

High Prevalence of Chronic Non-Communicable Conditions Among Adult Refugees: Implications for Practice and Policy

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Abstract The global rise in non-communicable disease (NCD) suggests that US-based refugees are increasingly affected by chronic conditions. However, health services have focused on the detection of infectious disease, with relatively limited data on chronic NCDs. Using data from a retrospective medical record review of a refugee health program in the urban Northeast ($n = 180$), we examined the prevalence of chronic NCDs and NCD risk factors among adult refugees who had recently arrived in the US,

with attention to region of origin and family composition. Family composition was included because low-income adults without dependent children are at high risk of becoming uninsured. We found that half of the adult refugees in this sample had at least one chronic NCD (51.1%), and 9.5% had three or more NCDs. Behavioral health diagnoses were most common (15.0%), followed by hypertension (13.3%). Half of adults were overweight or obese (54.6%). Chronic NCDs were somewhat more common among adults from Iraq, but this difference was not significant (56.8 vs. 44.6%). Chronic NCDs were common among adults with and without dependent children (61.4 vs. 44.6%, respectively), and these two groups did not significantly differ in their likelihood of having a chronic NCD after adjustment for age and gender (AOR = 0.78, 95% CI = 0.39, 1.55). This study suggests that chronic NCDs are common among adult refugees in the US, including refugees at high risk for uninsurance. We propose that refugee health services accommodate screening and treatment for chronic NCDs and NCD risk factors, and that insurance outreach and enrollment programs target recently arrived refugees.

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Introduction

In the past decade, over 527,000 refugees have immigrated to the United States, seeking protection from persecution and violence [1]. Refugees are individuals who are unable to return to their home countries due to “persecution or a well-founded fear of persecution on account of race, religion, nationality, membership in a particular social group,

or political opinion” [2]. The US accounts for nearly three-quarters of all permanent refugee resettlement worldwide [3]. Most recently, the majority of refugees receiving shelter the US have been individuals escaping war or persecution in Iraq (24.6%), Burma (22.8%), and Bhutan (16.9%) [4]. However, after arrival in the US, these individuals, like other vulnerable immigrant groups, may face disproportionately poor health outcomes [5–10].

The rising prevalence of chronic non-communicable diseases (NCDs) in refugees’ regions of origin suggests that chronic conditions may be increasingly common among recent refugees and underscores the need for a greater understanding of NCDs in this population. Chronic NCDs now account for 61% of all deaths and 46% of the burden of disease among low- and middle-income countries [11, 12]. The global rise in chronic NCDs has dramatically increased the likelihood that adults from low- and middle-income nations will arrive in the US with pre-existing chronic conditions. However, the extent to which refugees in the US may be impacted by NCDs remains under-investigated.

To date, research with refugee populations in the US has overwhelmingly and justifiably focused on communicable diseases [13] or mental health [14], with relatively little research attention to other conditions [15]. Extant studies of chronic illness among this population are likely to underestimate the extent of chronic NCDs among US-based refugees. They generally rely upon screening protocols that assess only a small number of chronic NCDs, such as diabetes and hypertension, and are limited to the initial US health encounter, without allowing time for additional diagnostic evaluation [16–19]. The latter is of particular importance for refugees who have had little prior access to health care. In sum, data are not available on the full spectrum of chronic health problems that may impact US-based refugees [20]. More comprehensive data on the burden of chronic NCDs among US-based refugees would help prepare both clinicians and community-based organizations to better address the full range of health concerns impacting this population.

Studies are also needed to better document refugees’ health care needs as they transition out of the early resettlement period. Current federal policy provides supplementary funding for refugee health services (Refugee Medical Assistance, RMA) for refugees’ first eight months in the US. After this time, adults without dependent children, who are generally ineligible for federal Medicaid or the Children’s Health Insurance Program (CHIP), are at high risk of becoming uninsured [21–23]. As seen in other populations without medical coverage, being uninsured places refugees at risk for poor health outcomes, often due to delays in seeking care and to forgoing necessary services, including chronic disease treatment and indicated

preventive services [24–27]. Those with chronic NCDs face even greater barriers navigating a poorly organized and fragmented health system, placing them at even higher risk for poor health outcomes [28–31].

To address these gaps in the existing literature, the current study uses data from a refugee health clinic at a large academic medical center to describe the prevalence of chronic NCDs among adult refugees eight months after arrival in the US. Additionally, we documented the prevalence of chronic NCDs among two key subgroups: individuals from Iraq, who accounted for 20.4% of US refugee resettlement from 2007 to 2010, and individuals without dependent children, who are at heightened risk for becoming uninsured.

Methods

We performed a retrospective medical record review at a single academic medical center in a mid-sized city in the Northeast. This medical center provides health screening for refugees who have recently arrived in the US, as well as ongoing primary care. Medical record review included hospitalizations, outpatient surgery, emergency department visits, and visits to the hospital-based primary care center (pediatrics, internal medicine, and obstetrics and gynecology) and tuberculosis clinic. An eight month window—beginning on the date of arrival in the US—was used to capture chronic conditions that may have been undiagnosed at the time of arrival in the US and to provide information about refugee health at the time when RMA elapses.

Sample

For the purposes of this study, the term “refugee” included refugees, derivative refugees (immigrant family members of refugees), and special entrants from Cuba, Iraq, and Afghanistan whose histories, immigration status, and eligibility for services are similar to those of refugees. Patients were included if they arrived in the US between January, 2006 and May, 2010; were age 19 years or older at the time of arrival in the US; and had at least one primary care visit at the study location within their first eight months of arrival ($n = 180$). An additional 146 adult refugees who arrived in the study catchment area during this time period were excluded because they had received primary care elsewhere. However, excluded adults were unlikely to have been more or less healthy than the individuals included in the study. After arriving in the US, all refugees in the region receive federally-mandated resettlement assistance from a nonprofit organization. This organization coordinates with local clinics and community

health centers to ensure that every individual undergoes a primary care assessment as soon as possible following arrival in the US. A health and wellness team schedules appointments and ensures that a case manager or volunteer provide accompaniment to the first appointment. Appointments are scheduled even for those without known health problems, who undergo screening for communicable and non-communicable conditions and receive vaccinations that are required prior to applying for legal permanent residency in the US.

Measures

Chronic non-communicable disease (NCD) was defined as any non-communicable condition that typically lasts for a year or more and requires ongoing medical attention and/or limits activities of daily living [32]. Patients were categorized as having a chronic NCD if they were diagnosed or treated for a condition meeting this definition at anytime during the eight month study period. In addition to provider diagnosis or treatment, the following were also used to categorize patients with: *hypertension*: three outpatient blood pressure measurements with an average systolic blood pressure ≥ 140 mmHg; *diabetes*: hemoglobin A1C $> 6.5\%$; and *dyslipidemia*: triglycerides > 290 mg/dL, cholesterol > 280 mg/dL, HDL < 30 mg/dL or LDL > 200 mg/dL. Additional conditions included: *arthritis* (osteoarthritis and autoimmune arthritis), *asthma*, *behavioral health problems* (excluding adjustment disorder), *cancer*, *cardiac disease* (coronary artery syndrome, congestive heart failure, congenital heart defects, excluding nonspecific heart murmurs), *COPD* (chronic obstructive pulmonary disease or emphysema), *developmental delay*, *diabetes mellitus*, *physical disability* (congenital or acquired), *hearing impairment*, *liver disease* (cirrhosis or liver failure, excluding chronic Hepatitis B or C viral infection), *renal disease* (chronic renal insufficiency, recurrent nephrolithiasis, nephrotic or nephritic disease, congenital renal malformations), *seizures*, *stroke*, *thyroid disease* (hyper- or hypothyroidism), and *vision impairment* (decreased visual acuity requiring corrective lenses, glaucoma, cataracts). Other chronic conditions included autoimmune disease, endocrine disorders requiring hormone replacement (excluding low testosterone), congenital malformations, and bleeding or clotting disorders, among others. Anemia was excluded, as it was frequently attributed to nutritional deficiencies that would normally resolve within less than 12 months.

The following risk factors for chronic NCDs were included: tobacco use, underweight, overweight, and obesity. Patients were categorized as tobacco users if they were diagnosed or treated anytime during the eight month study period. Centers for Disease Control and Prevention

(CDC) age- and gender-based standards for Body Mass Index (BMI) were used to categorize patients as underweight, overweight, or obese using the last available height and weight during the study period [33]. Underweight was defined as a BMI less than 18.5, overweight as a BMI equal to or greater than 25 but less than 30, and obesity as a BMI equal to or greater than 30. Pregnant women were excluded from the BMI assessment, as BMI norms are not applicable during pregnancy.

The following socioeconomic and demographic characteristics were obtained: gender, age at the time of US arrival, country of origin, date of US arrival, and family composition. Family composition was used to determine whether study participants were living with any dependent children (adults without dependent children), defined as a son or daughter aged 18 years or younger.

Data Collection and Analysis

Data were extracted by trained research assistants using a standardized form and then entered into an electronic database by the primary investigator. For all charts, a selection of data points (diabetes status, tuberculosis screening results, weight, and height) was extracted independently by two investigators and evaluated for concordance, in order to screen for errors in data extraction and entry. One in twenty charts was reviewed by two independent investigators, for the same reason.

Associations were evaluated using t-tests (for continuous variables) and Chi-square tests (for categorical variables). Chi-square tests were also used to compare the prevalence of NCDs between adults from Iraq and those from other nations and adults with and without dependent children. To further compare adults with and without dependent children, who differed significantly in age ($P \leq 0.05$), we used logistic regression to adjust for age and gender. All analyses were performed using SAS Version 9.2 software [34]. The institutional review board of Yale University School of Medicine approved this study and monitored its conduct.

Results

Demographics

Approximately 40% of individuals included in the study were female, over half had originated in the Middle East, and 63.0% were adults without dependent children (Table 1). Most adults were young, with a median age of 31 years. Individuals from Iraq were comparable in age to adults from other nations. Adults without dependent children were younger than adults with children by a mean of

Table 1 Demographic characteristics of adult refugees, by national origin and family composition (Jan 2006–May 2010)

	Total (n = 180)	National origin		Family composition ^a	
		Iraq (n = 95)	Other (n = 83)	No Dependent Children (n = 110)	Dependent Children (n = 70)
Female (%)	41.2	39.3	43.2	35.0	50.0
Age (years)					
Median	31	31	30	28 [‡]	37 [‡]
Interquartile Range	25–40	25–41	24–40	24–34	31–45
Region of origin (%)					
Middle East	56.5	100.0 [‡]	6.1 [‡]	57.4	55.1
Africa	18.6	–	40.2	22.2	13.0
South Asia	11.9	–	25.6	11.1	13.0
Latin America	11.9	–	25.6	8.3	17.4
Asia–Pacific	0.6	–	1.2	0.9	0
Europe	0.6	–	1.2	0	1.5
No dependent children (%)	63.0	60.0	61.9	100.0 [‡]	0 [‡]

[†] $P < 0.05$; [‡] $P \leq 0.001$

^a Adults without dependent children: adults age ≥ 19 years at the time of US arrival who were neither the parent nor guardian of a dependent child (age ≤ 18 years)

9 years ($P < 0.001$). Of note, refugee adults who were excluded from the current study sample were older by a mean of 3.7 years and were less likely to be from Iraq (34.9 vs. 53.4%); no other significant demographic differences emerged (data not shown).

Prevalence of Chronic Health Problems Among Refugees During the First Eight Months in the US

During their first eight months in the US, half of adults were diagnosed or treated for at least one chronic NCD (51.1%), and one in five adults had two or more chronic NCDs (Table 2). Overall chronic NCD prevalence was comparable between individuals from Iraq and those from other countries (Table 2). Chronic health conditions were somewhat less common among adults without dependent children than other adults in crude analyses (44.6 vs. 61.4%, $P = 0.03$), however significance did not persist in adjusted analyses [Adjusted Odds Ratio (AOR) = 0.78, 95% Confidence Interval [CI] = 0.39, 1.55—Table 3]. The most commonly reported chronic health problems were behavioral health conditions (15.0%), such as depression and PTSD. Hypertension (13.3%), dyslipidemia (9.4%), impaired vision (8.9%), and other conditions (9.5%) were also common. Adults from Iraq were more likely to have been diagnosed or treated for behavioral health conditions than other adults (21.1 vs. 8.4%, $P = 0.02$). They were also more likely than other adults to have completed a primary care-based behavioral health screening (56.8 vs. 33.7%, $P < 0.001$, data not shown). Relative to adults with

children, adults without dependent children were less likely to have been diagnosed or treated for hypertension (7.3 vs. 22.9%, $P = 0.001$) or dyslipidemia (5.5 vs. 15.7%, $P = 0.02$).

Burden of Chronic Disease Risk Factors

Risk factors for chronic health problems are shown in Table 4. Despite being a young cohort, over half of adults were overweight (31.3%) or obese (23.3%). Obesity was more common among refugees from Iraq than other countries (30.6 vs. 14.3%, $P = 0.01$). Relative to adults with children, overweight was less common among individuals without dependent children (21.7 vs. 45.6%, $P = 0.001$); however, obesity was equally common (24.7 vs. 21.2%, $P = 0.60$). Few adults were underweight, and the proportion decreased from the time of US arrival to 8 months after arrival (data not shown). Tobacco use was observed among 28.9% of adults during the study period and was significantly more common among men than women (44 vs. 11.4%, $P < 0.001$, data not shown).

Discussion

In this primary care-based sample of recently arrived refugees, a high burden of chronic health problems was documented, with half of refugee adults diagnosed or treated for at least one chronic NCD during their first eight months in the US. Among adults, one in five (18.4%)

Table 2 Chronic non-communicable conditions (NCDs) diagnosed or treated within 8 months of arrival in the US, by national origin and family composition (Jan 2006–May 2010)

	Total (n = 180)	National origin		Family composition ^a	
		Iraq (n = 95)	Other (n = 83)	No dependent children (n = 110)	Dependent children (n = 70)
Any chronic NCD ^b (%)	51.1	56.8	44.6	44.6 [†]	61.4 [†]
Number of chronic NCDs (%)					
1	31.7	34.7	27.7	28.2	37.1
2	8.9	9.5	8.4	9.1	8.6
≥ 3	9.5	11.6	7.2	6.4	14.3
Specific conditions					
Arthritis (%)	4.4	5.3	3.6	2.7	7.1
Asthma (%)	6.1	8.4	3.6	8.2	2.9
Behavioral health problems (%)	15.0	21.1 [†]	8.4 [†]	10.9	21.4
Cancer ^c (%)	0	–	–	–	–
Cardiac disease (%)	4.4	5.3	4.8	3.6	2.2
COPD (%)	1.7	–	–	–	–
Development delay (%)	0.6	–	–	–	–
Diabetes (%)	4.4	4.2	4.8	3.6	5.7
Disability, physical (%)	2.8	–	–	–	–
Dyslipidemia (%)	9.4	12.6	6.0	5.5 [†]	15.7 [†]
Hearing impairment (%)	3.9	6.3	1.2	3.6	4.3
Hypertension (%)	13.3	12.6	14.5	7.3 [‡]	22.9 [‡]
Liver disease (%)	0.6	–	–	–	–
Renal disease (%)	2.2	–	–	–	–
Seizures (%)	0.6	–	–	–	–
Stroke (%)	0	–	–	–	–
Thyroid disease (%)	3.3	5.3	1.2	1.8	5.7
Vision impairment (%)	8.9	8.4	8.4	10.0	7.1
Other (%)	9.4	12.6	6	8.2	11.4

[†] $P < 0.05$; [‡] $P \leq 0.001$

^a Adults without dependent children: adults age ≥ 19 years at the time of US arrival who were neither the parent nor guardian of a dependent child (age ≤ 18 years)

^b Chronic NCDs were defined as any disease that typically lasts for a year or more and requires ongoing medical attention and/or limits activities of daily living. Chronic infectious diseases, e.g. HIV, were excluded

^c Subgroup data are not reported for conditions with $\leq 3\%$ prevalence to reduce the risk of deductive identification of individuals

had more than one chronic NCD, the most common being behavioral health diagnoses and hypertension. Though chronic NCDs were more common among adults with dependent children, there were no significant differences in likelihood of having chronic NCDs between adults with and without dependent children once age and gender were taken into account. Moreover, adults without dependent children—who are at greater risk of becoming uninsured after RMA elapses and comprised over half of all adults in this sample—still had a high rate of chronic NCDs (over 4 in 10). The current study's findings underscore the importance of screening and providing necessary treatment for chronic NCDs.

Findings from the current investigation indicate that the prevalence of chronic conditions among adult refugees in this cohort may be higher than, or at least comparable to, that of the general US adult population. This stands in contrast to the image of refugee healthcare as a field primarily concerned with the diagnosis and treatment of infectious diseases. Approximately 45% of non-institutionalized US adults aged 18–64 years have at least one chronic health condition [32]. Given that our study cohort is younger than the US adult population—85% of the adults in our study were aged 45 years or younger—adult refugees in this cohort may have a higher burden of chronic NCDs than age-matched US peers. This may be explained

Table 3 Results of unadjusted and adjusted logistic regression models for chronic NCDs, underweight, overweight, obesity, and tobacco use among adults without dependent children (Jan 2006–May 2010)

	No dependent children ^a (n = 110)	
	Odds ratio (95% confidence interval)	Adjusted odds ratio ^b (95% confidence interval)
Any chronic NCD ^c , %	0.49 (0.26, 0.90)	0.78 (0.39, 1.55)
Behavioral health problems (%)	0.45 (0.20, 1.03)	0.53 (0.22, 1.30)
Dyslipidemia (%)	0.31 (0.11, 0.88)	0.48 (0.16, 1.47)
Hypertension (%)	0.27 (0.11, 0.66)	0.39 (0.14, 1.15)
Underweight (%)	0.66 (0.04, 10.68)	0.24 (0.01, 6.77)
Overweight (%)	0.37 (0.19, 0.70)	0.39 (0.19, 0.81)
Obese (%)	1.13 (0.55, 2.34)	1.68 (0.74, 3.79)
Tobacco use (%)	1.15 (0.59, 2.24)	1.24 (0.57, 2.73)

Bold values indicate $P < 0.05$

^a Adults without Dependent Children: Adults age ≥ 19 years at the time of US arrival who were neither the parent nor guardian of a dependent child (age ≤ 18 years)

^b Multivariable logistic regression models adjusted for age and gender. Adults with dependent children served as the reference group

^c Chronic NCDs were defined as any disease that typically lasts for a year or more and requires ongoing medical attention and/or limits activities of daily living. Chronic infectious diseases, e.g. HIV, were excluded

in part by a rise in the prevalence of chronic conditions in low- and middle-income nations. Additionally, refugees' pre-migration experiences may increase the likelihood of certain chronic health conditions, such as PTSD from prior trauma [35].

Placing these findings in the context of other studies with US-based refugees is challenging, as the prevalence of NCDs has changed over time, varies by national and ethnic group, and varies by pre- and post-migration experiences [36]. However, a recent study of newly arrived refugees in California supports the finding that chronic NCDs are

common among the most recent wave of refugees arriving from Iraq. This study found that 14.8% of refugees from Iraq (ages 3 years and older) were hypertensive, 24.6% of adults were obese, and 39.9% of adults ages 40 years and older had dyslipidemia [19]. Examining the prevalence of behavioral health problems in comparison to other studies is more challenging. Accurately documenting the prevalence of behavioral health conditions among refugees is often complicated by language barriers and social stigma, which may prevent many people from seeking care [35, 37–39]. Furthermore, in our sample, adults from Iraq were more likely than adults from other nations to have completed a primary care-based behavioral health screening, and differences in detection may partially account for the higher rate of behavioral health problems reported for this subgroup. Despite these limitations, our findings are comparable to those of large community screening studies, which suggest that one in ten adult refugees may have PTSD and one in twenty may have major depression, with significant overlap between these two groups [40].

Limitations and Possible Biases

Current findings are best considered within the context of important limitations. This is a primary care-based sample, and health problems are often more prevalent among clinic-based samples than among the general population. However, federal immigration and refugee resettlement regulations are such that all refugees in the study region undergo primary care-based medical screening shortly after arriving in the US, making it unlikely that our sample underrepresents healthier individuals. Additionally, less than 5% of our sample was comprised of refugees from Bhutan or Burma, two large recently-arrived refugee groups; thus, conclusions from this study are likely to be most applicable to refugee cohorts with demographics similar to those represented in the current sample. Finally, administrative data used to determine family composition was provided by a single source, making it possible for

Table 4 Underweight, overweight, obesity, and tobacco use, by national origin and family composition (Jan 2006–May 2010)

	Total (n = 180)	National origin		Family composition ^a	
		Iraq (n = 95)	Other (n = 83)	No dependent children (n = 110)	Dependent children (n = 70)
Underweight ^b (%)	1.2	–	–	–	–
Overweight (%)	31.3	34.1	28.6	21.7 [‡]	45.6 [‡]
Obese (%)	23.3	30.6 [†]	14.3 [†]	24.7	21.2
Tobacco use (%)	28.9	36.9 [†]	20.5 [†]	35.5	37.1

[†] $P < 0.05$; [‡] $P \leq 0.001$

^a Adults without dependent children: Adults age ≥ 19 years at the time of US arrival who were neither the parent nor guardian of a dependent child (age ≤ 18 years)

^b Subgroup data are not reported for risk factors with $\leq 3\%$ prevalence to reduce the risk of deductive identification of individuals

adults without dependent children to have been misclassified. However, this subgroup's significantly younger median age, as would be expected among adults who have yet to start families, suggests that misclassification was not common.

Conclusions

These limitations notwithstanding, the current study is among the first to examine the full range of chronic NCDs among US-based refugees and to include diagnoses made after the first US medical exam. This work advances the current literature by providing a comprehensive description of the health of recently-arrived refugees in the US. The high prevalence of chronic NCDs among recently-arrived refugees has a number of practice, research, and policy implications. In addition to infectious disease screening, refugees are likely to benefit from early access to primary care and screening for chronic conditions [41]. This is particularly important when chronic health conditions may impede successful resettlement into the US (e.g. obtaining employment), which can in turn result in significant economic hardships for refugees who must quickly enter the US workforce.

Programs that facilitate early access to primary care, such as partnerships between refugee service organizations and clinical service providers, and programs that induce providers to provide primary care for refugees by removing financial and administrative barriers have already been developed by existing providers [42–47]. These programs may merit broader dissemination, as well as additional research documenting best practices. In addition, culturally effective medical case management, health care navigation, and community health worker models warrant additional examination, as these programs may improve access and increase health care efficiency for refugees with multiple chronic conditions who are seen by multiple providers [48]. Finally, tobacco cessation, physical activity, and healthy food preparation and eating habits are important targets for community health education and primary care among recently-arrived refugees.

The high prevalence of chronic conditions among adults without dependent children—who are generally ineligible for federally-funded health insurance programs apart from RMA—raises a significant challenge. These adults are at high risk for becoming uninsured, which is likely to increase their risk for poor health outcomes and forgone care [49]. Solutions may include programs that help small businesses offer affordable health benefits, as refugees, like other immigrants, are often employed in this sector [22, 50]. Furthermore, as Medicaid expands in 2014 and health insurance exchanges come into effect, refugees and other eligible immigrants are likely to benefit from

targeted, culturally- and linguistically-appropriate outreach and enrollment [51, 52].

As refugees continue to strive towards successfully re-establishing themselves and their families in the US, it is critical that medical and public health programs provide adequate supports for individuals with chronic health conditions. Short-term solutions, designed only to address acute communicable diseases, are no longer adequate to meet the needs of this community. Ensuring that refugees with chronic health problems remain healthy is a key step to ensuring their long-term success as new Americans.

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References

1. *Yearbook of Immigration Statistics, 2000–2010*. Washington, DC: Department of Homeland Security, Office of Immigration Statistics, Accessed July 27, 2011, Available at <http://www.dhs.gov/files/statistics/publications/yearbook.shtm>.
2. Refugee Act, S. 643, Congress of the United States of America, 96th Congress. (1980).
3. (2010). *2009 Global trends: Refugees, asylum-seekers, returnees, internally displaced and stateless persons*. Geneva: United Nations High Commissioner for Refugees, Division of Programme Support and Management.
4. *Yearbook of immigration statistics, 2010*. Washington, DC: Department of Homeland Security, Office of Immigration Statistics, Accessed July 27, 2011. Available at <http://www.dhs.gov/files/statistics/publications/yearbook.shtm>.
5. Goel, M. S., Wee, C. C., McCarthy, E. P., Davis, R. B., Ngo-Metzger, Q., & Phillips, R. S. (2003). Racial and ethnic disparities in cancer screening: The importance of foreign birth as a barrier to care. *Journal of General Internal Medicine, 18*(12), 1028–1035.
6. Wong, E. C., Marshall, G. N., Schell, T. I., Elliott, M. N., Babey, S. H., & Hambarsoomians, K. (2010). The unusually poor physical health status of Cambodian refugees two decades after resettlement. *Journal of Immigrant and Minority Health, 13*(5), 876–882.
7. Ku, L., & Matani, S. (2001). Left out: Immigrants' access to health care and insurance. *Health Affairs, 20*(1), 247–256.
8. Guendelman, S., Schaufliker, H. H., & Pearl, M. (2001). Unfriendly shores: How immigrant children fare in the U.S. health system. *Health Affairs, 20*(1), 257–266.
9. Bischoff, A., Bovier, P. A., Rrustemi, I., Gariazzo, F., Eytan, A., & Loutan, L. (2004). Language barriers between nurses and asylum seekers: Their impact on symptom reporting and referral. *Social Science and Medicine, 57*(3), 503–512.
10. Huang, Z. J., Yu, S. M., & Ledsky, R. (2006). Health status and health service access and use among children in U.S. immigrant families. *American Journal of Public Health, 96*(4), 634–640.
11. Lopez, A. D., Mathers, C. D., Ezzati, M., Jamison, D. T., & Murray, C. J. L. (2006). Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. *The Lancet, 367*(9524), 1747–1757.

12. Abegunde, D. O., Mathers, C. D., Adam, T., Ortegón, M., & Strong, K. (2007). The burden and costs of chronic diseases in low-income and middle-income countries. *The Lancet*, *370*(9603), 1929–1938.
13. Liu, Y., Weinberg, M. S., Ortega, L. S., Painter, J. A., & Maloney, S. A. (2009). Overseas screening for tuberculosis in US-bound immigrants and refugees. *New England Journal of Medicine*, *360*(23), 2406–2415.
14. Steel, Z., Chey, T., Silove, D., Marnane, C., Bryant, R. A., & van Ommeren, M. (2009). Association of torture and other potentially traumatic events with mental health outcomes among populations exposed to mass conflict and displacement: A systematic review and meta-analysis. *JAMA, the Journal of the American Medical Association*, *302*(5), 537–549.
15. Vergara, A. E., Miller, J. M., Martin, D. R., & Cookson, S. T. (2003). A survey of refugee health assessments in the United States. *Journal of Immigrant Health*, *5*(2), 67–73.
16. Dookeran, N. M., Battaglia, T., Cochran, J., & Geltman, P. L. (2010). Chronic disease and its risk factors among refugees and asylees in Massachusetts, 2001–2005. *Preventing Chronic Disease*, *7*(3), A51.
17. Culhane-Pera, K., Moua, M., DeFor, T., & Desai, J. (2009). Cardiovascular disease risks in Hmong refugees from Wat Tham Krabok, Thailand. *Journal of Immigrant and Minority Health*, *11*(5), 372–379.
18. Barnes, D. M., Harrison, C. L., & Heneghan, R. (2004). Health risk and promotion behaviors in refugee populations. *Journal of Health Care for the Poor and Underserved*, *15*(3), 347–356.
19. Ramos, M., Orozovich, P., Moser, K., Phares, C. R., Stauffer, W., & Mitchell, T. (2010). Health of resettled Iraqi refugees—San Diego County, California, October 2007–September 2009. *Morbidity and Mortality Weekly Report*, *59*(49), 1614–1618.
20. Reilly, R. (2008). *Disabilities among refugees and conflict-affected populations*. New York: Women's Refugee Commission.
21. Carrasquillo, O., Carrasquillo, A. I., & Shea, S. (2000). Health insurance coverage of immigrants living in the United States: Differences by citizenship status and country of origin. *American Journal of Public Health*, *90*(6), 917–923.
22. Connor, P. (2010). Explaining the refugee gap: economic outcomes of refugees versus other immigrants. *Journal of Refugee Studies*, *23*(3), 377–397.
23. Alker, J. C., & Ng'andu, J. (2006). *The role of employer-sponsored health coverage for immigrants: A primer*. Washington, DC: Kaiser Commission on Medicaid and the Uninsured, Kaiser Family Foundation.
24. Ayanian, J. Z., Weissman, J. S., Schneider, E. C., Ginsburg, J. A., & Zaslavsky, A. M. (2000). Unmet health needs of uninsured adults in the United States. *JAMA, the Journal of the American Medical Association*, *284*(16), 2061–2069.
25. Weissman, J. S., Stern, R., Fielding, S. L., & Epstein, A. M. (1991). Delayed access to health care: Risk factors, reasons, and consequences. *Annals of Internal Medicine*, *114*(4), 325.
26. Hafner-Eaton, C. (1993). Physician utilization disparities between the uninsured and insured. *JAMA, the Journal of the American Medical Association*, *269*(6), 787–792.
27. Wilper, A. P., Woolhandler, S., Lasser, K. E., McCormick, D., Bor, D. H., & Himmelstein, D. U. (2008). A national study of chronic disease prevalence and access to care in uninsured U.S. adults. *Annals of Internal Medicine*, *149*(3), 170–176.
28. McWilliams, J. M. (2009). Health consequences of uninsurance among adults in the United States: Recent evidence and implications. *The Milbank Quarterly*, *87*(2), 443–494.
29. Schoen, C., Osborn, R., How, S. K. H., Doty, M. M., & Peugh, J. (2009). In chronic condition: Experiences of patients with complex health care needs, in eight countries, 2008. *Health Affairs*, *28*(1), w1–w16.
30. Ward, E., Halpern, M., Schrag, N., et al. (2008). Association of insurance with cancer care utilization and outcomes. *CA: A Cancer Journal for Clinicians*, *58*(1), 9–31.
31. (2002). *Care without coverage: Too little, too late*. Washington, DC: Institute of Medicine, Committee on the Consequence of Uninsurance. National Academies Press.
32. Anderson, G., & Horvath, J. (2004). The growing burden of chronic disease in America. *Public Health Reports*, *119*(3), 263–270.
33. (2010). *Defining Overweight and Obesity*. Atlanta: Division of Nutrition, Physical Activity and Obesity, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Accessed May 1, 2011. Available at <http://www.cdc.gov/obesity/defining.html>.
34. (2008). *SAS 9.2*. Cary, NC: SAS Institute Inc.
35. Silove, D., Sinnerbrink, I., Field, A., Manicavasagar, V., & Steel, Z. (1997). Anxiety, depression and PTSD in asylum-seekers: Associations with pre-migration trauma and post-migration stressors. *The British Journal of Psychiatry*, *170*(4), 351–357.
36. Gerritsen, A. A., Bramsen, I., Deville, W., van Willigen, L. H., Hovens, J. E., & van der Ploeg, H. M. (2006). Physical and mental health of Afghan, Iranian and Somali asylum seekers and refugees living in the Netherlands. *Social Psychiatry and Psychiatric Epidemiology*, *41*(1), 18–26.
37. Kim, G., Aguado Loi, C. X., Chiriboga, D. A., Jang, Y., Parmelee, P., & Allen, R. S. (2011). Limited english proficiency as a barrier to mental health service use: A study of Latino and Asian immigrants with psychiatric disorders. *Journal of Psychiatric Research*, *45*(1), 104–110.
38. Beiser, M., & Hou, F. (2006). Ethnic identity, resettlement stress and depressive affect among Southeast Asian refugees in Canada. *Social Science and Medicine*, *63*(1), 137–150.
39. Snowden, L. R., Masland, M. C., Peng, C. J., Wei-Mien Lou, C., & Wallace, N. T. (2010). Limited English proficient Asian Americans: Threshold language policy and access to mental health treatment. *Social Science and Medicine*, *72*(2), 230–237.
40. Fazel, M., Wheeler, J., & Danesh, J. (2005). Prevalence of serious mental disorder in 7000 refugees resettled in western countries: A systematic review. *The Lancet*, *365*(9467), 1309–1314.
41. Swinkels, H., Pottie, K., Tugwell, P., Rashid, M., & Narasiah, L. (2010). Development of guidelines for recently arrived immigrants and refugees to Canada: Delphi consensus on selecting preventable and treatable conditions. *Canadian Medical Association Journal*, *183*(12), e928–e932.
42. Eckstein, B. (2011). Primary care for refugees. *American Family Physician*, *83*(4), 429.
43. Geltman, P. L., & Cochran, J. (2005). A private-sector preferred provider network model for public health screening of newly resettled refugees. *American Journal of Public Health*, *95*(2), 196–199.
44. Dicker, S., Stauffer, W. M., Mamo, B., Nelson, C., & O'Fallon, A. (2010). Initial refugee health assessments: New recommendations for Minnesota. *Minnesota Medicine*, *93*(4), 45.
45. Kennedy, J., Seymour, D. J., & Hummel, B. J. (1999). A comprehensive refugee health screening program. *Public Health Reports*, *114*(5), 469–477.
46. Cochran, J., O'Fallon, A., & Geltman, P. L. (2007). US medical screening for immigrants and refugees: Public health issues. In P. F. Walker & E. D. Barnett (Eds.), *Immigrant medicine* (pp. 123–134). Philadelphia, PA: Elsevier Health Sciences.
47. Fowler, N. (1998). Providing primary health care to immigrants and refugees: The North Hamilton experience. *Canadian Medical Association Journal*, *159*(4), 388–391.
48. Feldman, R. (2006). Primary health care for refugees and asylum seekers: A review of the literature and a framework for services. *Public Health*, *120*(9), 809–816.

49. Finkelstein, A., Taubman, S., Wright, B., et al. (2011). *The Oregon health insurance experiment: Evidence from the first year NBER working paper no 17190*. Cambridge: National Bureau of Economic Research.
50. Yun, K., Fuentes-Afflick, E. & Desai, M. M. (in submission). Prevalence of chronic disease and insurance coverage among refugees in the United States.
51. Maxwell, J., Cortes, D. E., Schneider, K. L., Graves, A., & Rosman, B. (2011). Massachusetts' health care reform increased access to care for Hispanics, but disparities remain. *Health Affairs*, 30(8), 1451–1460.
52. Cortes, D. E. (2011). *"No one asked me": Latinos' experience with Massachusetts health care reform*. Princeton, NJ: Robert Wood Johnson Foundation.