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**7|2019** Does facilitated and early access to the health system improve refugees' health outcomes? Evidence from a natural experiment in Germany

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# Does facilitated and early access to the health system improve refugees' health outcomes? Evidence from a natural experiment in Germany

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# Contents

<b>1</b>	<b>Introduction</b> .....	<b>6</b>
<b>2</b>	<b>Policy Context</b> .....	<b>7</b>
<b>3</b>	<b>Theoretical background and literature review</b> .....	<b>9</b>
3.1	Refugees' pre- and post-migration health risks .....	9
3.2	Refugees' access to the healthcare system .....	9
3.3	Hypotheses on the role of (timely) healthcare access for refugees' health outcomes ...	10
<b>4</b>	<b>Data and Method</b> .....	<b>12</b>
4.1	IAB-BAMF-SOEP Survey of Refugees in Germany .....	12
4.2	Analytical sample .....	12
4.3	Dependent variables and method .....	13
4.4	Independent variables .....	14
<b>5</b>	<b>Results</b> .....	<b>18</b>
5.1	Effect of the policy change on refugees' health outcomes .....	18
5.2	The role of post-migration stress and health illiteracy .....	20
<b>6</b>	<b>Discussion</b> .....	<b>21</b>
	<b>References</b> .....	<b>24</b>
	<b>Appendix</b> .....	<b>30</b>

# Tables

Table 1:	Descriptive statistics of dependent variables .....	13
Table 2:	Descriptive statistics on control variables .....	17
Table 3:	Multivariate regressions of health indicators .....	19
Table 4:	Effect of illiteracy on health by <i>eHC</i> -access .....	21

## Abstract

Because of their often-dramatic, life-threatening flight patterns and resulting pronounced health disparities, refugees have a great need for medical treatment after their arrival to their host countries. In Germany, as long as their asylum application is not approved or their duration of stay has not yet exceeded 15 months, refugees who require doctor visits must request them, with a considerable amount of bureaucracy, from the local responsible authority. Since 2016, several federal states and municipalities in Germany have introduced electronic health cards (*eHCs*) which give refugees immediate and unbureaucratic access to the healthcare system. We examine whether being eligible for *eHCs* because of the policy change had an effect on multidimensional health indicators of refugees in Germany. For empirical identification, we take advantage of variation in this policy change across German regions and over time. Relying on the IAB-BAMF-SOEP Survey of Refugees, we find that being eligible for *eHCs* because of the policy change indeed improved the mental well-being and subjective health assessment of the recently arrived refugees, while having no impact on physical health status. These results can be traced back to the moderating effect of facilitated healthcare access on post-migration stress, which is known to affect primarily psychological well-being. Moreover, facilitated healthcare access appears to alleviate potential language and cultural barriers faced by refugees illiterate in the language of the country of origin. Altogether, the article illustrates how structural and institutional constraints may shape individual health outcomes of adult refugees, in particular of those with low health literacy.

## Zusammenfassung

Aufgrund ihres oft dramatischen, lebensbedrohlichen Fluchtwegs und der daraus resultierenden starken gesundheitlichen Beeinträchtigungen haben Geflüchtete nach Ankunft in ihren Aufnahmeländern einen hohen medizinischen Behandlungsbedarf. Solange ihr Asylantrag in Deutschland nicht anerkannt ist oder ihre Aufenthaltsdauer 15 Monate noch nicht überschritten hat, müssen Geflüchtete die Behandlung mit erheblichem bürokratischen Aufwand bei der zuständigen Behörde vor Ort beantragen. Seit 2016 haben mehrere Bundesländer und Kommunen in Deutschland elektronische Gesundheitskarten (*eHCs*) eingeführt, die Geflüchteten einen sofortigen und unbürokratischen Zugang zum Gesundheitssystem ermöglichen. Wir untersuchen, ob sich der Politikwechsel auf multidimensionale Gesundheitsindikatoren von Geflüchteten in Deutschland ausgewirkt hat. Zur empirischen Identifikation nutzen wir Variation in der Einführung der *eHCs* in Deutschland zwischen Regionen und über die Zeit. Unsere Ergebnisse auf Grundlage der IAB-BAMF-SOEP Befragung von Geflüchteten zeigen, dass *eHC*-Zugang durch die Reform in der Tat das psychische Wohlbefinden und die subjektive Beurteilung des Gesundheitszustands der kürzlich angekommenen Geflüchteten verbessert hat. Auswirkungen auf den physischen Gesundheitszustand finden sich nicht. Diese Ergebnisse lassen sich auf die moderierende Wirkung des erleichterten Zugangs zur medizinischen Versorgung auf den Post-Migrationsstress zurückführen, von dem bekannt ist, dass er sich vor allem auf das psychische Wohlbefinden auswirkt. Darüber hinaus

scheint der erleichterte Zugang zur medizinischen Versorgung potenzielle sprachliche und kulturelle Barrieren abzubauen, mit denen Geflüchtete konfrontiert sind, die Analphabeten in der Sprache ihres Herkunftslandes sind. Insgesamt veranschaulicht der Artikel, wie strukturelle und institutionelle Beschränkungen die individuelle gesundheitliche Situation von erwachsenen Geflüchteten, insbesondere mit geringer Gesundheitskompetenz, beeinflussen können.

## JEL classification

F22, I14, I18, H75, R50

## Keywords

Asylum-seekers, health, IAB-BAMF-SOEP survey of refugees in Germany, access to health system, asylum policy, dispersal policies, quasi-experiment, physical and mental health diseases, depression symptoms, post-migration stress.

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## Reference

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# 1 Introduction

Refugee<sup>1</sup> migration and integration has become one of the major topics in research and politics in recent years (OECD 2018) since war, persecution, and other forms of violent conflicts have unfolded in the Middle East following the Arab Spring in late 2010 (Valdez 2020; Hatton 2020). The often life-threatening events and stressful or traumatic experience before and during forced migration (Hatton 2020; Brücker, Jaschke, and Kosyakova 2019) together with substandard living conditions and post-migration stress in host countries (Robjant, Hassan, and Katona 2009; Silove et al. 1999), create a specific burden for the refugee population compared to other migrants, particularly for their health status (see Lindert et al. 2009; Sardadvar 2015). Of particular significance are refugees' mental health risks (Claassen and Jäger 2018; Silove et al. 2007; Li, Liddell, and Nickerson 2016; Kindermann et al. 2020) that seem to be difficult to detect in this population due to cultural and linguistic barriers as well as communication and recall problems (Crumlish and O'Rourke 2010). Given the relevance of health status for individual educational achievements (Eide and Showalter 2011), economic integration (Chatterji, Alegria, and Takeuchi 2011), and social inclusion (Stephoe, Deaton, and Stone 2015), facilitated access to healthcare in the early phase after immigration may be essential for refugees' well-being and integration prospects in host countries (Kindermann et al. 2020).

Against this background, this article addresses the important issue of whether earlier and improved access to the healthcare system has a positive effect on the mental and physical health outcomes of recently arrived refugees in Germany. Germany has evolved as the main refugee destination among high-income OECD countries in absolute and relative terms: from 2015 to 2018, 41 percent (1.6 million) of the 3.9 million first-time asylum applications in the EU-28 were submitted there (Eurostat 2019). Two-thirds of the recently arrived refugee population in Germany arrived from Syria, Afghanistan, Iraq, Eritrea, and Iran – which are countries affected by armed conflict, group persecution, or other human rights violations (Brücker, Jaschke, and Kosyakova 2019). Not surprisingly, refugees are associated with poorer mental health outcomes relative to the native population and other migrant groups in Germany (Brücker et al. 2019; Metzging, Schacht, and Scherz 2020).

In addition to the pronounced health risks that refugees face, there are several limitations in their access to healthcare services in Germany (Wenner et al. 2020). Specifically, refugees cannot receive medical treatment in Germany within the first 15 months of their stay in case their asylum application is not yet approved, without the consent of nonmedically trained personnel from social and immigration offices, who act as so-called gatekeepers (Kroneman, Maarse, and Zee 2006; Rolke, Wenner, and Razum 2019). The resulting serious health impairments and illnesses – which likely remain undiagnosed – may have severe consequences not only for refugees' health status and personal life situation (Bischoff et al. 2003; Robjant, Hassan, and Katona 2009) but also put the excessive burdens of financing the treatment of protracted illnesses on the healthcare system (Bozorgmehr and Razum 2015). Recent policy changes in Germany, however, modified the existing

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<sup>1</sup> Henceforth, the term “refugee” is used as a category that covers all individuals who seek asylum outside their home countries or any other form of protection, irrespective of their legal status.

rules and introduced electronic health cards (*eHCs*) which allow refugees immediate, almost-unrestricted access to the healthcare system directly after they register in Germany (Wächter-Raquet 2016). The implementation of these policies, though, is subject to regional authorities and was adopted in only a few federal states and municipalities, creating pronounced regional and temporal variability in refugees' access to healthcare. We investigate this important policy change in Germany to examine whether being eligible earlier for the *eHC* because of the policy change affects refugees' health outcomes. Moreover, the national dispersal policies that determine refugees' residential allocation in Germany<sup>2</sup> minimize the likelihood that refugee inflows into particular regions are driven by the availability of healthcare access, thereby providing an appropriate framework for causal inference. Given that refugees' restricted access to the healthcare system is neither unique for Germany (Chase et al. 2017; Norredam, Mygind, and Krasnik 2006; Silove et al. 1999), neither for refugees (Kullgren 2003), our study is of general interest for understanding the consequences of the restricted health treatment service for vulnerable population groups in developed countries.

Using the rich, representative longitudinal data from the IAB-BAMF-SOEP Survey of Refugees (2020), we find that being eligible for *eHCs* because of the policy change indeed improved the mental well-being and subjective health assessment of refugees who arrived in Germany between 2013 and 2016, while having no effect on physical health. These results can be traced back to the moderating effect of facilitated healthcare access on post-migration stress, which is known to affect primarily psychological well-being (Robjant, Hassan, and Katona 2009; Silove et al. 1999). Our results further reveal that the early and facilitated healthcare access can alleviate potential language and cultural barriers often faced by refugees illiterate in the country of origin (Murray and Skull 2005).

In the remainder of this article, we first outline the institutional policy context of refugees' healthcare access in Germany. This is followed by a literature overview on refugees' health risks, their access to the host-country healthcare systems and the consequences of post-migration stress factors. The aim of this discussion is to form empirically testable hypotheses for the refugee population in Germany. We then present the data and operationalization of our dependent and independent variables. The results section discusses our findings on the effect of the policy change on refugees' psychological and physical health outcomes, the mediating role of post-migration stress and heterogeneity of the policy change effects. In the final section we draw our conclusions.

## 2 Policy Context

Since 1993, refugees' access to healthcare in Germany has been regulated by the German social welfare law for asylum-seekers (*Asylbewerberleistungsgesetz*, AsylbLG, para.4), which restricts refugees' access to the healthcare system for the first 15 months of their stay (Wenner et al. 2020).

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<sup>2</sup> Upon arrival, refugees are distributed exogenously across federal states (following the annually updated *Königsteiner Schlüssel*, which is based on tax-revenue and population numbers) and within federal states across districts or municipalities based on similar but state-specific criteria. Refugees with pending or rejected asylum application are bound to the locality of first assignment unless they make their own living, which is difficult to achieve, given far-reaching restrictions on work permits.

During this time, refugees, including those with pending asylum applications and those whose applications were rejected but whose stay in Germany is tolerated (*Duldung*), are only eligible for the primary, basic treatment of acute illnesses and pain and for further time-sensitive interventions (i.e., pregnancy) (AsylbLG, para.4). If they require a doctor's visit, refugees must request it, either from the local authority for foreigners or the responsible social assistance office (Wächter-Raquet 2016; Wenner et al. 2020). Such decisions on medical treatment claims are made by employees without specific medical training; therefore, in many cases, a medical treatment requires a consultation with the local health authority beforehand, which can sometimes take months. Due to poor language concordance and potential miscommunication, this non-medically trained staff may constitute intermediaries that reinforce linguistic and cultural barriers to healthcare for refugees (Bischoff et al. 2003). Additionally, from the host society's perspective, restricting access appears to be counterproductive as it substantially increases costs through delayed treatment (Bozorgmehr and Razum 2015) and the administrative burden through case-by-case accounting (Wenner et al. 2020).<sup>3</sup>

The recent changes in policies concerning refugees in October 2015 (in particular, *Asylverfahrensbeschleunigungsgesetz*) included, inter alia, important amendments concerning refugees' access to the health system (Grote 2018). In particular, it facilitates the possibility for Germany's 16 federal states to sign a framework agreement with health insurance funds to care for and ensure health provisions for refugees in their first 15 months of stay. If federal states opt for a general agreement with health insurance funds and if administrative authorities at the lower regional level (district or municipality) decide to join, refugees with pending or rejected asylum applications who reside in affected territories, even in the first 15 months of stay, gain far more comprehensive access to the healthcare system than they would otherwise have gained. In such states, refugees obtain an *eHC* that treats them almost equivalently to "standard" official health insurance contributors in terms of services that they can receive.<sup>4</sup> Once in possession of an *eHC*, refugees are allowed to directly approach (independent) physicians and hospitals without pre-contacting the local authority for foreigners or the responsible social assistance office.

In some (urban) federal states, namely Bremen and Hamburg, corresponding arrangements were already agreed upon in 2005 and 2012, respectively, on a voluntary basis with insurance funds (based on individual-case reimbursement of costs). After the reform in October 2015, large-scale implementation in additional German federal states became possible. During the period of investigation – between 2013 and 2019 – seven out of sixteen German federal states also introduced *eHCs* for refugees with pending or rejected asylum applications in their territories, either ubiquitously or only in selected districts or municipalities (for details, see Figure A1 and Table A1 in the Appendix). These regional and temporal heterogeneities create a quasi-experimental research setting.

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<sup>3</sup> The administrative burden arises as the medical service providers and doctors must issue bills for treatment costs for each treated case to the responsible local authority. This is different to the standard (non-refugee) case, for treatment of which the bill is issued within the framework of the existing system of statutory health insurance funds.

<sup>4</sup> Only services in the areas of continuing care, psychotherapy, and rehabilitation measures are excluded.

## 3 Theoretical background and literature review

### 3.1 Refugees' pre- and post-migration health risks

In view of the existing health disparities linked to migrants' legal status (see, e.g., Hamilton, Hale, and Savinar 2019 for the US; see also Lindert et al. 2009 for meta analyses comparing labor migrants and refugees in various destination countries), refugees seem to be particularly vulnerable to severe health conditions for the following reasons. First, compared to economic migrants, refugees are less oriented toward the labor market in their migration decision and are, therefore, less likely to be positively selected based on health (Chiswick, Lee, and Miller 2008). Second, refugees (often) suffer from various traumatic experiences in the home country and on their way to the destination country. Between 70 and 85 percent of recent refugees in Germany, for example, arrived from countries affected by wars or war-like situations or human rights violations, according to the Uppsala Conflict Database and the Political Terror Scale (Brücker, Jaschke, and Kosyakova 2019). Approximately one-quarter of these population reported shipwrecks, two-fifths reported physical assaults and 15 percent of female refugees reported sexual assaults during their migration experience (Brücker, Jaschke, and Kosyakova 2019). Third, in destination countries, refugees often suffer from post-migration stress, which turns out to be an important determinant of refugees' health outcomes (Porter and Haslam 2005; Li, Liddell, and Nickerson 2016). Fourth, refugees' health literacy is typically low compared to other population groups (Wångdahl et al. 2014). As previous research for Western societies indicates, lower health literacy may deter refugees from treatments they consider suspicious or morally or religiously unacceptable, thereby reinforcing health disparities (von Wagner et al. 2009; Wångdahl et al. 2014).

All of these challenges have important consequences for refugees' health status: empirical evidence from major western refugee-hosting countries reveals severe mental health impairments among refugees and particularly compared to other population groups in similar age (Fazel, Wheeler, and Danesh 2005; Robjant, Hassan, and Katona 2009). At the same time, the empirical evidence on refugees' physical health is scarce. While some studies report prevalence of physical health problems among refugees in various destination countries (Gerritsen et al. 2006; Weinstein, Sarnoff, and Gladstone 2000), comparison with other population groups suggest refugees' have on average better physical health status (Brücker et al. 2019; Metzinger, Schacht, and Scherz 2020) and lower mortality rates (Norredam et al. 2012).

### 3.2 Refugees' access to the healthcare system

Refugees are disadvantaged regarding no (legal) access to healthcare services in many host countries (Chase et al. 2017; Norredam, Mygind, and Krasnik 2006; Silove et al. 1999). For instance, although refugee access to medical screening upon arrival has been safeguarded in almost all of EU-25 countries, in almost half, pregnant women, children, and adult refugees face legal restrictions in access to healthcare (Norredam, Mygind, and Krasnik 2006). In most of these cases, only emergency care is available (ibid.). In other cases, bureaucratic obstacles, such as identity card requirements, can create insurmountable barriers for refugees (Norredam, Mygind, and Krasnik 2006;

Alawa, Zarei, and Khoshnood 2019). Such restricted access to healthcare systems seems to deteriorate refugees' health status (Chase et al. 2017; Coffey et al. 2010; Robjant, Hassan, and Katona 2009).

Beyond access to the primary basic health treatment per se, some recent studies have emphasized the importance of timely and extended healthcare access for patients (e.g., Sampalis et al. 2001; Kullgren 2003; Arango et al. 2018; Johannessen et al. 2001). For instance, the negative effect of long waiting times during medical (surgical) operations on patients' health status and life satisfaction following the intervention has been empirically documented (Sampalis et al. 2001). Likewise, a delayed treatment may not only increase treatment costs due to the aggravation of illness but also pose a risk to public health in the case of communicable diseases such as tuberculosis and HIV (Kullgren 2003). In terms of mental health risks, available clinical treatment approaches often seem to be ineffective for already-manifested illnesses such that great importance is attached to early detection and prevention (for a review, see Arango et al. 2018). The significance of the accessible and comprehensive health services has been further shown for refugees: their reduced waiting times for health treatment resulted in more effective care (McMurray et al. 2014). This suggests that unbureaucratic and direct access to treatment shortens the time to diagnosis and thus improves the success of the therapy (Johannessen et al. 2001).

### 3.3 Hypotheses on the role of (timely) healthcare access for refugees' health outcomes

Given the institutional context in Germany, all refugees are technically eligible for the primary basic treatment of acute illnesses and time-sensitive interventions. Moreover, all refugees will eventually have full access to the healthcare system after a 15-month residency requirement (see the *Policy context* section). In this regard, it is not access to the healthcare system per se but rather facilitated and immediate access to extended healthcare that might be crucial for the health outcomes of newly arrived refugees. Subsequently, we develop a theoretical model illustrating the connections between early facilitated healthcare access and refugees' health outcomes.

In particular, refugees who did not initially possess the *eHC* likely faced pronounced practical obstacles when consulting a doctor. The available evidence from a qualitative survey of 16 refugees in Germany in 2015 reveals that access to the healthcare system via the social and immigration authorities (i.e., without *eHC*) was "hurdle-packed, bureaucratically inefficient and incapacitating" (Spura et al. 2017, 468). This non-direct healthcare system access, in turn, delayed the therapy start and may have worsened refugees' health status and prevented them from experiencing self-efficacy regarding their own disease management. Likewise, general practitioners, social workers, employees of statutory health insurance organizations, and the gatekeepers responsible for admission report the *eHC*'s facilitating effect, such as reduction of their personal workload and higher treatment access for refugees (Rolke, Wenner, and Razum 2019). In fact, acquisition of an *eHC* resulted in greater utilization of medical services by refugees in Germany (Claassen and Jäger 2018; Bauhoff and Göppfarth 2018). Altogether, then, we hypothesize that refugees assigned to German regions that provide refugees with immediate access to the healthcare system via the *eHC* show better health outcomes than refugees assigned to German regions with restricted access to the healthcare system (*H1*).

Refugees' traumatic events before, during and after the forced migration are strongly linked to their mental stress and disturbance, which are likely to stay undiagnosed without the *eHC*, because of refugees' underutilization of healthcare services (Nickerson et al. 2010; Claassen and Jäger 2018). In turn, diagnosing of physical diseases among newly arrived refugees might even be effective without the *eHC*, because of mandatory screening programs upon arrival aimed at identification of potential infectious disease or basic health needs of refugees (Ossege and Köhler 2016; Bozorgmehr et al. 2016). Therefore, early and extended healthcare access via the *eHC* might be particularly relevant to refugees' psychological health outcomes and to a lesser extent to their physical well-being. In this regard, the positive effect of being assigned to German regions that provide refugees with immediate access to the healthcare system via the *eHC* should be particularly visible for mental health outcomes (*H2*).

Some recent studies have argued that the stress that refugees experience in the destination countries (a.k.a. post-migration stress) may heighten existing mental problems (Porter and Haslam 2005; Li, Liddell, and Nickerson 2016) and be an even more important predictor of refugees' mental health status than traumatic experiences before and during the flight (Beiser and Hou 2016). Hence, immediate and direct access to the healthcare system via the *eHC* may lower the likelihood of experiencing stress while trying to navigate the healthcare system in the following ways. First, the *eHC* may mitigate the consequence of perceived legal insecurity that refugees face while waiting for their asylum decisions. These feelings of legal insecurity appear to worsen psychosocial health and to increase the risk of anxiety and depression (Robjant, Hassan, and Katona 2009) and may exacerbate the trauma that refugees have suffered in their countries of origin or during flight (Coffey et al. 2010). Second, mental illness is often associated with social stigma (Thorncroft et al. 2016; Weiss, Ramakrishna, and Somma 2006). Accordingly, intermediaries between the patient and the doctor, such as social and immigration authorities, could further exacerbate the stress when refugees delay contact for fear of discrimination and stigmatization. Third, a lack of access to stable and secure housing refugees face (Adam et al. 2019) is an important post-migration stress factor, since life in temporary collective accommodations goes hand-in-hand with a lack of privacy, autonomy and isolation from the local community (Porter and Haslam 2005). Fourth, post-migration stress might be a direct consequence of more complicated and indirect healthcare access without the *eHC* (Chase et al. 2017). Altogether, on the one hand, earlier and facilitated access to extended healthcare may alleviate the consequences of post-migration stress for refugees to some extent. On the other hand, refugees with safeguarded healthcare access may feel more secure and be more resistant to post-migration stress. Either way, the positive effect of being assigned to German regions that provide refugees with immediate access to the healthcare system via the *eHC* on health outcomes is likely to be (partly) mediated via post-migration stress (*H3*).

The lack of easily accessible extended healthcare might be particularly disadvantageous for refugees with communication problems (i.e., poor host country language proficiency) or poor health literacy (i.e., a lack of knowledge about health and the healthcare system) (Wångdahl et al. 2014), since they might be less capable of expressing their health-related problems in the German language (Spura et al. 2017). Both communication problems and poor health literacy, in turn, might reduce refugees' trustworthiness and credibility and, therefore, their approval chances for the treatment claim. Correspondingly, the negative effect of being assigned to German regions with

restricted access to the healthcare system on refugees' health outcomes should be stronger for (health)-illiterate refugees (H4).

## 4 Data and Method

### 4.1 IAB-BAMF-SOEP Survey of Refugees in Germany

For our analysis, we rely on the IAB-BAMF-SOEP Survey of Refugees in Germany (2020),<sup>5</sup> a longitudinal survey of refugees and their household members conducted annually (Brücker et al. 2016). The target population was drawn from the Central Register of Foreigners (*Ausländerzentralregister*, AZR), the national registry of all foreign citizens in Germany. The survey covers all individuals seeking asylum or any other form of protection, irrespective of their current legal status, who arrived in Germany for humanitarian reasons between 2013 and 2016, and were registered in the AZR by January, 2017. By using appropriate sample weights, the data allow us to make representative inferences for these refugee population in Germany and their household members (Kroh et al. 2017). The survey was carried out in 169 representatively selected sampling points all over Germany, allowing us to draw representative conclusions at regional levels.

The survey's first wave was conducted between June and December 2016 and covered 4,465 adult refugees. The gross participation rate was approximately 50 percent of the addresses originally drawn, which is substantially higher than in comparable surveys of the German population (Kroh et al. 2017). Interviews were conducted face-to-face with computer assistance (CAPI) and were supported by translators, if needed. Questionnaires were available in seven languages (Arabic, English, Farsi/Dari, German, Kurmanji, Pashtu, and Urdu) and with auditory instruments for surveying people who were illiterate. The second wave covered 67 percent of participants in the first wave and included an additional sample that resulted in data for 2,559 panel respondents and 2,897 first-time respondents (Brücker et al. 2019). The response rate for panel respondents in the third wave was 68 percent, while the panel stability amounted to 80 percent (Britzke and Schupp 2020). As a result, the data from the IAB-BAMF-SOEP Survey of Refugees in Germany (2020) include 7,950 adult persons (18 years and older) who contributed 14,436 person-year observations over three survey waves. Overall, 41 percent of respondents participated only once, 38 percent could be observed over two survey waves, and 22 percent participated over three waves.

### 4.2 Analytical sample

We excluded refugees who arrived before 2013, refugees who had missing information on the arrival year, and individuals who were identified as nonrefugees (526 person-year observations). The dates of arrival, the decision on asylum applications, the decision outcomes, and the place of first residence are critical for the definition of our treatment and control groups (see the *Independent variables* section). For this reason, we excluded refugees with more than one asylum application (632 person-year observations) and with missing or implausible information on the dates, asylum

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<sup>5</sup> This article uses the factually anonymous data of the IAB-BAMF-SOEP Survey of Refugees, waves 1-3. Data access was provided via a Scientific Use File supplied by the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB). DOI: 10.5684/soep.iab-bamf-soep-mig.2018.

decision (1,851 person-year observations), and first place of residence (813 person-year observations). After these exclusions, we end up with 5,922 respondents who contributed 10,614 person-year observations (74 percent of the original sample). Since the availability of our dependent outcomes vary by survey waves and by respondent groups, the size of the corresponding analytical samples differs. This issue will be addressed in the subsequent section.

### 4.3 Dependent variables and method

To address refugees' health status, we rely on a series of multidimensional indicators such as (1) symptoms of depressive illness and anxiety (PHQ-4, henceforth, depression and anxiety), (2) a mental component summary scale (MCS, henceforth, mental well-being), (3) a physical component summary scale (PCS, henceforth, physical well-being), (4) health satisfaction, and (5) self-rated health status.<sup>6</sup> The underlying survey questions regarding the utilized health indicators are illustrated in Table A4 in the Appendix. Table 1 presents descriptive statistics for the dependent variables in the pooled sample.

**Table 1: Descriptive statistics of dependent variables**

	Survey years	N	mean	SD	min	max
Depression and anxiety (PHQ-4, reversed)	2016	3186	8.88	2.76	0	12
Mental wellbeing (MCS)	2016, 2017, 2018	8041	48.14	11.69	5	78
Physical wellbeing (PCS)	2016, 2017, 2018	8041	53.26	10.10	12	78
Health satisfaction	2016, 2017, 2018	10600	7.86	2.49	0	10
Self-rated health	2016, 2017, 2018	10604	3.98	1.08	1	5

Notes: All scales were reversed in a way that a higher value means a better health outcome. SD = standard deviation.

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

The PHQ-4 is an established four-item measure of depression and anxiety (Löwe et al. 2010). The original scale ranges from zero to twelve, where a higher value corresponds to more reported symptoms. The threshold of six or greater indicates a “yellow flag,” and the threshold of nine indicates a “red flag” for the presence of a depressive or anxiety disorder (Löwe et al. 2010). The PHQ-4 was only available for first-time respondents in 2016. For the empirical analyses, we reversed the scale so that a higher value corresponds to a lower level of depression and anxiety (i.e., better health).

The sum scales for PCS and MSC are provided by the Socio-Economic Panel (SOEP) (Andersen et al. 2007) and are calculated based on the so-called short form version 2 questionnaire (SF-12v2; Ware et al. 2002). SF-12v2 is a widely-used measurement instrument based on a series of questions related to self-reported assessments of symptoms such as physical and mental aspects of the

<sup>6</sup> The IAB-BAMF-SOEP Survey of Refugees in Germany includes questions that allow an examination of the Refugee Health Screener (RHS-13) instrument, which measures the degree of emotional distress (see Brücker et al. 2019). However, the underlying questions were surveyed only among panel respondents in 2017 who were all staying in Germany for more than 15 months; therefore, all were granted access to the eHC in some way. This sampling does not allow an exploration of the eHC's effect via the policy change on health status compared to refugees who were “not eligible” at all (see the *Independent variables* section).

health-related quality of life, particularly physical functioning, the role of physical and bodily pain in general health, vitality, and social functioning, and the role of emotional and mental health. In the empirical literature, both scales – although they cannot replace empirical studies – have become established instruments with which to proxy respondents' health status in the social sciences (Andersen et al. 2007). The SF-12v2 was collected for first-time respondents in 2016 and 2017 and for all respondents in 2018. Both the PCS and MCS sum scales vary from theoretical 0 to 100, where a higher value corresponds to a higher level of well-being

The next two health indicators refer to the subjective assessment of one's own health status. First, we consider satisfaction with current health, which is a self-stated measure on an 11-point scale that ranges from 0 ("totally unhappy") to 10 ("totally happy"). Second, we refer to the self-rated current state of health that is scaled between 1 ("poor") and 5 ("very well"). These measures reflect slightly different aspects of one's subjectively perceived health situation and may provide a more comprehensive view on overall health status, since they combine both mental and physical health status. Subjective health evaluations have become conventional ways to address the health status of the population of interest (Idler and Benyamini 2006; Huijts and Kraaykamp 2012).

In the multivariate analyses, we apply log specifications to the MCS, PCS, and PHQ-4 scales to consider the potential nonlinear relationships between the explanatory and dependent variables. Since the variables for the PHQ-4 are only available for one point in time, we apply a cross-sectional ordinary least squares (OLS) estimation with robust standard errors. The rest of the health indicators were surveyed more than once over waves; accordingly, we apply a panel random effects estimation with robust standard errors.<sup>7</sup>

## 4.4 Independent variables

**Treatment and control groups.** We define the treatment group in terms of having access to the health system as a consequence of the policy intervention as outlined in the *Policy context* section (i.e., *being qualified for an eHC via the policy change*). Importantly, our analysis resembles an intention-to-treat framework because we do not have factual information about whether an individual actually possesses the eHC. Instead, belonging to the treatment or control group depends on the following four factors: the assigned residence (based on the survey question about respondents' first or longest place of residence in Germany); the date of policy introduction (if the policy was implemented at all in the region); the length of stay in Germany; and the type and date of the decision on the asylum application.

Essentially, in the first 15 months of their stay in Germany, refugees receive benefits according to the Asylum Seekers Benefits Act (*Asylbewerberleistungsgesetz*). This Act restricts the utilization of health services to the basic provisions, as previously outlined. Upon approval of their asylum application or after 15 months, refugees with a pending or rejected asylum application receive the eHC and, therefore, gain comprehensive healthcare access. Correspondingly, respondents in our sample may qualify for the eHC not only via the policy change but also via their asylum application approval or the duration of their stay. To address potential heterogeneity within the control group, we consider the following categorization for our explanatory variable:

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<sup>7</sup> Note that the treatment variable is constant over the survey years for most respondents so that a panel fixed effect estimation could be highly biased.

1. Eligibility for the eHC via policy change (treatment);
2. Eligibility for the eHC via status approval (control);
3. Eligibility for the eHC via duration of stay (control); and
4. Not eligible for the eHC (control).

In total, only five federal states – Berlin, Bremen, Hamburg, Schleswig-Holstein, and Thuringia – have introduced the eHC for refugees throughout their territories. In Brandenburg, Lower-Saxony, North Rhine-Westphalia, and Rhineland-Palatinate only selected districts or municipalities have introduced the eHC. Figure A1 and Table A1 in the Appendix include a detailed overview of the localities with the eHC and information on the date when the policy was implemented for each region.

We define individuals as belonging to the treatment group – those *eligible for the eHC via policy change* – if the following conditions apply: (1) refugees reported their assigned place of residence in a region subject to the above-described policy intervention; (2) by the date of the policy intervention, their asylum application was not yet decided (independent of the eventual decision type by the interview date); and (3) they arrived less than 15 months before the date of the policy intervention. Consider, for example, a refugee who arrived in July 2015, who was assigned to Berlin, and who had an asylum approval date of August 2016. The reform of the eHC implementation in Berlin took place in January 2016. Given that the policy intervention in Berlin occurred before the application approval and not later than 14 months after arrival, we define the refugee in the example as treated (i.e., eligible for the eHC via policy change).

We define refugees as *eligible for the eHC via status approval* if their asylum application was approved by the interview date and if this approval occurred within the first 15 months of their stay in Germany. For respondents assigned to regions subject to the eHC reforms, approval should occur before the date of the reform. Accordingly, the refugee in the example illustrated above would be defined as *eligible for the eHC via status approval* if the asylum approval date was December 2015 or earlier.

Refugees are defined as *eligible for the eHC via duration of stay* when their duration of stay exceeds 14 months and (a) the decision on asylum applications has not yet been received (or refugees are rejected and their stay in Germany is tolerated) as of that date or (b) their asylum application was approved and the date of approval fell after the date when the duration of stay exceeded 14 months. For respondents assigned to regions subject to the eHC reform, the 15 months or longer duration of stay should occur before the date of the reform. The refugee in our example would be defined as *eligible for the eHC via duration of stay* if the arrival date was October 2014 or earlier. In all other cases (i.e., assigned to a district without the reform and no decision or a negative decision on the asylum application and the duration of stay does not exceed 15 months by the interview date), refugees are defined as *not eligible for the eHC*.

In our data, roughly twelve percent of the person-year observations were eligible for the eHC via policy change (see also Table A2 in the Appendix). The control group is considerably heterogeneous. In total, 82 percent were eligible for the eHC either via status approval or duration of stay, while six percent faced restrictions in healthcare access. This distribution varies considerably over the survey waves and respondent type (first and panel respondents). Refugees with eHC access via the policy change waited, on average, 2.6 months before being eligible. This wait was more than

twice as long for refugees with *eHC* access via status approval (6.5 months), while the censored waiting times of non-eligible refugees amounted to 11 months.

**Post-migration stress.** To address the role of post-migration stress, we include several factors that have been identified in the literature as particularly important for refugees' health status (see Li, Liddell, and Nickerson 2016 for a review). These factors include *living in reception centers or communal accommodation* as opposed to private housing, having *members of the nuclear family overseas*, experiences of *discrimination* based on origin, the feeling of being *welcome in Germany*, and *worries about the prospects of staying in Germany*.

**Literacy.** Unfortunately, our data do not allow a straightforward measurement of health literacy among refugees. Instead, we proxy health literacy via a dummy indicator for being *CO (country of origin) illiterate*, which is defined as being unable to read or write in the mother tongue or official language of the origin country. Corresponding language skills were surveyed based on a self-reported scale from 1 ("Not at all") to 5 ("Very good"). As previous research indicates, illiteracy correlates negatively with health literacy (Wångdahl et al. 2014; von Wagner et al. 2009).

**Confounders.** Generally, a natural experimental research design ensures that the lack of information on confounders is randomly distributed across regions because refugees' regional allocation is exogenously driven (i.e., the assignment to the treatment and control groups is exogenous); therefore, omitting any observables and unobservables should not bias our results so long as they are not related to health outcomes. However, a natural experiment such as ours allows for more noise than a controlled laboratory experiment. For this reason, we control for commonly observed predictors of individual health in our multivariate analyses (see Nickerson et al. 2010; Mascini and Van Bochove 2009). These predictors include (1) socio-demographics such as *origin country (group)* fixed effects (aggregated into Syria, Afghanistan, Iraq, Eritrea, Iran, the remaining Middle Eastern and North African (MENA) countries, Russia, the remaining states of the former Soviet Union, the West Balkans, the remaining countries in Africa, and the rest of the world), *gender*, *age* and *age squared*, having a *partner*, and having *children* in the household and (2) pre-migration human capital characteristics such as *years of education* and *years of work experience*. The controls specific to migrants and refugees in particular include *months of stay* (until the interview) and having a *traumatic experience* (during escape).

There is some empirical evidence that larger municipalities are more likely to implement the *eHC* for refugees to reduce the administration of related costs and workload (Rolke, Wenner, and Razum 2019).<sup>8</sup> Therefore, to account for the local context of reception in the assigned region, we include municipality-level *population density*, district-level *hospital bed density*, the *unemployment rate*, *median income per capita*, *share of foreigners*, and *share of the politically far-right votes in the 2017 federal election*. We further control for region fixed effects measured via the *federal state of the first residence* to absorb further potentially important, time-constant links between the local context of reception and individual health. Finally, to absorb any systematic differences related to survey design, we control for the survey wave and survey sample. Descriptive statistics for the control variables are presented in Table 2; details on the variables' construction are presented in Table A5 in the Appendix.

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<sup>8</sup> For analyses on the regional correlates of the *eHC* at the district level, see Tables A6 and A7 in the Appendix.

**Table 2: Descriptive statistics on control variables**

Variables	2016		2017		2018		Pooled		
	Mean	(SD)	Mean	(SD)	Mean	(SD)	N	Min	Max
Months of stay in Germany	18.81	(9.09)	27.41	(10.09)	40.43	(9.29)	10614	0	72
Current age	33.37	(10.24)	33.38	(10.76)	34.94	(10.69)	10612	18	88
Female	0.36	(0.48)	0.38	(0.49)	0.37	(0.48)	10614	0	1
In Partnership	0.70	(0.46)	0.70	(0.46)	0.75	(0.43)	10594	0	1
Child in the household	0.65	(0.48)	0.42	(0.49)	0.46	(0.50)	10614	0	1
CO: Syria	0.50	(0.50)	0.53	(0.50)	0.59	(0.49)	10614	0	1
CO: Afghanistan	0.13	(0.34)	0.13	(0.34)	0.12	(0.33)	10614	0	1
CO: Iraq	0.12	(0.33)	0.13	(0.34)	0.12	(0.33)	10614	0	1
CO: Eritrea	0.06	(0.23)	0.05	(0.22)	0.06	(0.23)	10614	0	1
CO: Iran	0.01	(0.11)	0.02	(0.14)	0.01	(0.11)	10614	0	1
CO: remaining MENA	0.02	(0.14)	0.02	(0.13)	0.02	(0.13)	10614	0	1
CO: Russia	0.03	(0.16)	0.02	(0.12)	0.01	(0.09)	10614	0	1
CO: remaining former USSR	0.02	(0.12)	0.01	(0.11)	0.01	(0.09)	10614	0	1
CO: West Balkans	0.04	(0.19)	0.01	(0.12)	0.01	(0.10)	10614	0	1
CO: remaining Africa	0.04	(0.19)	0.04	(0.21)	0.03	(0.18)	10614	0	1
CO: Rest of the world	0.02	(0.15)	0.02	(0.15)	0.01	(0.12)	10614	0	1
CO: Stateless	0.01	(0.12)	0.01	(0.09)	0.01	(0.11)	10614	0	1
Traumatic experience during escape	0.52	(0.50)	0.50	(0.50)	0.52	(0.50)	6871	0	1
CO Illiterate	0.06	(0.23)	0.06	(0.24)	0.06	(0.23)	10596	0	1
Years of education at arrival	9.67	(5.41)	9.57	(5.23)	9.64	(5.23)	10014	0	37
Years of work experience at arrival	8.46	(9.53)	7.98	(9.64)	8.58	(9.66)	10349	0	51
Population density in arrival municipality (per km <sup>2</sup> )	1154.28	(1192.19)	1132.52	(1120.43)	1109.08	(1119.86)	10609	13	4736
Hospital beds density in arrival district (per 1,000)	7.13	(3.76)	7.00	(3.48)	7.12	(3.60)	10614	0	22
Share of foreigners in arrival district	10.01	(4.93)	10.81	(5.36)	10.70	(5.30)	10614	1	28
Unemployment rate in arrival district	6.73	(2.86)	6.51	(2.71)	6.59	(2.74)	10614	1	15
Median income in arrival district	3075.27	(591.17)	3108.13	(520.45)	3112.44	(550.84)	9902	1962	5874
Share of the politically far-right votes in arrival district	12.56	(5.01)	11.81	(4.69)	11.81	(4.67)	10614	5	36
Communal accommodation	0.33	(0.47)	0.29	(0.45)	0.17	(0.37)	10570	0	1
Very concerned about prospects of staying	0.34	(0.48)	0.42	(0.49)	0.36	(0.48)	10441	0	1
Discrimination experience in Germany	0.37	(0.48)	0.33	(0.47)	0.39	(0.49)	10340	0	1
Felt welcome at time of arrival	0.89	(0.31)	0.90	(0.31)	0.90	(0.30)	10469	0	1
Spouse or children abroad	0.15	(0.36)	0.17	(0.37)	0.19	(0.39)	10607	0	1
Survey sample M3	0.52	(0.50)	0.27	(0.45)	0.31	(0.46)	10614	0	1
Survey sample M4	0.48	(0.50)	0.31	(0.46)	0.33	(0.47)	10614	0	1
Survey sample M5	0.00	(0.00)	0.42	(0.49)	0.36	(0.48)	10614	0	1
Observations	3497		4179		2938		10614		

Notes: CO = country of origin. SD = standard deviation. Variation in the number of observations is due to differences in missing data across variables.

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

To address missing information, we use multiple imputation with chained equations (van Buuren 2012). We construct 25 imputed data sets that use all available information from the full models and additional variables that may be correlated with the used model variables in some way. Respondents with missing information on health outcomes and on asylum decisions were included

in the multiple imputation but not in the analyses. Missing information was present to varying degrees with a maximum of 35 percent in the measure for traumatic experience (during escape) (see Table 2, column 7). Note that we refrain from imputing the missing dates of arrival or asylum decision because such missing information is likely to not be random and to correlate with education and literacy (see Table A3 in the Appendix).

## 5 Results

### 5.1 Effect of the policy change on refugees' health outcomes

Results from the multivariate regressions of the health outcomes on eligibility for the *eHC* and the entire set of explanatory variables are presented in Table 3. We build our models gradually by starting with inclusion of the treatment measure (Models with a subscript 1), followed by inclusion of individual-, origin-country-, and regional-level controls (Models with a subscript 2) and measures of post-migration stress (Models with a subscript 3).

**Table 3: Multivariate regressions of health indicators**

Outcome: Model:	Ln(Depressions and anxiety)			Ln(Mental wellbeing)			Ln(Physical wellbeing)			Health satisfaction			Self-rated health		
	M A.1 Coef. (SE)	M A.2 Coef. (SE)	M A.3 Coef. (SE)	M B.1 Coef. (SE)	M B.2 Coef. (SE)	M B.3 Coef. (SE)	M C.1 Coef. (SE)	M C.2 Coef. (SE)	M C.3 Coef. (SE)	M D.1 Coef. (SE)	M D.2 Coef. (SE)	M D.3 Coef. (SE)	M E.1 Coef. (SE)	M E.2 Coef. (SE)	M E.3 Coef. (SE)
Eligibility for eHC (Ref. via policy change)															
Via status approval	0.038* (0.020)	0.042 (0.036)	0.016 (0.036)	0.023** (0.010)	-0.003 (0.015)	-0.013 (0.014)	0.009 (0.009)	0.006 (0.012)	0.006 (0.012)	0.183** (0.092)	0.133 (0.128)	0.098 (0.126)	0.025 (0.040)	0.018 (0.056)	0.005 (0.056)
Via duration of stay	-0.035 (0.023)	0.004 (0.041)	-0.001 (0.039)	-0.015 (0.011)	-0.029* (0.016)	-0.023 (0.016)	0.005 (0.009)	0.002 (0.013)	0.003 (0.013)	-0.103 (0.100)	-0.123 (0.138)	-0.104 (0.136)	-0.084* (0.044)	-0.075 (0.060)	-0.064 (0.059)
Non-eligible	-0.095*** (0.029)	-0.038 (0.042)	-0.036 (0.040)	-0.038** (0.017)	-0.051** (0.021)	-0.041** (0.020)	0.009 (0.012)	0.000 (0.015)	0.001 (0.015)	-0.260* (0.141)	-0.290* (0.166)	-0.250 (0.165)	-0.124** (0.059)	-0.127* (0.070)	-0.107 (0.070)
CO illiterate		-0.041 (0.041)	-0.031 (0.039)		-0.018 (0.018)	-0.017 (0.017)		0.001 (0.013)	0.001 (0.013)		-0.256* (0.140)	-0.253* (0.139)		-0.051 (0.057)	-0.052 (0.057)
Communal accommodation			-0.072*** (0.018)			-0.050*** (0.009)			0.006 (0.006)			-0.266*** (0.063)			-0.066** (0.026)
Discrimination experience in Germany			-0.118*** (0.016)			-0.068*** (0.007)			-0.017*** (0.005)			-0.324*** (0.050)			-0.157*** (0.021)
Very concerned about prospects of staying			-0.102*** (0.017)			-0.061*** (0.007)			-0.008* (0.005)			-0.102** (0.051)			-0.088*** (0.021)
Felt welcome at time of arrival			0.097*** (0.027)			0.072*** (0.012)			0.013* (0.008)			0.451*** (0.087)			0.178*** (0.037)
Spouse or children abroad			-0.155*** (0.027)			-0.055*** (0.010)			-0.009 (0.008)			-0.269*** (0.080)			-0.110*** (0.034)
Constant	2.233*** (0.018)	2.155*** (0.635)	2.300*** (0.635)	3.846*** (0.010)	3.819*** (0.249)	3.827*** (0.247)	3.966*** (0.008)	4.203*** (0.192)	4.216*** (0.192)	7.797*** (0.089)	7.816*** (1.919)	7.819*** (1.916)	3.969*** (0.039)	4.239*** (0.849)	4.299*** (0.848)
Controls <sup>1)</sup>	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Country (group) of origin FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Federal State of 1st residence FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Person-Year observations	-	-	-	8041	8041	8041	8041	8041	8041	10600	10600	10600	10604	10604	10604
Person observations	3186	3186	3186	5669	5669	5669	5669	5669	5669	5914	5914	5914	5917	5917	5917
R <sup>2</sup> adjusted	0.013	0.063	0.120	-	-	-	-	-	-	-	-	-	-	-	-
R <sup>2</sup> within	-	-	-	0.006	0.008	0.016	0.010	0.006	0.008	0.001	0.000	0.002	0.001	0.001	0.004
R <sup>2</sup> between	-	-	-	0.010	0.069	0.119	0.001	0.246	0.249	0.005	0.188	0.204	0.006	0.216	0.231
R <sup>2</sup> overall	-	-	-	0.008	0.057	0.099	0.002	0.214	0.217	0.003	0.146	0.159	0.003	0.171	0.185

Notes: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01. CO = country of origin. FE = fixed effects. Estimations are based on M = 25 imputed datasets. Models A1.1-A.3 estimated as OLS with robust standard errors. Models M B.1-E.3 as Panel Random-Effects models with robust standard errors. For all indicators a higher value corresponds to better health. 1) Further controls are omitted, see Table A8 in the Appendix.

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

Starting with depression and anxiety, our results imply a positive effect of eligibility for the *eHC* via policy change on refugees' health outcomes (Model A.1). In particular, refugees who were not eligible for the *eHC* had ten-percent lower scores than refugees eligible via policy change. However, these differences fade after including further model covariates (Model A.2). For mental well-being, we similarly find a positive effect of the *eHC* via policy change (Models B.1), and this conclusion strengthens even after including further model covariates (Model B.2). Accordingly, we observe a five-percent lower score of mental well-being for refugees who were not eligible for the *eHC* compared to refugees eligible via the policy change, net of the model confounders. In turn, we do not find that eligibility for the *eHC* via policy change had any statistically significant effect on physical health compared to refugees who were not eligible for the *eHC* (Model C.1 and C.2). The differences between refugees eligible for the *eHC* via policy change and those eligible via status approval or duration of stay, were also not statistically significant. Turning to the subjective health status measures, we again observe a positive effect of eligibility for the *eHC* via policy change compared to refugees who were not eligible at all. Specifically, non-eligible refugees were likely to report a 0.26-point lower health satisfaction (Model D.1) and a 0.12-point lower self-rated health (Model E.1). The corresponding effects remain statistically significant in the full models (Models D.2 and E.2).

In elaborating on these results in light of our hypotheses, we expected a positive effect of being assigned to regions with immediate access to the healthcare system via the *eHC* on health outcomes compared to being assigned to regions with restricted access to the healthcare system (*H1*). Since we find that eligibility for the *eHC* via policy change improved only mental well-being, health satisfaction, and self-rated health status and only compared to refugees who were not eligible, our results only partly conform to our expectations.<sup>9</sup> For depression and anxiety symptoms, although we observe a significant negative effect of being non-eligible, the effect reduces in size and becomes non-statistically significant in the full model. However, the statistical uncertainty might be an artifact of a smaller sample size: depression and anxiety symptoms were only surveyed in the first wave. Next, we expected that the *eHC* policy change would be particularly visible for mental health outcomes (*H2*). Given that we find a positive effect of the *eHC* eligibility via policy change only for mental well-being and subjective health status, *H2* is empirically supported. Accordingly, the provision of early, easily surmountable, and nonbureaucratic access to healthcare services as implemented by the *eHC* apparently has considerable positive effects on refugees' mental health outcomes.

## 5.2 The role of post-migration stress and health illiteracy

To test whether post-migration stress factors mitigated the positive effect of earlier *healthcare access* on refugees' health outcomes (*H3*), we turn next to the models that include the covariates that approximate post-migratory living conditions. Indeed, the positive effect of being eligible for the *eHC* via policy change on refugees' mental well-being is reduced in size – although it remains statistically significant – after controlling for post-migration stress factors (Model B.3). In turn, this

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<sup>9</sup> Note that for three of five indicators, we observe refugees who had access to the *eHC* via status approval being better off than refugees who had access to the *eHC* via policy change (Models A.1, B.1, and D.1). These differences disappear after controlling for individual-, origin-country-, and regional-level model covariates, which implies that the positive effect of access to the *eHC* via status approval is spurious and might be driven by group differences and approval chances.

relationship is explained for health satisfaction (Model D.3) and self-rated health (Model E.3). That is, refugees with a facilitated access to healthcare services seemed to be less subject to post-migration stress than their counterparts who were eligible via another way or who were not eligible at all. These results are mostly consistent with our expectations.

In focusing on the results of the post-migration stress variables, the observed patterns conform to prior literature findings (see Li, Liddell, and Nickerson 2016 for an overview). In particular, living in reception centers or communal accommodation reduced refugees' health outcomes significantly (except for physical well-being). Likewise, experiences of discrimination, worries about prospects of staying in Germany, and separation from family members may have negatively shaped refugees' health outcomes.

Finally, we expected health-illiterate refugees to particularly benefit from eligibility for the eHC via policy change regarding their health outcomes (H4). The underlying argument is that health literacy facilitates refugees' healthcare access by allowing more effective communication with government authorities and overcoming bureaucratic hurdles in the absence of the eHC. Table 4 presents the corresponding empirical exercise by showing the gap due to being CO-illiterate (expressed in terms of average marginal effects) for different treatment types. Among refugees not eligible for the eHC, CO illiterate refugees had a 22-percent worse score on depression symptoms and anxiety compared to CO-literate refugees. Among refugees subject to the eHC policy change, we observe the opposite patterns: CO-illiterate refugees had a 9-percent improved score. In turn, the differences for the other treatment categories were not statistically significant. These results are, thus, in line with H4. However, no such relationship could be confirmed for other health outcomes, which contrasts with H4.

**Table 4: Effect of illiteracy on health by eHC-access**

CO Illiterate x eHC access-way		Ln(Depression, Anxiety)	Ln(Mental Well-Being)	Ln(Physical Well-Being)	Health satisfaction	Self-rated health
Via policy change	<b>AME</b>	<b>8.727*</b>	<b>-4.344</b>	<b>-2.048</b>	<b>-34.08</b>	<b>-14.16</b>
	z	1.67	-0.97	-0.58	-0.88	-0.86
Via status approval	<b>AME</b>	<b>-2.916</b>	<b>-3.322</b>	<b>-0.900</b>	<b>-57.89***</b>	<b>-13.28*</b>
	z	-0.54	-1.35	-0.48	-2.87	-1.65
Via duration of stay	<b>AME</b>	<b>4.431</b>	<b>1.352</b>	<b>2.437</b>	<b>23.52</b>	<b>10.43</b>
	z	0.68	0.47	1.19	1.15	1.18
Non-eligible	<b>AME</b>	<b>-21.99**</b>	<b>-0.320</b>	<b>-0.390</b>	<b>-36.45</b>	<b>-11.29</b>
	z	-1.97	-0.06	-0.11	-0.76	-0.66

Notes: AME = Average marginal effect, multiplied with 100. For all indicators a higher value corresponds to better health. Models include the same variables as corresponding Models in Table 3 (Models A.3, B.3, C.3, D.3, and E.3).

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

## 6 Discussion

Our article contributes to understanding how structural and institutional constraints may shape individual outcomes by investigating the consequences of the restricted healthcare access refugees face in Germany but also in many other refugee-host countries (Chase et al. 2017; Norredam, Mygind, and Krasnik 2006). Such policy constellations are not unique to refugees but are also true

for undocumented migrants (Kullgren 2003). Given their often-dramatic, life-threatening flight patterns and resulting disproportionately high incidence of physical and psychological problems, refugees' restricted access to healthcare services may not only deteriorate their health status but also have adverse economic and societal consequences for the host society. To facilitate refugees' (earlier) access to the healthcare system, several federal states and municipalities in Germany have introduced electronic health cards (*eHC*), which allow an immediate, direct, nonbureaucratic, and comprehensive utilization of healthcare services. Whether and to what extent this policy change has had an effect on the physical and psychological health outcomes of recently arrived refugees in Germany is addressed in this article. In this regard, by focusing not on access to the healthcare system per se but on an easier and immediate access to extended healthcare, we add a nuanced aspect to the literature. For empirical identification, we exploit a unique policy reform in Germany that provides exogenous variation in (the timing of) local healthcare access for refugees. The national dispersal policies on refugees' spatial assignment to their first place of residence allow us to circumvent the potential problem of regional (self-)selection and to make causal inferences on the reform effects.

Our analyses show significant health improvements in terms of psychological wellbeing, health satisfaction and self-rated health status among refugees if early general access to the health system (i.e., in the first 15 months of the stay) is provided. For refugees' physical well-being, we find no impact of immediate access to treatment. These findings could be due to the fact that refugees' (often) traumatic experiences before, during and after forced migration particularly affect their mental stress and disturbance, which are likely to stay undiagnosed without the *eHC*, because of refugees' underutilization of healthcare services (Nickerson et al. 2010; Claassen and Jäger 2018). In turn, existing mandatory screening programs upon arrival might be effective instruments for early diagnosing of physical diseases (Ossege and Köhler 2016; Bozorgmehr et al. 2016). At the same time, with an average age of just over 30 years, refugees are fairly young and have relatively good physical health despite often serious experiences before and during their flight (Brücker, Jaschke, and Kosyakova 2019; Metzging, Schacht, and Scherz 2020). Accordingly, the provision of early, easily surmountable, and nonbureaucratic access to healthcare services as implemented by the *eHC* apparently has considerable positive effects on refugees' mental health outcomes.

Another two important inferences from our analysis relate to the role of (1) post-migration stress and (2) CO-illiteracy. Similar to prior empirical studies (Robjant, Hassan, and Katona 2009; Silove et al. 1999), we observe that substandard living conditions, unclear staying perspectives, an unfriendly social environment, and separation from family are crucial hurdles for refugees' psychological and physical health outcomes. Moreover, post-migration stress seems to mitigate the positive effect of earlier healthcare access, which means that refugees without such access are more vulnerable to an inferior post-migration environment. Regarding the CO-illiteracy, the reform's effect seems to be particularly beneficial for CO-illiterate refugees regarding depression symptoms and anxiety. Due to language and cultural barriers, refugees often face disadvantages in making their first appointments with specialists (Murray and Skull 2005). As our results reveal, the *eHC*'s introduction can alleviate potential language and cultural barriers faced by refugees. Note that our sample is restricted to refugees with non-missing information related to recall and memory (such as recalling dates and assigned regions) and is, therefore, likely to be positively selected on

human capital characteristics.<sup>10</sup> In this regard, our estimates represent only the tip of the iceberg: the patterns might become more visible for the entire refugee population.

Altogether, our results highlight that the introduction of the *eHC* improved mental wellbeing of the recent refugees in Germany through 1) immediate access to mental healthcare services, and 2) mitigating stress refugees are exposed to while trying to navigate the healthcare system. Hence, our conceptual approach and empirical results provide new insights into the mechanisms linking the early facilitated healthcare access and psychological health outcomes of the recently arrived refugees in developed economies. Accordingly, our article reinforces the conclusion of Riosmena et al. (2015) on the importance of focusing on both structural and cultural explanations to understand the reasons for health differences between foreign- and native-born populations (Riosmena et al. 2015). On top of that, our findings illustrate that considering multidimensional indicators of health outcomes is crucial since the consequences of the restricted access to the extended health services are only adverse for psychological health impairments and illnesses – which are at higher risk to remain undiagnosed (Bischoff et al. 2003; Robjant, Hassan, and Katona 2009). Lastly, our article not only contributes to a long-standing debate on the consequences of restricted healthcare access on the newcomers' health status, but also allows investigation of its causal impact by relying on the quasi-experimental design.

From the policy perspective, a comprehensive nationwide introduction of the *eHC* for refugees could benefit both refugees and the German economy and welfare state (Bozorgmehr and Razum 2015). Free access to health services and early detection of depression, emotional distress and psychiatric disorders, combined with effective treatments, may promote long-term integration of refugee into the German labor market and society. Clearly, there is great potential in a nationwide introduction of the *eHC* for refugees, and this potential is highly transferable to other countries because refugees' access to health services is restricted in most parts of the world (Chase et al. 2017; Norredam, Mygind, and Krasnik 2006).

Although this article focused on the early access to (extended) healthcare for refugees, delving deeper into the quality of healthcare that refugees can access could be a fruitful avenue for future research. If demand for healthcare services increases, not only the capacity of supply but also the quality of healthcare services must be ensured. There is some evidence on pronounced regional disparities in the quality of healthcare services in Germany; the available capacity of relevant specialists (e.g., psychotherapists) is often already insufficient for the population in Germany without the recently arrived refugee cohorts (Albani et al. 2010). Moreover, standard therapeutic offerings in western European health systems such as Germany are often unable to address humanitarian migrants' specific needs due to a lack of therapists specifically qualified to treat posttraumatic stress disorder (Leopoldina 2018) and a lack of targeted measures by non-specialists, such as the provision of stress management techniques by laypersons or social workers (Bajbouj et al. 2018).

In addition, future research should address refugees' disproportional exposure to the pandemic spread of health diseases such as COVID-19 (WHO 2020). In these times, limited or delayed access to healthcare services may become even more jeopardizing for refugees' health outcomes for the following reasons. First, many refugees still live in collective accommodations that restrict the possibility of social distancing. Second, refugees with mental illness may be particularly vulnerable to

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<sup>10</sup> Our additional analyses indeed support this claim (see Table A3 in the Appendix).

the effects of widespread panic and threats. Third, pressure on the healthcare system due to virus outbreaks may push back non-urgent treatments of psychiatric illnesses, particularly treatments that involve interactions with group attendance. Finally, reduced personal communication with authorities might result in delays of granting authorities' consent for visiting a doctor or a hospital, thereby increasing the health risks of refugees without *eHC* access.

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# Appendix

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Figure A1: Electronic health card (eHC) coverage in German regions.



Note: Maps based on municipal boundaries on December 31, 2017. Dark areas denote localities with eHC. Bright areas denote localities without eHC. White segments denote unincorporated areas.

Source: own illustration.

**Table A1: Regional and temporal variation in introduction of the electronic health card (eHC) for refugees in Germany**

Place (level)			Date		
Federal state	District	Municipality	Month	Year	
Baden-Wuerttemberg	-	-	-	-	
Bavaria	-	-	-	-	
Berlin	All	All	1	2016	
Brandenburg	Landkreis Teltow-Fläming	All	9	2016	
	Oberhavel	All	10	2016	
	Potsdam	All	7	2016	
	Dahme-Spreewald	All	1	2017	
	Havelland	All	1	2017	
	Potsdam-Mittelmark	All	1	2017	
	Cottbus	All	1	2017	
	Barnim	All	2	2017	
	Uckermark	All	2	2017	
	Frankfurt Oder	All	2	2017	
	Oder-Spree	All	4	2017	
	Prignitz	All	4	2017	
	Brandenburg an der Havel	All	4	2017	
	Spree-Neiße	All	1	2018	
	Elbe-Elster	All	10	2017	
	Oberspreewald-Lausitz	All	10	2017	
Ostprignitz-Ruppin	All	1	2019		
Bremen	All	All		2005	
Hamburg	All	All		2012	
Hesse	-	-	-	-	
Lower Saxony	Delmenhorst	All	1	2017	
		Cuxhaven	1	2019	
		Burgwedel	1	2018	
Mecklenburg-Hither Pomerania	-	-	-	-	
North Rhine-Westphalia	Bonn Bochum Mülheim an der Ruhr Köln Münster Düsseldorf Oberhausen Remscheid Mönchengladbach	All	1	2016	
		All	1	2016	
		All	1	2016	
		All	3	2016	
		All	3	2016	
		All	4	2016	
		All	4	2016	
		All	4	2016	
		All	4	2016	
		All	7	2016	
		Gevensberg	1	2016	
		Monheim am Rhein	1	2016	
		Wetter (Ruhr)	3	2016	
		Herdecke	4	2016	
			Dülmen	4	2016
			Hattingen	4	2016
			Alsdorf	3	2016
			Leichlingen (Rheinland)	1	2016
			Wermelskirchen	2	2016
			Bocholt	3	2016
			Moers	4	2016
			Sprockhövel	4	2016
			Gladbeck	1	2017
			Hennef	1	2017
			Troisdorf	1	2017
			Bornheim	1	2017
	Neukirchen-Vluyn	1	2019		
	Recklinghausen	1	2019		
	St. Augustin	1	2018		
Rhineland-Palatinate	Trier Mainz Kusel	All	1	2017	
		All	7	2017	
		All	7	2017	
Saarland	-	-	-	-	
Saxony	-	-	-	-	
Saxony-Anhalt	-	-	-	-	

Place (level)			Date	
Federal state	District	Municipality	Month	Year
Schleswig-Holstein	All	All	1	2016
Thuringia	All	All	1	2017

Sources: (Berlin.de 2015; Deutsches Ärzteblatt 2017; Landkreis Teltow-Fläming 2016; Maybaum 2016; Medizinische Flüchtlingshilfe Göttingen e.V. 2019a, 2019b, 2019c; Ministerium für Soziales, Arbeit 2017; Oderzeitung 2016; Wächter-Raquet 2016)

**Table A2: Eligibility for eHC by respondent type and survey year, in percent**

Eligibility to the eHC	Survey year, respondent type					Total
	2016		2017		2018	
	First-time respondent	Panel respondent	First-time respondent	Panel respondent	First-time respondent	
Via policy change	11,95	9,83	15,99	11,48	13,91	12,28
Via status approval	47,56	56,77	52,31	61,43	63,58	54,15
Via duration of stay	26,02	33,40	28,10	27,05	21,19	28,05
Non-eligible	14,47	0,00	3,60	0,04	1,32	5,53
Total	100	100	100	100	100	100
N	3497	2015	2164	2787	151	10614

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

**Table A3: Patterns of sample selection, multinomial logit (results as relative risk ratios)**

Variables	Base outcome: Analytical sample					
	Model 1		Model 2		Model 3	
	Exclusion on missings vs. base	Other exclusion vs. base	Exclusion on missings vs. base	Other exclusion vs. base	Exclusion on missings vs. base	Other exclusion vs. base
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
CO Illiterate	1.341** (0.156)	1.314 (0.245)	1.267* (0.154)	1.274 (0.241)	1.274* (0.159)	1.497* (0.363)
Years of education at arrival	0.963*** (0.006)	0.994 (0.010)	0.973*** (0.007)	0.997 (0.010)	0.976*** (0.007)	1.012 (0.013)
Years of work experience at arrival	1.001 (0.003)	0.996 (0.005)	1.008* (0.005)	0.980*** (0.007)	1.007 (0.005)	0.988 (0.008)
Age			0.963** (0.014)	0.988 (0.027)	0.958*** (0.015)	0.965 (0.029)
Age squared			1.000*** (0.000)	1.000 (0.000)	1.001*** (0.000)	1.001* (0.000)
Female			1.322*** (0.098)	0.738*** (0.080)	1.334*** (0.102)	0.917 (0.116)
In partnership			1.149* (0.096)	1.030 (0.129)	1.071 (0.094)	1.051 (0.151)
Child in the household			0.996 (0.067)	1.999*** (0.185)	1.103 (0.113)	1.068 (0.149)
Traumatic experience during escape			0.798** (0.077)	0.686*** (0.087)	0.812** (0.081)	0.876 (0.129)
Constant	0.084*** (0.010)	0.256*** (0.019)	0.252*** (0.067)	0.074*** (0.033)	0.046*** (0.022)	0.058*** (0.045)
Country (group) of origin FE	No	No	No	No	Yes	Yes
Federal State of current residence FE	No	No	No	No	Yes	Yes
Survey sample FE	No	No	No	No	Yes	Yes
Person observations		7950		7950		7950
Pseudo R <sup>2</sup>		0.075		0.103		0.210

Notes: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01. CO = country of origin. FE = fixed effects. Robust standard errors in parentheses. Dependent outcome: 1= Exclusion on missings (missing data on month and year of arrival, or month and year of asylum decision, or type of asylum decision, or first residence place), 2 = Other exclusions (non-refugee or has more than one asylum request), 3 = analytical sample. Models estimated as multinomial logit. Models control for missings in control variables. Sample includes only first observation of every respondent.

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

**Table A4: Survey questions underlying the utilized health indicators**

Indicator	Question	Response Scale
Depression, anxiety (PHQ-4)	Now let's talk about the last two weeks. How often have you felt negatively affected by the following complaints in the last two weeks?	
	Little interest or pleasure in your activities?	1 ("Not at all") - 4 ("Almost every day")
	Low spirits, melancholy or hopelessness?	1 ("Not at all") - 4 ("Almost every day")
	Nervousness, anxiety or tension?	1 ("Not at all") - 4 ("Almost every day")
	Unable to stop or control worrying?	1 ("Not at all") - 4 ("Almost every day")
Mental wellbeing (MCS), Physical wellbeing (PCS)  (Different factor loadings for both indicators)	If you have to climb stairs, i.e. walk up several floors: Does your state of health restrict you a lot, a little or not at all?	1 ("A lot") - 3 ("Not at all")
	And what about other strenuous activities in everyday life, e.g. when you have to lift something heavy or need to be mobile: Does your state of health restrict you a lot, a little or not at all?	1 ("A lot") - 3 ("Not at all")
	How often in the last four weeks, due to health problems of a physical nature, did you achieve less in your work or everyday activities than you actually intended?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks, due to health problems of a physical nature, have you been restricted in the type of tasks you can perform in your work or everyday activities?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks did you suffer from severe physical pain?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks did you feel full of energy?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks, due to health or psychological problems, have you been restricted in terms of your social contact to for example friends, acquaintances or relatives?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks, due to psychological or emotional problems, did you perform your work or everyday activities less carefully than usual?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks, due to psychological or emotional problems, did you achieve less in your work or everyday activities than you actually intended?	1 ("All the time") - 5 ("Never")
	How often in the last four weeks did you feel calm and balanced?	1 ("All the time") - 5 ("Never")
How often in the last four weeks did you feel in low spirits and melancholy?	1 ("Not at all") - 4 ("Almost every day")	
How would you describe your current state of health?	1 ("Poor") - 5 ("Very Well")	
Health satisfaction	How satisfied are you with your current health?	0 ("Totally dissatisfied") - 10 ("Totally satisfied")
Self-rated health	How would you describe your current state of health?	1 ("Very well") - 5 ("Poor")

Source: Authors' own elaborations based on IAB-BAMF-SOEP Survey of Refugees (2020), v.35.

**Table A5: Information about the coding of control variables**

Variable	Coding
Age	Continuous variable derived based on the birth year of the respondent and date of the interview. We also include age squared.
Child in the household	Dummy variable coded as 1 = if children below 18 are living in the household 0 = otherwise
Country (group) of origin	Categorical variable based on the survey question “What is your country of citizenship?”. We aggregated the original variable into the following groups: (1) Syria, (2) Afghanistan, (3) Iraq, (4) Eritrea, (5) Iran, (6) remaining Middle Eastern and North African (MENA) countries, (7) Russia, (8) remaining states of the former Soviet Union, (9) West Balkan countries, (10) remaining African countries, (11) rest of the world
County origin (CO) illiterate	The variable is based on the concept of primary illiteracy. Persons are classified as illiterate in language of the CO if they cannot read or write in their mother tongue or the official language on the country from which they escaped. The corresponding dummy indicator is coded as: 1 = cannot read or write in their mother tongue or the CO official language 0 = otherwise
Female	Self-reported gender coded as 1 = Female 0 = Male
Hospital beds density in arrival district (per 1,000)	Continuous variable for the number of hospital beds available for the inpatient treatment of acute patients, operationalized per 1000 inhabitants in each district. The data is based on federal and state hospital statistics. We consider the hospital beds density in the first (the longest) district of respondents' residence in Germany in the year of arrival to Germany. Data on district-level unemployment rate was downloaded from INKAR (INKAR 2020).
In partnership	Dummy variable coded as 1 = if person is in a partnership, not necessarily married or living together 0 = otherwise
Months of stay in Germany	Continuous variable derived based on the year and month of the interview and the year and month of arrival to Germany. Underlying survey question: “When did you arrive in Germany?”
Population density in arrival municipality (per km <sup>2</sup> )	Continuous variable measuring the average number of people living per km <sup>2</sup> for each German municipality the year 2018. We consider the population density in the first (the longest) district of respondents' residence in Germany. Data on municipality-level population density was downloaded from DESTATIS (DESTATIS 2019).
Traumatic experience during escape	Dummy variable based on the question regarding experiences of one or more traumatic event (financial fraud or financial exploitation; sexual harassment; physical attacks; shipwreck; robbery; blackmail; imprisonment) during the journey or escape. The question was asked only if the respondent agreed to report his or her experiences connected with the escape. The corresponding dummy indicator is coded as: 0 = No (none of the listed traumatic experiences is selected); 1 = Yes (at least one of the listed traumatic experiences is selected)
Years of education at arrival	Continuous variable constructed based on the self-reported years of school, vocational education and university/institute attended before migration to Germany.
Years of work experience at arrival	Continuous variable based on the so-called “calendar block” with annual information about activities respondents pursued from the age of 15 onwards. We sum up the years that people pursued in part- and full-time before arriving to Germany.
Share of foreigners in arrival district	Continuous variable capturing number of foreigners as a share of the total population in the first (the longest) district of respondents' residence in Germany in the year of arrival to Germany. Data on district-level share of foreigners was downloaded from INKAR (INKAR 2020).
Unemployment rate in arrival district	Continuous variable measured as the percentage of all civilian labor force (employed + unemployed) registered with the Federal Employment Agency as unemployed. We consider the unemployment rate in the first (the longest) district of respondents' residence in Germany in the year of arrival to Germany. Data on district-level unemployment rate was downloaded from INKAR (INKAR 2020).

Variable	Coding
Median income in arrival district	Continuous variable measuring mean employment income at district level in each year of employees who are compulsorily registered for health, pension and statutory nursing care insurance. Also included are trainees, interns and part-time employees. Civil servants, self-employed persons, family workers, and soldiers and people in military or alternative service are excluded. Employees with multiple employments are only included once with their most recent position. We consider the median income in the first (the longest) district of respondents' residence in Germany in the year of arrival to Germany. Data on district-level median income was downloaded from INKAR (INKAR 2020).
Share of AFD votes in arrival district	Continuous variable reflecting share of the far-right political party Alternative for Germany (AFD) in the valid second votes of the last federal elections in 2017 in each district in Germany. Under German electoral law, the distribution of secondary votes corresponds to the share of seats in the Bundestag. We consider the Share of AFD votes in the first (the longest) district of respondents' residence in Germany in the year of arrival to Germany. Data on Share of AFD votes was downloaded from INKAR (INKAR 2020).
Communal accommodation	Based on a survey question that was answered by the interviewer. The corresponding dummy indicator is coded as: 0 = Private flat 1 = Reception centers or communal accommodations
Discrimination experience in Germany	Based on the following survey question: "How often have you personally experienced being disadvantaged in Germany because of your origin?" The corresponding dummy indicator was coded as: 1 = if respondents state 1 ("Frequently") or 2 ("Occasionally"), 0 = if respondents state 3 ("Never").
Very concerned about prospects of staying	Variable based on survey question "Are you worried that you will be unable to stay in Germany?" The corresponding dummy indicator was coded as: 0 = if respondents state 2 ("Yes, I worry somewhat") or 3 ("No, I don't worry at all"), 1 = if respondents state 1 ("Yes, I worry a lot").
Felt welcome at time of arrival	Variable based on the survey question "Did you feel that you were welcome when you arrived in Germany?" The corresponding dummy indicator was coded as: 0 = if respondents state 5 ("Not at all"), 4 ("Hardly at all", 3 ("In some ways"), 1 = if respondents state 2 ("Mostly") or 1 ("Totally").
Spouse or children abroad	Dummy indicator coded as 1 = if partner and/or children of the respondent are not living in Germany 0 = otherwise.
Survey sample	Categorical variable capturing refugee sub-samples of the IAB-BAMF-SOEP Survey of Refugees: M3, M4, M5. The samples M3 and M4 were part of the first wave of the survey in the year 2016 and included persons who entered Germany as asylum-seekers between January 1, 2013 and January 31, 2016. The refreshment sample M5 of the 2nd wave of the survey in 2017 extended the survey by persons who had entered the country by December 31, 2016.
Federal State of 1 <sup>st</sup> residence	Categorical variable capturing the first (or the longest one before the current) residence place in Germany. Based on two survey questions: "Now, please think of the accommodation in which you were housed the longest in Germany before your current accommodation. Where was this accommodation?" 1) Location; 2) Near; 3) State. „Is your current accommodation your first accommodation in Germany or have you previously lived in one or more other forms of accommodation in Germany?“ We assume that the longest residence place before the current corresponds to the assigned one by authorities.

Source: Authors' own elaborations based on IAB-BAMF-SOEP Survey of Refugees (2020), v.35.

**Table A6: Regional characteristics of districts with and without implementation of eHC**

Variable, district-level	Mean (SE)		Difference	
	no eHC	eHC	Unconditional	Conditional on East-West Germany
	(1)	(2)	(3)	(4)
Population density (per km <sup>2</sup> )	495.2 (653.8)	669.7 (840.8)	174.4* (99.0)	314.8*** (104.5)
Mean age	44.2 (1.8)	45.3 (2.3)	1.1*** (0.3)	-0.0 (0.2)
Share of foreigners	10.0 (4.9)	7.6 (4.7)	-2.4*** (0.6)	0.1 (0.5)
Share of humanitarian immigrants	1.8 (1.1)	1.9 (0.8)	0.2 (0.1)	0.4*** (0.1)
Unemployment rate	5.1 (2.4)	7.0 (2.1)	1.9*** (0.3)	1.1*** (0.3)
Employment share of foreigners	40.6 (9.0)	32.5 (6.1)	-8.1*** (0.8)	-4.4*** (0.9)
Median income	3053.5 (432.8)	2749.5 (434.1)	-304.0*** (53.3)	-19.3 (37.9)
Number of hospital beds per 1,000 inhabitants	6.2 (4.0)	7.0 (3.4)	0.8* (0.4)	0.5 (0.4)
Life expectancy in years	81.0 (1.0)	80.5 (0.9)	-0.5*** (0.1)	-0.2* (0.1)
<i>Political party voting share in federal elections 2017 (in percent)</i>				
Conservatives, CSU/CSU (Union)	35.4 (5.8)	30.0 (4.9)	-5.3*** (0.6)	-3.2*** (0.6)
Social democrats, SPD	20.1 (6.5)	20.2 (5.9)	0.1 (0.7)	3.2*** (0.5)
Far left, DIE LINKE	7.9 (3.8)	12.5 (5.1)	4.7*** (0.6)	0.9*** (0.3)
Greens, Bündnis 90/Die Grünen	8.3 (3.6)	7.3 (4.0)	-1.0** (0.5)	1.0** (0.4)
Liberals, FDP	10.2 (2.3)	9.9 (3.1)	-0.3 (0.4)	1.1*** (0.3)
Far right, AFD	12.9 (4.6)	15.2 (7.2)	2.3*** (0.8)	-2.1*** (0.5)
Number of districts	318	83	401	401

Notes: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. The table shows univariate comparisons between districts that have or have not introduced the eHC. SE = Standard error. State of variables: 2016. Due to joint immigration authorities for a small number of districts, the observation number for the share of humanitarian immigrants is only 394 instead of 401. For the number of hospital beds there are missing values for 2 out of 401 districts. Columns (1), (2) show the mean and standard error, columns (3), (4) the mean difference. Column (3): Unconditional mean comparison. Column (4): Conditional on East-West Germany dummy. This is equivalent to separate regressions of the variables in col. 1 on eHC-dummy and East-West-dummy (with robust standard errors).

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v.35.

**Table A7: Linear probability models for implementation of eHC at district level**

Specification	Base	+ Controls	+ Voting	+ East-West Germany
Model	Model 1	Model 2	Model 3	Model 4
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
Population density (per km <sup>2</sup> )	0.000*** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000* (0.000)
Mean age	0.074*** (0.012)	0.024 (0.016)	0.029 (0.017)	0.020 (0.017)
Share of humanitarian immigrants	0.011 (0.023)	0.021 (0.019)	0.018 (0.018)	0.024 (0.021)
Unemployment rate		0.031* (0.014)	0.031* (0.014)	0.007 (0.015)
Median income		-0.000*** (0.000)	-0.000*** (0.000)	-0.000* (0.000)
Number of hospital beds per 1,000 inhabitants		-0.001 (0.005)	-0.001 (0.005)	-0.004 (0.004)
Life expectancy in years		0.048 (0.027)	0.051 (0.028)	0.003 (0.028)
Far right (AfD) voting share in federal elections 2017			-0.004 (0.005)	-0.025*** (0.006)
East Germany				0.542*** (0.109)
Constant	-3.196*** (0.533)	-4.184 (2.401)	-4.540 (2.429)	-0.454 (2.554)
Number of districts	401	401	401	401

Notes: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Robust standard errors in parentheses. We control for (i) 7 out of 401 missings in the share of humanitarian immigrants due to joined authorities and (ii) 2 missings in number of hospital beds.

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

**Table A8: Further effects from multivariate regressions of health indicators (Table 3)**

Outcome: Model:	Ln(Depressions and anxiety)			Ln(Mental wellbeing)			Ln(Physical wellbeing)			Health satisfaction			Self-rated health		
	M A.1	M A.2	M A.3	M B.1	M B.2	M B.3	M C.1	M C.2	M C.3	M D.1	M D.2	M D.3	M E.1	M E.2	M E.3
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
Months of stay in Germany		0.001 (0.001)	-0.000 (0.001)		-0.000 (0.000)	-0.001** (0.000)		-0.000 (0.000)	-0.000 (0.000)		0.005 (0.004)	0.002 (0.004)		0.000 (0.002)	-0.001 (0.002)
Age		-0.004 (0.005)	-0.005 (0.005)		-0.003* (0.002)	-0.005** (0.002)		-0.004*** (0.001)	-0.004*** (0.001)		-0.056*** (0.015)	-0.063*** (0.015)		-0.030*** (0.006)	-0.033*** (0.006)
Age squared		-0.000 (0.000)	0.000 (0.000)		0.000 (0.000)	0.000 (0.000)		-0.000*** (0.000)	-0.000*** (0.000)		-0.000** (0.000)	-0.000 (0.000)		-0.000* (0.000)	-0.000 (0.000)
Female		-0.076*** (0.018)	-0.078*** (0.018)		-0.056*** (0.008)	-0.060*** (0.008)		-0.062*** (0.006)	-0.062*** (0.006)		-0.566*** (0.067)	-0.585*** (0.067)		-0.285*** (0.029)	-0.290*** (0.029)
In partnership		0.017 (0.022)	0.050** (0.023)		0.018** (0.009)	0.022** (0.009)		0.001 (0.006)	0.002 (0.006)		0.157** (0.063)	0.186*** (0.064)		0.055* (0.028)	0.069** (0.028)
Child in household		0.073*** (0.021)	0.004 (0.023)		0.050*** (0.010)	0.027*** (0.010)		-0.006 (0.007)	-0.009 (0.007)		0.164** (0.072)	0.049 (0.073)		0.067** (0.032)	0.024 (0.032)
Traumatic experience during escape		-0.064*** (0.016)	-0.050*** (0.016)		-0.036*** (0.007)	-0.030*** (0.007)		-0.023*** (0.006)	-0.022*** (0.006)		-0.309*** (0.062)	-0.282*** (0.061)		-0.131*** (0.027)	-0.117*** (0.026)
Years of education at arrival		0.002 (0.002)	0.001 (0.002)		0.001 (0.001)	0.001* (0.001)		0.004*** (0.001)	0.005*** (0.001)		0.029*** (0.006)	0.030*** (0.006)		0.016*** (0.003)	0.017*** (0.003)
Years of work experience at arrival		0.001 (0.001)	0.001 (0.001)		0.001** (0.001)	0.001* (0.001)		0.002*** (0.000)	0.002*** (0.000)		0.015*** (0.005)	0.014*** (0.005)		0.007*** (0.002)	0.007*** (0.002)
Ln(population density) in arrival municipality		0.013 (0.011)	0.014 (0.011)		0.003 (0.005)	0.004 (0.005)		-0.008** (0.003)	-0.008** (0.003)		-0.046 (0.038)	-0.042 (0.037)		-0.020 (0.016)	-0.019 (0.016)
Ln(hospital beds density) in arrival district		-0.063*** (0.019)	-0.066*** (0.019)		0.002 (0.009)	-0.003 (0.009)		0.008 (0.007)	0.008 (0.007)		0.052 (0.074)	0.029 (0.074)		0.027 (0.032)	0.020 (0.032)
Share of foreigners in arrival district		0.001 (0.003)	0.001 (0.003)		-0.001 (0.001)	-0.001 (0.001)		0.003*** (0.001)	0.003*** (0.001)		0.015 (0.010)	0.016* (0.010)		0.008* (0.004)	0.008** (0.004)
Unemployment rate in arrival district		0.004 (0.006)	0.006 (0.005)		-0.001 (0.002)	-0.000 (0.002)		-0.005** (0.002)	-0.005** (0.002)		-0.011 (0.021)	-0.010 (0.021)		-0.008 (0.009)	-0.007 (0.009)

Outcome: Model:	Ln(Depressions and anxiety)			Ln(Mental wellbeing)			Ln(Physical wellbeing)			Health satisfaction			Self-rated health		
	M A.1	M A.2	M A.3	M B.1	M B.2	M B.3	M C.1	M C.2	M C.3	M D.1	M D.2	M D.3	M E.1	M E.2	M E.3
	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)	Coef. (SE)
Ln(median income) in arrival district		0.021 (0.080)	0.013 (0.080)		0.009 (0.031)	0.013 (0.031)		-0.002 (0.024)	-0.003 (0.024)		0.258 (0.243)	0.266 (0.242)		0.090 (0.108)	0.087 (0.108)
Share of the politically far-right votes in arrival district		-0.001 (0.004)	-0.001 (0.004)		0.002 (0.002)	0.002 (0.002)		0.002* (0.001)	0.002 (0.001)		0.015 (0.013)	0.011 (0.013)		0.012** (0.006)	0.011* (0.006)
Survey wave (Ref. 2016)															
2017				-0.007 (0.008)	0.004 (0.011)	0.019* (0.011)	0.013** (0.006)	0.012 (0.008)	0.013* (0.008)	-0.001 (0.049)	-0.017 (0.069)	0.007 (0.069)	0.020 (0.021)	0.040 (0.030)	0.053* (0.029)
2018				0.025*** (0.007)	0.038*** (0.014)	0.054*** (0.013)	-0.013*** (0.005)	0.005 (0.010)	0.007 (0.010)	0.006 (0.053)	0.017 (0.107)	0.071 (0.106)	0.065*** (0.023)	0.126*** (0.046)	0.151*** (0.045)
Survey sample (Ref. M3)															
M4		0.022 (0.016)	0.022 (0.015)		-0.002 (0.008)	-0.002 (0.008)		0.015** (0.006)	0.016** (0.006)		0.111* (0.066)	0.096 (0.066)		0.064** (0.029)	0.059** (0.029)
M5					0.020 (0.012)	0.002 (0.012)		-0.002 (0.009)	-0.005 (0.009)		0.104 (0.092)	0.030 (0.092)		0.032 (0.040)	0.004 (0.040)

Notes: \* p<0.10, \*\* p<0.05, \*\*\* p<0.01. CO = country of origin. FE = fixed effects. Estimations are based on M = 25 imputed datasets. Models A1.1-A.3 estimated as OLS with robust standard errors. Models M B.1-E.3 as Panel Random-Effects models with robust standard errors. For all indicators a higher value corresponds to better health.

Source: IAB-BAMF-SOEP Survey of Refugees (2020), v35.

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