedures. Nevertheless, since the relationships identified are largely considered to be only associational, Equation (2) represents the general form for all the regressions to be estimated.

$$y_{it} = \alpha + \beta'_1 CS_{it-1} + \beta'_2 CTX_{it} + \varepsilon_{it} \tag{2}$$

where y_{it} is the health outcome variable, of individual i at time t in Turkey, CS_{it} represents the set of relevant conditions of individual i in period $t - 1$ while still back in Syria., CTX_{it} is a vector of individual characteristics and conditions for

TABLE 2 Incidence of diseases among Syrian refugees in Turkey

	Non-chronic disease	Chronic disease	A condition that you think is a symptom of a chronic illness	Cardiac disease	Diabetes	Hypertension	Oral/tooth disease	Cancer	Sexually transmitted diseases or fertility disorder	Chronic pulmonary	Ashtma	Number OF diseases
	1	2	3	4	5	6	7	8	9	10	11	12.000
Female												
Commonality in origins	−0.349	0.531	0.233	2.672	0.521	0.944	−0.274	−1.706	−0.416	1.253	2.138**	0.058
	(0.509)	(0.690)	(1.023)	(1.599)	(1.184)	(0.699)	(0.798)	(1.497)	(1.947)	(1.205)	(0.744)	(0.081)
Family member killed in War	0.821	2.464***	1.184*	−17.898***	−18.573***	1.335*	0.825	−20.144***	−20.058***	−19.164***	0.071	0.194
	(0.651)	(0.611)	(0.472)	(0.519)	(0.409)	(0.535)	(0.831)	(0.890)	(1.153)	(1.097)	(1.046)	(0.189)
Log income in Syria	0.085	−0.193	0.038	−0.049	0.039	0.110	0.033	−0.131	−0.035	−0.161	−0.122	0.002
	(0.146)	(0.122)	(0.094)	(0.084)	(0.142)	(0.092)	(0.080)	(0.153)	(0.148)	(0.213)	(0.075)	(0.016)
Damage to house in Syria	−0.230	−0.141	0.053	−0.293*	−0.036	−0.220	0.129	−0.462	0.492	0.476	−0.240	−0.038
	(0.177)	(0.187)	(0.144)	(0.127)	(0.190)	(0.160)	(0.187)	(0.332)	(0.676)	(0.571)	(0.309)	(0.030)
Height	−0.025	−0.063*	0.055**	0.031*	−0.050	−0.006	−0.047	0.001	0.056	0.042	−0.043*	−0.005*
	(0.020)	(0.028)	(0.021)	(0.016)	(0.031)	(0.018)	(0.026)	(0.102)	(0.096)	(0.082)	(0.018)	(0.002)
N	2,072	2,072	2,072	2,072	2,072	2,072	2,072	2,072	2,072	2,072	2,072	2,072
Pseudo-R-squared	0.056	0.158	0.121	0.078	0.109	0.112	0.116	0.111	0.174	0.093	0.097	
R-squared												0.081
Male												
Commonality in origins	−0.049	0.276	−0.164	0.197	−0.381	−0.348	−0.760	2.509	3.026***	1.109	−0.716	−0.037
	(0.460)	(0.457)	(0.786)	(0.482)	(0.607)	(0.411)	(0.473)	(1.412)	(0.610)	(1.209)	(0.809)	(0.063)
Family member killed in war	−0.346	1.308	0.107	−19.281***	−0.502	0.178	0.014	−18.681***	−15.902***	1.909*	1.042*	0.076
	(0.713)	(0.905)	(1.070)	(0.651)	(0.829)	(0.696)	(0.568)	(0.925)	(1.327)	(0.879)	(0.413)	(0.085)
Log income in Syria	0.214	0.179	0.096	0.217**	0.145	0.219*	0.164	0.327*	0.304***	−0.190	−0.002	0.045*
	(0.154)	(0.098)	(0.145)	(0.072)	(0.088)	(0.099)	(0.106)	(0.155)	(0.090)	(0.099)	(0.083)	(0.019)

(Continues)

TABLE 2 (Continued)

	Non-chronic disease	Chronic disease	A condition that you think is a symptom of a chronic illness	Cardiac disease	Diabetes	Hypertension	Oral/tooth disease	Cancer	Sexually transmitted diseases or fertility disorder	Chronic pulmonary	Ashtma	Number OF diseases
	1	2	3	4	5	6	7	8	9	10	11	12.000
Damage to house in Syria	−0.092	0.222	−0.107	−0.034	−0.144	−0.020	0.290*	−0.273	0.158	0.072	−0.143	−0.009
	(0.158)	(0.176)	(0.221)	(0.133)	(0.100)	(0.139)	(0.145)	(0.603)	(0.200)	(0.319)	(0.116)	(0.019)
Height	−0.002	−0.070***	−0.024	−0.061***	−0.073***	−0.087***	−0.043**	−0.071	−0.048***	−0.008	−0.066***	−0.011**
	(0.014)	(0.009)	(0.024)	(0.013)	(0.010)	(0.014)	(0.013)	(0.040)	(0.006)	(0.048)	(0.016)	(0.004)
N	2,562	2,562	2,562	2,562	2,562	2,562	2,562	2,562	2,562	2,562	2,562	2,562
Pseudo-R-squared	0.065	0.153	0.114	0.089	0.067	0.092	0.132	0.194	0.307	0.065	0.053	
R-squared												0.056

Note: Other controls included Age, Education, Married, Urban, Months in Turkey, Smoking, Frequency of Eating Fruits and Vegetables, Provinces in Turkey, and Aleppo and its interactions with other variables.

***p <.001; **p <.01; and *p <.05.

TABLE 3 Ever had physical problems

	Difficulty in moving around	Pain or discomfort	Difficulty in self-care	Difficulty in work or household activities	Ever had any physical health problems
	1	2	3	4	5
Females					
Commonality in origins	0.557	0.517	0.460	0.487	0.519
	(0.479)	(0.526)	(0.598)	(0.562)	(0.500)
Family member killed in War	0.592	1.012	0.779	1.077	0.915**
	(0.529)	(0.584)	(0.594)	(0.758)	(0.331)
Log income in Syria	0.148*	0.168*	0.208**	0.265***	0.202**
	(0.059)	(0.067)	(0.064)	(0.058)	(0.065)
Damage to house in Syria	0.065	−0.068	−0.043	−0.026	−0.021
	(0.159)	(0.154)	(0.169)	(0.168)	(0.164)
Height	0.013	0.016	0.014	0.013	0.016
	(0.015)	(0.014)	(0.014)	(0.013)	(0.017)
n	2,072	2,072	2,072	2,072	2,072
Pseudo-r-squared	0.048	0.061	0.068	0.093	0.067
Males					
Commonality in origins	0.323	0.229	0.176	0.237	0.327
	(0.446)	(0.478)	(0.513)	(0.549)	(0.480)
Family member killed in War	0.737**	0.674	0.759	0.936	1.033
	(0.246)	(0.487)	(0.452)	(0.565)	(0.585)
Log income in Syria	0.192**	0.194**	0.224**	0.262**	0.284***
	(0.063)	(0.062)	(0.081)	(0.080)	(0.066)
Damage to house in Syria	0.035	−0.066	−0.028	−0.072	−0.011
	(0.126)	(0.139)	(0.144)	(0.144)	(0.146)
Height	0.006	0.004	0.010	0.014	0.014
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
N	2,562	2,562	2,562	2,562	2,562
Pseudo-R-squared	0.043	0.058	0.063	0.075	0.076

Note: ***p <.001; **p <.01; and *p <.05.
Controls included Age, Education, Married, Urban, Months in Turkey, Smoking, Frequency of Eating Fruits and Vegetables, Aleppo in Syria, and Provinces in Turkey.

individual i in Turkey in year t, including dummy variables for province to capture unobserved differences between locations, and ε_{it} represents the unexplained errors. In each of the tables presented below, we will attempt to indicate not only the direction of the various influences of the CS conditions of individual i in period t-1 on y_{it} but also some indication of the relevant magnitudes.

The comparison of magnitudes of the different coefficients is not very straightforward, especially in the logit models used to estimate many of the relationships, not only due to differences in measurement units, but also due to the nonlinearity of the logit function, and changing variance issues in nested models. Yet, to give some reasonable insight into the magnitudes of such effects, in discussing some of the empirical results tables presented

TABLE 4 Ever had mental problems

	Distress sadness or worry	Difficulty in concentrating	Depressive	Lose interest in regular activities	Sleep disorder	Psychiatric disorders	Ever had any mental health problems
	1	2	3	4	5	6	7
Females							
Commonality in origins	0.762	0.766	0.666	0.771	0.593	0.943	0.816
	(0.629)	(0.516)	(0.543)	(0.490)	(0.488)	(1.100)	(0.577)
Family member killed in War	1.686	0.992	1.456*	1.025	1.070	0.036	1.745
	(1.004)	(0.784)	(0.581)	(0.745)	(0.573)	(1.007)	(1.012)
Log income in Syria	0.061	0.097	0.262***	0.208**	0.171**	0.020	0.140*
	(0.058)	(0.054)	(0.074)	(0.073)	(0.059)	(0.108)	(0.063)
Damage to house in Syria	0.081	0.112	−0.071	−0.045	−0.008	−0.054	0.082
	(0.132)	(0.130)	(0.132)	(0.121)	(0.125)	(0.196)	(0.142)
Height	0.011	0.013	0.015	0.014	0.015	−0.065*	0.019
	(0.017)	(0.017)	(0.015)	(0.013)	(0.020)	(0.026)	(0.019)
N	2,072	2,072	2,072	2,072	2,072	2,072	2,072
Pseudo-R-squared	0.039	0.028	0.092	0.074	0.063	0.171	0.062
Males							
Commonality in origins	0.591	0.725	0.441	0.316	0.433	0.149	0.687
	(0.478)	(0.514)	(0.484)	(0.513)	(0.505)	(0.703)	(0.491)
Family member killed in War	0.494	0.449	0.659	0.782	0.769	0.492	0.602
	(0.422)	(0.373)	(0.725)	(0.595)	(0.613)	(1.061)	(0.509)
Log income in Syria	0.092	0.132*	0.269***	0.238**	0.210**	0.451***	0.188**
	(0.062)	(0.066)	(0.080)	(0.086)	(0.074)	(0.102)	(0.063)
Damage to house in Syria	0.152	0.087	−0.027	−0.026	0.065	0.058	0.142
	(0.133)	(0.130)	(0.135)	(0.133)	(0.116)	(0.132)	(0.122)

(Continues)

TABLE 4 (Continued)

	Distress sadness or worry	Difficulty in concentrating	Depressive	Lose interest in regular activities	Sleep disorder	Psychiatric disorders	Ever had any mental health problems
	1	2	3	4	5	6	7
Height	0.015	0.012	0.010	0.011	0.014	−0.051**	0.024*
	(0.016)	(0.013)	(0.014)	(0.014)	(0.011)	(0.016)	(0.010)
N	2,562	2,562	2,562	2,562	2,562	2,562	2,562
Pseudo-R-Squared	0.027	0.032	0.066	0.061	0.054	0.324	0.059

Note: Controls included Age, Education, Married, Urban, Months in Turkey, Smoking, Frequency of Eating Fruits and Vegetables, Aleppo in Syria, and Provinces in Turkey.

***p <.001; **p <.01; and *p <.05.

TABLE 5 The severity of the physical and mental problems

	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical Problems
	Females		Males	
Commonality in origins	0.805*	0.723*	0.418	0.303
	(0.281)	(0.314)	(0.269)	(0.278)
Family member killed in War	0.344	0.246	0.194	0.157
	(0.216)	(0.182)	(0.133)	(0.115)
Log income in Syria	0.063*	0.086**	0.108*	0.125*
	(0.026)	(0.025)	(0.043)	(0.043)
Damage to house in Syria	0.057	0.001	0.047	−0.006
	(0.036)	(0.046)	(0.038)	(0.041)
Height	0.005	0.003	−0.001	−0.004
	(0.010)	(0.010)	(0.007)	(0.007)
N	2,072	2,072	2,562	2,562
R-squared	0.090	0.092	0.062	0.077

Note: Other controls included Age, Education, Married, Urban, Months in Turkey, Smoking, Frequency of Eating Fruits and Vegetables, Aleppo in Syria, and Provinces in Turkey.
***$p <.001$; **$p <.01$; and *$p <.05$.

below, we use the predictive probability for a one standard deviation change in the explanatory variable holding all other covariates at their mean values. Note that the predictive probabilities need to be considered relative to the proportion of the respondents having the condition under consideration. We divide the results into the three following sections.

5.1 | Incidence of diseases and physical/mobility problems

Table 2 presents the logit estimates for the incidence of each of the 11 different disease measures (in columns 1–11), and OLS estimates of the total number of diseases (in column 12) based on a common specification linking the three traumatic or other conditions back in Syria to the current incidence of disease among the Syrian refugees in Turkey that we found provided quite robust results. It does so separately for Females in the top half of the table and for Males in the bottom half of the table. While, as indicated above and reported in the table, the specifications include a number of other relevant controls, the results presented here are limited to those for three conditions back in Syria, namely, Family Member Killed in War, Log of Income in Syria, and Damage to House in Syria, Commonality, Height and location in Syria (especially Aleppo). Of these, income in Syria might be deemed the one most likely to be endogenous to the choice of destinations and health outcomes and subject to selection bias as well. Yet, since such incomes were earned prior to the decision to leave Syria and well before any the health conditions of the Syrian refugees in Turkey were observed, we believe that this source of bias should be rather small. As a robustness check in this and all other tables we have also re-estimated the results of these equations by considering height, age, education to be instrumental variables in determining income in the first stage of a two-step procedure in which the instrumented effect of income on disease and other health outcomes is in the second stage.

Notably, the results in the second row for Females indicate that females who report having a Family Member Killed in the War seem to have higher probabilities of having a Chronic Disease (in column 2) as diagnosed by a

TABLE 6 Same as Table 5 but split into the 0–28, 29–48 and 49+ months in Turkey groups with alternative measures for income in Syria

| | Using predicted income | | | | | | Using actual income | | | | | |
| | 0–28 months | | 29–48 months | | 49+ months | | 0–28 months | | 29–48 months | | 49+ months | |
	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems
Females												
Commonality in origins	0.667	0.693	0.710	0.652	0.919***	0.746**	0.631	0.669	0.648	0.618	0.991***	0.876***
	(0.337)	(0.370)	(0.425)	(0.469)	(0.177)	(0.206)	(0.326)	(0.420)	(0.401)	(0.436)	(0.173)	(0.175)
Family member killed in War	-0.389	-0.262	0.536	0.267	0.692	0.716	-0.149	-0.102	0.715	0.464	0.712	0.744
	(0.432)	(0.438)	(0.341)	(0.260)	(0.388)	(0.481)	(0.256)	(0.270)	(0.361)	(0.269)	(0.391)	(0.475)
Log income in Syria	0.013	0.083	0.075*	0.089**	0.042	0.046	0.009	0.096	0.039	0.084	-0.048	-0.039
	(0.052)	(0.055)	(0.027)	(0.029)	(0.032)	(0.038)	(0.118)	(0.136)	(0.086)	(0.087)	(0.117)	(0.112)
Damage to house in Syria	0.093*	0.049	0.042	-0.018	0.023	-0.057	0.109**	0.086*	0.012	-0.038	-0.019	-0.084
	(0.043)	(0.049)	(0.047)	(0.068)	(0.066)	(0.068)	(0.036)	(0.038)	(0.052)	(0.069)	(0.059)	(0.054)
Height	0.021	0.016	0.013	0.011	-0.009	-0.010	0.017	0.016	0.019	0.017	-0.007	-0.007
	(0.013)	(0.012)	(0.013)	(0.012)	(0.011)	(0.010)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)
N	487	487	970	970	615	615	558	558	1,119	1,119	721	721
R-Squared	0.109	0.105	0.103	0.098	0.139	0.132	0.097	0.078	0.083	0.076	0.115	0.114
Males												
Commonality in origins	0.128	-0.015	1.242	1.124	0.452	0.436	0.157	0.037	1.389	1.305	0.670	0.616
	(0.192)	(0.231)	(0.782)	(0.798)	(0.414)	(0.383)	(0.202)	(0.243)	(0.733)	(0.747)	(0.456)	(0.423)
Family member killed in War	0.152	0.153	-0.122	-0.142	-0.177	-0.343	0.091	0.079	-0.132	-0.157	0.089	-0.062
	(0.159)	(0.104)	(0.362)	(0.486)	(0.726)	(0.805)	(0.141)	(0.085)	(0.339)	(0.462)	(0.659)	(0.726)

(Continues)

TABLE 6 (Continued)

| | Using predicted income | | | | | | Using actual income | | | | | |
| | 0–28 months | | 29–48 months | | 49+ months | | 0–28 months | | 29–48 months | | 49+ months | |
	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems	Mean severity of mental problems	Mean severity of physical problems
Log income in Syria	0.039	0.072	0.115*	0.120	0.155	0.133	−0.008	0.035	0.307*	0.350*	−0.050	−0.074
	(0.042)	(0.048)	(0.053)	(0.058)	(0.083)	(0.084)	(0.084)	(0.092)	(0.112)	(0.136)	(0.141)	(0.128)
Damage to house in Syria	0.083	0.019	0.055	0.003	−0.038	−0.080	0.073	0.011	0.010	−0.028	−0.118	−0.149
	(0.047)	(0.052)	(0.063)	(0.083)	(0.097)	(0.100)	(0.050)	(0.054)	(0.073)	(0.093)	(0.094)	(0.098)
Height	0.001	−0.002	0.005	0.004	−0.007	−0.008	0.004	0.001	0.003	0.001	−0.009	−0.010
	(0.006)	(0.006)	(0.013)	(0.012)	(0.013)	(0.013)	(0.006)	(0.006)	(0.011)	(0.010)	(0.012)	(0.013)
N	1,878	1,878	291	291	393	393	1,960	1,960	301	301	409	409
R-Squared	0.040	0.060	0.214	0.187	0.311	0.307	0.034	0.045	0.187	0.167	0.265	0.271

Note:: Other controls included Age, Education, Married, Urban, Months in Turkey, Smoking, Frequency of Eating Fruits and Vegetables, Aleppo in Syria, and Provinces in Turkey.

*** p <.001; ** p <.01; and * p <.05.

doctor in the last two weeks of very similar size and significance as that in column 3 when Chronic Disease is suspected by the reporting individual but without necessarily having been diagnosed by a doctor in those last two weeks. Similarly, the results reveal positive and significant coefficients for Family Member Killed in War on females' Hypertension in column 6. From the corresponding results for Family Member Killed in War for Males in the lower section of the table, from columns 10 and 11 one can see that males who have experienced death of a Family Member in War are also more likely to have been diagnosed with Chronic Pulmonary Disease and Asthma. Note that, for some other diseases, the coefficients of Family Member Killed are negative and that for neither females or males are the coefficients significant for the Number of Diseases (column 12). Yet, the finding that having a Family Member Killed in the War does seem to be associated with higher probabilities of having at least some diseases or disease types is quite interesting and perhaps surprising, given the relatively low percentage of adults (6%) in Table 1 reporting having had a family member killed.

From the parameter estimates in the third rows of both sections of Table 2, Income in Syria is shown to be never a significant determinant of the incidence of any of these diseases for females, whereas for males it does contribute significantly to Cardiac Disease, Hypertension, Cancer and Sexually Transmitted Diseases. Notably also, from the fourth rows of both sections of the table, it can be seen that Damage to House in Syria is not associated with an increase in the likelihood of any of the diseases or disease types for females but it is associated with a slightly higher probability of Oral/Tooth Disease in column 7. Commonality of Origins (in the first row of each part of the table contributes to Asthma among females and to Sexually Transmitted Diseases among males. Overall, therefore, we see considerable evidence of adverse effects of several of these back-in-Syria conditions on at least some of these diseases, and in the case of Income in Syria especially on those among males.

To get an idea on the relative magnitudes of some of these different back-in-Syria measures on the mostly binary measures of the diseases, we focus on Non-chronic Disease regressions which as indicated in Table 1 were by far the most common (with the highest mean) and for Females for whom the effects shown in Table 2 were slightly larger than for Males. For Non-chronic Disease as a whole, the estimated coefficient in column (1) implies that the predictive probability of non-chronic disease among females would rise by 0.012 for a one standard deviation change in Family Member Killed in War. On the other hand, the magnitude of the effect on the predictive probability of Non-chronic Disease of a one standard deviation change in log of income in Syria would be about 0.166. For one specific but relatively common such disease, Hypertension, the estimates in Table 2 imply, again for Females, that the predictive probabilities of Hypertension would rise by 0.120 for a one standard deviation increase in Family Member Killed in War, by 0.362 for a one standard deviation increase in Log of Income in Syria. (For Males, the analogues to these same one standard deviation increases on Hypertension would be 0.055 and 0.231, respectively).

Next, we turn to the corresponding empirical results using the same specifications for five different measures of the physical and mobility problems of adult Syrians in Table 3. In this case, we show that for Females having a Family Member Killed is positively associated with most physical problems, but significantly so only for Ever Having Had Any Physical Health Problem. For Males, that same traumatic experience is associated with the greater likelihood of Difficulty in Moving Around. While Damage to House in Syria was found to be not significantly related to any of the Physical/Mobility Problems identified in the table for either females or males, we see positive effects of Income in Syria on each of these and for both Females and Males. The size of these coefficients are fairly similar in size and significance from one such difficulty to another and for both females and males. This finding of positive effects on health adversities of higher income back in Syria is much more common than what was observed in the case of Diseases in Table 2 where those effects were largely limited to a few diseases and to males. In comparing the magnitudes of the effects of the different back-in-Syria variables in the Pain or Discomfort regression of Table 3, we find that the effect of a one standard deviation change in Family Member Killed in War raises the predictive probability of Pain or Discomfort by 0.025 for both males and females while that of a one standard deviation increase in log income raises it by 0.391 and 0.426 for females and males, respectively. Since the coefficients of Log Income in Syria on most of the other adversities are larger for both Females

and Males than for Pain or Comfort, it is quite clear that the magnitudes of one standard deviations increases in Income in Syria are relatively larger than those of Family Member Killed and Damage to House on each of the five indicators of Physical Mobility Problems examined in this table.

5.2 | Mental health problems

Next, in Table 4 we turn to what, as noted above, are often found to be the most important and distinctive health problems among refugees from conflict situations, namely, the incidence of mental problems. Especially since these, too, have been found in the literature to differ from one specific mental problem to another, in Table 4 we examine the empirical estimates, again separately for Females and Males, for the relations between the same conditions back in Syria and six different types of mental health problems in columns 1–6 and an overall measure of ever having any of the mental problems in column 7 of the table. In this case, the estimation results for Distress, Sadness or Worry are given in column 1, those for Difficulty in Concentrating in column 2, Depressive in column 3, Lose Interest in Regular Activities in column 4 and those for Sleep Disorder and Psychiatric Disorders in columns 5 and 6, respectively. As was the case for diseases in Table 2, from the second row of the table it can be seen that having had a Family Member killed in War is more closely and more significantly related to each of the various Mental Health Adversities for females than for males. From the third rows in both parts of the table, we can see that Income in Syria is positively and significantly related to four of the seven different measures among Females and to six of them among Males. In most cases and in the overall measure in column (7), the magnitudes of the income coefficients are slightly larger for Males than for Females, quite consistent with the findings in Tables 2 and 3. For Psychiatric Disorders in column (6), this effect is by far the largest one for males, and with the largest gap vis-à-vis that for Females. Finally, from the fourth rows of each section of Table 4, we see no significant relation between Damage to House in Syria and any of the Mental Health indicators for either Males or Females.

From the values of the pseudo-$R^{2,}$ in Table 4, one can see that the strongest estimates in the table are those for Psychiatric Disorders in column 6 for both males and females. For males, the most highly significant coefficient is that of Income in Syria, while that for females is Family Member Killed in War. What is quite different from the previous types of health problems is that, with the exception of Distress, Sadness or Worry in column (1) and Psychiatric Disorders in column (6), Females are just as likely to suffer from higher Income in Syria in Mental Health Problems as Males, and more seriously than Family Member Killed in War.

To illustrate the magnitudes of the different effects of various prior conditions in Syria on the incidence of mental health problems among Syrian refugees in Turkey we again consider changes in predictive probabilities from a one standard deviation increase in the relevant variable. A one standard deviation increase in Family Member Killed in War raises the predictive probabilities of Psychiatric Disorders, Distress, Sadness or Worry, and Sleep Disorder for Females by 0.080, 0.054 and 0.031, respectively, but for Males only by 0.049, 0.017, and 0.024, respectively. These results clearly show that the effects of identical increases in Family Member Killed in War can result in considerably larger increases in the predictive probabilities of some Mental Adversities among Females than for Males while for some others for Males more than Females.

In Table 5, we return to both the Physical/Mobility Problems of Table 3 and the Mental Problems of Table 4, but in this case focused on the Average Severity of these adversities rather than merely their incidence. These Mean Severity Scores are constructed as the weighted averages of severity of all the individual Physical/Mobility Problems in Table 3 and Mental Problems shown in Table 4. Notably, in this case, even more so than in the preceding tables, the influences of Income in Syria on the Mean Severity of both types of adversities are larger and more statistically significant for both Females and Males than those of either Family Member Killed in War or Damage to House in Syria. The Income in Syria coefficients are slightly larger for Males than for Females. Note, however, that the coefficients for Commonality of Origins are larger and more significant for Females than for Males.

5.3 | Capturing differences in effects according to time in Turkey

As stated both above and in the notes to the tables, but not shown in the tables themselves, we have included Months in Turkey as a control variable in all Tables 2–5. In the light of some important studies in the literature, such as Lindeboom and van Ewijk (2015) and Kesternich et al. (2014) which examined more long-term effects of war and other traumatic experiences, we now wish to extend some of the preceding analysis to see if there are any indications that some of these effects of the traumatic events back in Syria on the Average Severity of Mental Health and Physical Mobility Problems might vary by the extent of time since the trauma occurred. Since in most cases, the Syrian refugees fled from their original homes in Syria for Turkey (or for other countries) very shortly after having experienced the trauma, we now make use of Months in Turkey as an, at least, crude measure of the time since the trauma was experienced. Specifically, for both males and females we investigate whether or not the effects of these conditions back in Syria on Mental and Physical/Mobility Problems vary across three different Months in Turkey groups. These are those with 0–24, 25–48 and 49 and above Months in Turkey, respectively. It has also been mentioned above, that for robustness purposes and concerns about the Income in Syria measure implying some degree of selection in whether or not to flee Syria and where to migrate, we have also estimated each of the regressions in Tables 2–5 with Income Predicted on the basis of the typical income model (based on Age, Education, and Governorate of Origin). In the interest of space, these results (which have in general been very similar but with slightly lower explanatory power) have not been presented. Yet, since these estimates with predicted income are somewhat more different and have slightly higher explanatory power for the Mean Severity regressions than those based on actual reported Incomes in Syria, in Table 6 we present regression results for the Average Severity of Physical/Mobility and Mental Problems for each of the three Months-in-Turkey groups, and again separately for females and males using both sources for the income in Syria measures. The results using the new predicted income measure are presented in the first six columns of the table and those with the actual income measures (as used in all the preceding tables) are shown in the last six columns.

While the disaggregation of the female and male samples into the three Months-in-Turkey groups has the effect of lowering the numbers of observations available for any single group, thereby making it more difficult to identify statistically significant coefficients, the results do show that there still are several Mean Severity Health Problems measures for which statistically significant effects of the conditions back in Syria can be identified. Note first that, from the results of the 0–28 Months in Turkey Group in both sets of columns, the only significant coefficients are those for Damage to House in Syria for Females. This, however, is an important finding in that it was not observed in the full sample results reported in Table 5 and that the finding is robust to the method used for estimating the effect of Income in Syria. In neither set of columns in Table 6 are there any statistically significant coefficients for Family Member Killed in War. As in Table 5, all these coefficients are all positive and fairly similar in the two sets of columns. In the case of Income in Syria, however, the effects on Mean Severity of both kinds of health problems tend to be larger for both males and females in the 29–48 Months in Turkey group. The most striking findings in Table 6, however, are the much larger effects of Commonality of Origins on Mean Severity on both Mental and Physical/Mobility Problems for females in the 49+ Months in Turkey Group. Note that these particular coefficients are also rather invariant to the measure of Income in Syria used, and clearly reflect the relevance of commonality in neighbors before and after flight from the traumatic conditions in current assessment of the severity of their health problems.

6 | CONCLUSION: CONTRIBUTIONS RELATIVE TO EXISTING LITERATURE, TO THE TRAUMATIC EVENT PARADOX AND IMPLICATIONS FOR POLICY AND FURTHER RESEARCH

Consistent with much of the more traditional literature on health among refugees from conflicts, much of which has been focused on mental problems, some of the results in Tables 4 and 6 have shown the relevance of adverse

conditions back in Syria, such as Family Member Killed in War or Damage to House in Syria, to have been relatively strong and more significant for Mental Health Problems and to have been stronger for Females than for Males. Yet, in the case of Family Member Killed in War, its effects on health adversities seem to have been considerably larger in both Diseases and Physical/Mobility Problems as shown in Tables 2 and 3, respectively.

Rather surprisingly, the type of back- in-Syria condition that is shown to have had the most consistent adverse effects on Mental Health Problems was that of Log of Income in Syria. In Table 4 it was shown to raise the likelihood of incidence of four of the seven different Mental Health Adversities among Females and of six of the same seven among Males. The same is true in terms of the mean severity of the weighted average of these adversities as shown in Table 5. Tables 3 and 5, moreover, reveal the same patterns concerning the effects of Income in Syria on both incidence and mean severity of Physical/Mobility adversities, and as already mentioned to raise the probability of having had four different diseases in the case of males as shown in Table 2.

While there could be various mechanisms lying behind the explanations for the stronger adverse effects arising from higher (rather than lower) Income in Syria on the subsequent Health Outcomes, the one that would seem most plausible is that the higher was that Income back in Syria, the larger would be the nostalgia for the good old days when they had such incomes. Not surprisingly, that effect was found to be stronger among the males who were more likely to have earned that higher income and this may have allowed them to get married and for their families to enjoy higher living standards than those with lower incomes. Another could be the effect of that income in Syria on weight and obesity. Notably, despite the fact that the incomes in Syria are quite highly correlated with Incomes in Turkey, which as a result would be expected to raise most health conditions among the Syrian refugees in Turkey, the negative effects of higher income in Syria dominate.

While as mentioned in Section 4, we cannot deny the presence of at least some simultaneity and selection biases, we have tried to mitigate these potential biases in several different ways. Since one of these concerns was in the role of the income in Syria variable which, as indicated above, has turned out to be surprisingly strong in its influence on health adversities of all three kinds, one way of assessing biases concerning income was to as an alternative estimate the same relationships with income in Syria estimated exclusively from the more purely exogenous factors such as age, height and education instead of actual income. To that end we have estimated all the tables presented using predicted education instead of actual education. In general, the differences in the results were found to be small. In the interest of space, since these estimates with predicted Income in Syria exclude other important determinants of income, such as parents' education, industry, type of job and employer, the results are generally slightly weaker, being reflected in somewhat smaller coefficients of the log Income in Syria variable and lower explanatory power (R^2), but not affecting the basic conclusions. The one exception was Table 6 in which the explanatory power was slightly higher when predicted income is used instead of actual income but as shown the estimates of the relevant coefficients are very similar.

Another factor that has been found to be an important contributor to some of the different health adversities of Syrian refugees in Turkey in the various tables is the Commonality measure, reflecting the degree of commonality among neighbors between back in Syria and after flight from Syria in Turkey. It was shown to be positively related to Asthma among females and Sexually Transmitted Disease among males.as well as to the Mean Severity of both Mental Problems and Physical/Mobility Problems among females (Table 5) and especially among those who have been in Turkey the longest (Table 6).

One other control, Height, which has served as a convenient and exogenous measure of initial health in all of the tables presented, has been shown to have been negatively related to six different diseases among males (Table 2) and to Psychiatric Disorders among both males and females (Table 4). Of the other controls used but not presented in the tables, Frequency of Eating Fruits and Vegetables (hence a proxy for Avoidance behavior (A) in our theoretical model presented in Section 4.1) has shown to be quite consistently negatively related to many of the health adversities.

We believe that our integration of the time in Turkey into the analysis, showing that traumatic experience, such as Damage to House in Syria has a stronger influence on the severity of Mental Problems among relatively recent

refugees whereas higher income in Syria and Commonality of Neighbors between Origin and Destination have stronger influences on those who have been in Turkey for 29 months or longer (Table 6), helps explain why Income in Syria seems to have been more important in this study of refugees than the measures of Traumatic Experience in this study of refugees who have been in the hosting country for quite a while. Many of the existing studies have been done on newly arrived refugees or even on those in the process of fleeing. This finding concerning the effect of Time in Turkey on health of the Syrian refugees is also consistent with the finding of Balcilar and Nugent (2019) that those refugees in Turkey who had experienced that destruction felt less likely to want to return and more likely to want to stay in Turkey and to "move on" in one's life, to work hard both physically and mentally, despite the fact that income loss between Syria and Turkey would come to play an increasingly important role as time went on. This also explains why this would be more important for males (as the main bread winners in the family) than for females.[9]

Finally, with respect to policy implications, especially if the findings reported here could be supported by further robustness tests, some tentative policy implications would seem to be: (1) that the mental and other health needs of refugees from Syria (and other locations of major conflict for substantial periods of time) are indeed extremely important, suggesting that their treatment is urgently needed, (2) that these needs extend well beyond the mental health needs, so much emphasized in existing literature based on the traumatic events experienced by Syrian and other refugees, to diseases of various kinds and physical/mobility problems that have been identified in the present study; (3) that, especially in the case of the Mental Problems, these problems are unlikely to decline over time, and (4) that the needs for health services of different types vary in importance between males and females, as well as over the length of time they have spent as refugees.

One interesting extension of this research would be to examine longer run effects of the traumatic events, such as in the interesting studies (again with large samples) of Kesternich et al. (2014) and Lindeboom and van Ewijk (2015), which examined the effects of wartime trauma in fighting zones in Europe during WW II on much later health.

Another interesting extension would be to develop and utilize a new study of Syrian refugees in Turkey which might include questions on individual attitudes of different types so as to examine the role of time discounting and attitudes to risk is linking traumatic and other conditions in Syria to subsequent health outcomes of the refugees in Turkey. Still another related extension would be to further extend existing literature on the externalities of refugee health and working conditions on Turkish households in nearby areas.

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[9]Interestingly, Aygun et al. (2020a,b) have demonstrated that the introduction of a special externally funded program (the Emergency Social Safety Net Program) aimed at refugee households in Turkey with large numbers of children relative to income earners has already had the effect of reducing child labor, and increasing school attendance among refugee children among those households receiving these cash transfers. We suspect that those households receiving these transfers would in the future be somewhat less adversely affected health-wise.

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