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Health Spending Among Working-Age Immigrants With Disabilities Compared To Those Born In The US

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Abstract

Background—Immigrants have disparate access to healthcare. Disabilities can amplify their healthcare burdens.

Objective/Hypothesis—Examine how US- and foreign-born working-age adults with disabilities differ in their healthcare spending patterns.

Methods—Medical Expenditures Panel Survey yearly-consolidated files (2000-2010) on working-age adults (18-64 years) with disabilities. We used three operational definitions of disability: physical, cognitive, and sensory. We examined annual total, outpatient/office-based, prescription medication, inpatient, and emergency department (ED) health expenditures. We tested bivariate logistic and linear regression models to, respectively, assess unadjusted group differences in the propensity to spend and average expenditures. Second, we used multivariable two-part models to estimate and test per-capita expenditures adjusted for predisposing, enabling, health need and behavior indicators.

Results—Adjusted for age and sex differences, US-born respondents with physical, cognitive, sensory spent on average \$2,977, \$3,312, and \$2,355 more in total compared to their foreign-born counterparts ($P < 0.01$). US-born spending was also higher across the four types of healthcare expenditures considered. Adjusting for the behavioral model factors, especially predisposing and enabling indicators, substantially reduced nativity differences in overall, outpatient/office-based and medication spending but not in inpatient and ED expenditures.

Conclusions—Working-age immigrants with disabilities have lower levels of healthcare use and expenditures compared to their US-born counterparts. Affordable Care Act provisions aimed at

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increasing access to insurance and primary care can potentially align the consumption patterns of US- and foreign-born disabled working-age adults. More work is needed to understand the pathways leading to differences in hospital and prescription medication care.

Keywords

Immigrants; Healthcare Expenditures; Disparities

INTRODUCTION

Federal and state policy initiatives established the elimination of disparities among individuals with disabilities as a strategic national health goal, making this group a US public health priority population.^{1,2} In 2010 close to 17% of US working-age adults had a disability,³ and rates of disability are expected to increase in the next few decades.⁴⁻⁸ Despite relative health advantages among immigrants, recent statistics indicate that one-in-ten immigrant adults have a disability,⁹ and an estimated 2.3 million working-age (18-64 years) immigrant adults are classified as such.¹⁰ These immigrants are, arguably, a doubly vulnerable population. Evidence on healthcare use and differences among subgroups within the disability population is emerging.¹¹ Yet, to date, there has been no empirical examination of the healthcare spending patterns of working-age immigrants with disabilities in the US. This work expands the research on outcomes associated with disability in the U.S and extends the evidence base in relation to healthcare services use among immigrants; an arguably healthcare underserved population.

Living with a disability places a significant burden on health, wellness, and standard of living, thus impacting the public support system.^{8,12-16} Recent research indicates that adults with disabilities have healthcare spending rates averaging close to 5 times the per-capita spending of the general population.¹⁷ Furthermore, the federal government spends close to a third of a trillion dollars yearly on programs for working-age people with disabilities.¹⁸ Healthcare costs represent 55% of all dollars spent by federal and state governments on this population, a 30% increase from levels recorded in 2002.¹⁸ One plausible explanation for higher spending among individuals with disabilities is that they are more likely to develop preventable secondary conditions, undergo severe medical complications, require more medication, and experience hospitalizations.¹⁹⁻²¹

The substantial growth of the foreign-born population in the US²² poses several challenges to providing equitable and cost efficient access to medical care for immigrants²³⁻²⁵ in a healthcare system that is already facing entrenched difficulties in delivering high quality and cost controlled care.²⁶⁻³⁰ Available empirical work establishes nativity as a risk factor for disparate access to healthcare.^{23,24} If nativity amplifies healthcare disparities among individuals with disabilities, a comprehensive understanding of this amplifying phenomenon and its consequences on healthcare services use and cost is warranted. Empirical findings may suggest effective ways to restructure the healthcare system to meet the essential needs of a highly disadvantaged and vulnerable population and reduce the use of expensive health services.

Previous research provides evidence on nativity-based differences in health expenditures in the adult population that suggests disparities in healthcare.^{23,31} This work focuses on health spending among persons with disabilities; a population with known high healthcare needs. As such, findings from this study can more pointedly identify nativity-based inequities in healthcare. The purpose of this paper is to examine how US- and foreign-born working-age adults with comprehensively defined and measured physical, cognitive, and sensory disabilities differ in their healthcare spending patterns. The three specific aims of this study are to determine: (1) whether known healthcare expenditure differences between US- and foreign-born adults in the general population extend to the high medical need population with disabilities; (2) whether differences between US- and foreign-born groups in spending vary depending on the type of healthcare services received; and (3) whether and to what extent predisposing, enabling, health need, and health behavior factors explain differences in spending patterns.

METHODS

Data

We used data from the Medical Expenditures Panel Survey (MEPS) Household Component (HC) yearly consolidated files,³² covering the entire first decade of the 21st century (2000-2010). Given that the MEPS data does not consistently include nativity information on respondents, we combined MEPS and National Health Interview Survey (NHIS) data. The MEPS-HC sample is selected from the sample of households that participated in a previous NHIS year and is representative of the U.S. civilian non-institutionalized population. A detailed discussion of the MEPS-HC sample design is available from the Agency for Healthcare Research and Quality (AHRQ).³³ Data files available from AHRQ permit users to link MEPS respondent records to their NHIS data from the previous year. Our data mergers followed specific procedures specified by AHRQ and used linkage codes created and provided by AHRQ staff. Details of these linkage files are provided elsewhere.³⁴ The NHIS data was only used for the purpose of extracting respondents' nativity information when not available in the MEPS yearly files. All other variables used in this study were based on the MEPS yearly household component files. The MEPS data includes detailed healthcare use and expenditures information, as well as extensive indicators of respondent demographic and socioeconomic conditions, health status, and health behavior. Wayne State University's institutional review board approved the study protocol.

Disability

To define disability we adopted the principles laid out by World Health Organization's International Classification of Functioning Disability and Health (ICF), as recommended by the Institute of Medicine.^{4,35} The ICF borrows from both medical and social approaches, defining disability by considering the latter to be not just an "attribute of the individual" but rather a state resulting from the interaction between person and environment.^{36,37} Given the definitional latitude of the concept of disability and the dependence between different disability classifications and healthcare needs, we consider three indicators that encompass multiple dimensions and severities in the relationship between person and environment. Our choice of indicators is consistent with a growing number of quantitative studies focusing on

disability in minority populations.³⁸⁻⁴¹ All indicators were measured dichotomously (i.e. 0=No, 1=Yes). First, we examined physical limitations, as gauged by respondents reporting difficulties in “walking, climbing stairs, grasping objects, reaching overhead, lifting, bending or stooping, or standing for long periods of time.”^{42(p.38)} Second, we examined cognitive limitations measured as endorsement of any of the following: “(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety.”^{42(p.40)} Third, we examine sensory limitations measured as either vision impairment based on self-reported “difficulty seeing (with glasses or contacts, if used)” or hearing impairment based on self-reports of aural “difficulty (with hearing aid, if used)”.^{42(p.41,42)} The disability measures we used were not mutually exclusive. For example, having physical disability did not preclude concomitant reports of cognitive or sensory disabilities. Two considerations factored into our operationalization decision. First, we had sample size constraints. Distinguishing between singular and compound disability profiles was likely to be underpowered, particularly with respect to cognitive disability where comorbidities were prevalent. Second, our primary focus was on examining nativity group differences in expenditures among respondents with the considered disabilities and not to estimate expenditures attributable to specific disability profiles. However, to accommodate the possibility of differing profiles between nativity groups and account for their effects on our estimates, all final models (described below) included adjustments for the presence of other disabilities. For example, in the case of physical disability the final models controlled for the presence of cognitive and/or sensory disabilities by including these indicators as covariates in the models.

Analytic sample

Our main focus in this study is on respondents ages 18-64 years with reported disabilities. The combined MEPS yearly files (2000-2010) included n=190,151 respondents ages 18-64 years. We excluded 6.7% respondents with missing values on the model covariates of interest and an additional 1.9% who did not report nativity status. The rates of missingness on the disability outcomes were less than 1.0%. The disabilities rates in the analytic sample were 11.4% (unweighted-n=20,909), 4.4% (unweighted-n=8,853), and 9.6% (unweighted-n=16,263) for physical, cognitive, and sensory, respectively. The prevalence of respondents reporting any of the three considered disabilities was 19.3% (unweighted-n=34,126). A more detailed investigation of participants profiles indicated that: 1) among respondents reporting a physical disability, close to three out of five (59%) reported having a physical disability only, while 14.9%, 16.7%, and 9.5% reported physical and cognitive, physical and sensory, and all three disabilities, respectively; 2) among respondents reporting a cognitive disability, less than three in ten (29.8%) reported having a cognitive disability only, while 38.2%, 7.9%, and 24.2% reported cognitive and physical, cognitive and sensory, and all three disabilities, respectively; finally, 3) among respondents reporting a sensory disability, more than two thirds (65.4%) reported having a sensory disability only, while 19.8%, 3.6%, and 11.2% reported sensory and physical, sensory and cognitive, and all three disabilities, respectively. Additional analyses of group profiles (available from authors) showed that foreign-born disabled respondents were more likely to report cognitive impairment only compared to the US-born, while US-born respondents with disabilities were more likely to report both physical and sensory disabilities and all three types of disabilities combined.

Outcome measures

We examined five measures of health expenditures including total yearly expenditures, as well as four types of incurred expenses: outpatient/office-based, prescription medication, inpatient hospitalization, and emergency department (ED). Expenditures in the MEPS account for direct payments for healthcare services received during a calendar year and include: payments made out-of-pocket, or by private insurance, Medicaid, Medicare, and other sources. Indirect payments and expenses incurred when purchasing over the counter drugs are excluded from MEPS.⁴²

Main Predictor

Our main interest is in the spending patterns of foreign-born respondents relative to those born in the US. Nativity was measured based on self-reported information probing whether a respondent was born outside the United States.

Covariates

We used a modified Andersen Behavioral Model as our conceptual framework.⁴³ First, we controlled for age, sex, geographic region, whether the respondent lives in a Metropolitan Statistical Area (MSA), and time using fixed categorical indicators for survey year with the reference set to year 2000. Our predisposing factors accounted for race/ethnicity, poverty status, and employment. Enabling factors included education, insurance, and report of a usual source of care (USC). Need factors were measured using four indicators: self-reported health status (fair/poor vs. good/very good/excellent), two subjective indices of physical and mental health based on the SF-12,⁴⁴ and a count of 9 health conditions classified as priority conditions by AHRQ due to either high prevalence or high cost of the underlying disease. We also accounted for three health behavior measures including: obesity (calculated as BMI $\geq$ 30 and generated based on self-reported weight and height information), physical activity (yes, no), and whether the respondent is currently a smoker (yes, no). With the exception of nativity, all variables used in the analyses were extracted from the MEPS-HC consolidated yearly files. The smoking status indicator, general self-reported health, and SF-12 assessment questions were based on the MEPS Adult Self-Administered Questionnaire (SAQ), which is a mail-back survey fielded to MEPS respondents 18 years older. Detailed descriptions of the SAQ and its content, and a copy of the survey questionnaire are publicly available from the AHRQ.⁴² We used probability weights generated by the AHRQ to allow generalizations of SAQ based analyses to the adult US population.⁴²

Statistical Approach

Our analytic plan consisted of three steps. First, we generated descriptive statistics to examine and test differences in predisposing, enabling, and need factors based on nativity status among persons with disabilities. Second, we calculated unadjusted spending propensities (i.e. whether or not a person reported any spending in the past year), and average per-capita spending among spenders by nativity status for each of the considered health spending outcomes of interest. We plotted the estimated differences in the 1) propensity to spend, and 2) average spending in Figure 1. Third, we tested two-part models

while incrementally adjusting for 1) age and sex, 2) geographic residence and survey-year, 3) social predisposing and enabling factors, and 4) health factors including need and behaviors. All fully adjusted models included additional adjustments for the presence of other disabilities as described above. We used logistic regression to distinguish between spenders and non-spenders and a generalized linear model with a gamma distribution to estimate the model parameters in the subpopulation of spenders. Detailed discussions of two-part models are available elsewhere.⁴⁵⁻⁴⁷ To facilitate the interpretation of our results we provide estimated sex and age adjusted and full covariates adjusted marginal effects and their 95% confidence intervals in Figure 2. We provide detailed presentations of the estimated average expenditures resulting from the incrementally adjusted models, as well as tests of differences between US and foreign-born estimates in supplemental Tables 1 and 2, and graphical plots of these estimates in supplemental Figure 1. All analyses used survey specific functionalities in the Stata 13.1 software to accommodate the MEPS complex survey design.

RESULTS

Descriptives (Table 1)

Among individuals with disabilities, foreign-born respondents were more likely to live in a MSA, the Northwest and Western regions, to report not having a usual source of care, to be Medicaid only recipients or to be uninsured, and to be classified as being poor or near poor. They were also more likely to be Latinos or Other race/ethnic background, and to report having less than a high school education.

US-born respondents were more likely to be obese, and to report being current smokers. The average age, with the exception of respondents with cognitive disability, and mental health scores were largely similar among US- and foreign-born respondents. US-born respondents had lower scores on the physical SF-12 and higher average numbers of reported medical conditions. These results were consistent across all considered disability measures.

Unadjusted differences in spending (Table 2; Figure 1)

US-born respondents had a higher likelihood of incurring health expenditures relative to the foreign-born. The higher propensity to incur an expense among the US-born was evident in all four types of health expenditures considered (i.e. outpatient/office-based, prescription medication, Inpatient hospitalization, and ED). The increased likelihood of incurring expenditures was especially high for hospital care, both inpatient and ED. Specifically, US-born respondents with physical, cognitive, and sensory disabilities had, respectively, 33.5%, 39%, and 69.1% higher probability of inpatient spending and 21.1%, 39.7%, and 38.7% higher probability of ED spending compared to their foreign-born counterparts ($P<0.01$).

We also found a higher level of average dollars spent among US-born respondents reporting expenditures in the past year. US-born respondents with physical disability spent 32.7% more overall, 20.6% more on outpatient/office based care, and 29.6% more on prescription drugs (all $p<0.01$). We found no difference between US- and foreign-born groups in spending on inpatient or ED care among those reporting physical limitations. Among

respondents with cognitive limitations, US-born respondents with expenditures spent 29.8% more overall, 27.9% more on prescription medication, and 48.3% on ED care (all $p<0.01$). We found no difference between US- and foreign-born groups in spending on inpatient or outpatient/office-based care among those reporting cognitive limitations.

Among respondents with sensory limitations, US-born respondents spent 50.4% ($p<0.01$) more overall, had 24% ($p=0.029$) higher average spending on outpatient/office based care, and 36.2% ($p<0.01$) higher spending on prescription medications, and 31.2% higher spending on inpatient hospitalization ($p=0.037$). US- and foreign-born respondents with sensory limitations did not differ in their spending on ED care.

Two-part models (Table 3)

Estimated marginal effects from the two-part models indicated that, adjusting for age and sex, US-born adults with physical limitations spent 34% ($p<0.01$) more overall, 28% ($p<0.01$) more on outpatient/office based care, 28% ($p<0.01$) more on outpatient/office-based care, 41% ($p<0.01$) more on prescription medication, 47% ($p<0.01$) more on inpatient hospitalization, and 31% ($p<0.05$) more on ED care. The results for cognitive, and sensory disabilities were largely similar to physical disability with one exception. We found no statistically significant differences in the spending of cognitively impaired US-born and foreign-born adults on inpatient care. The estimated marginal effects and their standard errors for the age and sex adjusted models are presented in Table 3. We also present the results of the age and sex adjusted estimated differences in spending between groups and their confidence intervals in Figure 2.

Adjusting for the Behavioral Model factors substantially attenuated the differences in total health spending between US- and foreign-born adults across all considered measures of disability. Nonetheless, though partially reduced, we found persistent differences based on nativity status for particular types of spending. Specifically, total spending remained 14.6% higher among respondents with sensory limitations. Spending on prescription medication remained 17% ($p<0.05$) and 23% ($p<0.01$) higher among US-born respondents with cognitive and sensory limitations. Spending on inpatient care remained 38% ($p<0.01$), and 44% ($p<0.05$) higher among US-born respondents with physical and sensory disabilities, respectively. Finally, spending on ED care remained 48% ($p<0.01$) higher among US-born respondents with cognitive limitations. The estimated marginal effects and their standard errors for the fully adjusted models are presented in Table 3. We also present the results of the fully adjusted estimated differences in spending between groups and their confidence intervals in Figure 2. Detailed tabular presentations that show the incremental reduction in differences between groups as a result of adjustment to predisposing, enabling and need factors are provided in supplemental Tables 1 and 2, and supplemental Figure 1.

DISCUSSION

Three main findings emerge. First, US-born working-age adults with disabilities had higher total healthcare expenditures compared to the foreign-born. Second, this higher level of spending was found for outpatient/office-based care, prescription medication, inpatient hospitalization, and ED care and was consistent across three measures of disability. Third,

higher spending among working-age US-born adults, though reduced, remained for prescription medication, inpatient hospitalization, and to a lesser extent ED care after adjusting for the covariates. The primary implication of these findings is that disparities in healthcare use and expenditures among the foreign-born, which have been shown in previous studies,^{23,24} extend to the vulnerable high health-need population with disabilities. However, when dealing with group differences in healthcare consumption it is important to note the difficulty in defining what the optimal levels of use are. Until these optimal levels of utilization are established it is critical to research whether group differences result, and if so to what extent, from “underuse” among the vulnerable group or “overuse” in the dominant group.

Iezzoni has argued that the US healthcare system is not structured or currently equipped to effectively address the needs of individuals with disability.⁸ Individuals with disabilities encounter numerous health access barriers including barriers associated with the physical accessibility of environments and equipment, the availability of specialists and healthcare providers familiar with their special needs, issues associated with insurance and reimbursement for healthcare services and equipment, and suitable preventative and mental health care.^{8,48-52} It is possible for these barriers to constitute a double jeopardy for the immigrant population that is already facing multiple structural impediments.⁵³ We aimed to identify factors that might be contributing to burdens introduced by individuals’ nativity status.

Our findings indicate that adjusting for the behavioral model factors substantially reduced total, outpatient/office-based, and prescription medication spending differences between US- and foreign-born groups. This was true across all types of disabilities examined. The importance of social risk factors (e.g. poverty and race/ethnicity) for understanding disparities in healthcare in the general population has been documented extensively, and in the case of insurance and access to a USC shown to play a particularly important role in the foreign-born population.^{23,24,54} Recent work, for example, indicates that lack of insurance presents a substantial barrier to accessing care among persons with disabilities compared to their uninsured counterparts.⁵¹ Uninsurance rates among immigrant adults with disabilities are higher than among their US-born counterparts (e.g., 36% among Mexicans).⁵⁵ As such, poor uninsured immigrant persons with disabilities could be more susceptible to primary and preventive care access related barriers.⁵⁵ Social determinants, namely predisposing and enabling factors, play an important role in explaining differences in overall healthcare spending due to nativity among disabled working-age adults; the effects of these factors, however, might be limited depending on the type of healthcare service used. This is in line with recent work showing that factors that influence access (e.g., insurance) among disabled individuals have mixed effects in explaining racial/ethnic and socioeconomic disparities in access to a variety of healthcare services.⁵⁶

Our behavioral model factors, despite substantial reduction, did not completely attenuate differences in spending on prescription medication for respondents with cognitive and sensory limitations. These findings suggest that foreign-born respondents with such disabilities remain at higher risk for foregoing treatment, delaying medication initiation, and non-adhering to medication regimen even after controlling for socioeconomic, access, and

health need characteristics. Immigrants, controlling for access and socioeconomic differences, are more likely than their US born counterparts to be unaware that they might have serious risk factors and diseases such as hypertension, and diabetes and thus less likely to recognize the need for treatment.⁵⁷⁻⁵⁹ In addition, foreign-born adults face a more serious financial burden due to healthcare compared to those born in the US.⁶⁰ Higher healthcare financial burden (e.g. due to cost sharing) is a risk factor for non-adherence and underuse of medication.^{61,62} Recent work suggests that individuals with disabilities have a disproportionate level of out-of-pocket expenses, even among those with access to Medicare or employer provided insurance.⁶³ Indeed, the higher use of healthcare services among disabled persons translates into a financial burden that is 2.6 times the burden of non-disabled individuals; mainly driven by spending on prescription medications.⁶⁴ It is possible that the higher financial burden among foreign-born respondents with cognitive and sensory limitations explains the evidenced differences in prescription medication spending. Factors that are unaccounted for in our models might contribute to explaining these residual differences among the foreign-born, including appropriate communication about treatment with healthcare providers, insurance plan generosity and generic drug use, and health beliefs and preferences in use of medication.

The behavioral model factors that we considered also did not completely explain differences in hospital based spending, including inpatient hospitalization and ED care. Several factors could have contributed to these residual differences. First, hospital expenditures are subject to structural and market determinants that go beyond the individual characteristics examined in this study and the literature includes evidence of large variations in cost of hospital care nationally.⁶⁵⁻⁶⁸ Although we controlled for factors such as residence in metropolitan statistical area and region, it is possible that more granular geographic differentiation of where immigrants seek care would yield more informative findings about differences in hospital use and expenditures. Second, empirical evidence suggests that immigrants are less likely to be aware of symptoms of serious medical conditions such as heart attacks and strokes compared to their US-born counterparts,⁶⁹ and that they are less inclined to use hospital services even for highly critical conditions such as having a stroke.⁷⁰ Third, healthcare facilities are not optimally designed to accommodate the needs of persons with disabilities,⁴⁹ and hospital settings, in particular, are hard to negotiate social and physical environments.⁴⁸ The effects of these obstacles vary by demographic and socioeconomic characteristics,^{48,50} and could have magnified the effects of sociocultural (e.g. linguistic) and structural (e.g. immigration status) burdens known to affect hospital use among immigrants with high medical needs,^{71,72} thus leading to the evidenced residual differences. Several other factors that influence immigrants' healthcare seeking behavior could also play a role, including geographic and transportation barriers (e.g. proximity to hospitals), communication problems, awareness of eligibility, trust in hospital based providers and perception of discrimination, care preferences and aversions to extensive and costly procedures, and the lower use of emergency department care among immigrants in the US.^{73,74} Future work should probe further into the effects of these factors on differences in hospital care expenditures.

Our findings should be interpreted within the context of several limitations. First, our data are based on survey-collected information and as such suffer from limitations of

observational survey data including lack of complete randomization of comparison groups, and reliance on self-reported measures. Second, MEPS does not account for environmental variables or measure physical barriers and transportation difficulties that can be pronounced among individuals with disabilities. Third, we did not control and therefore were unable to gauge the effects of language and citizenship status due to the high confounding with nativity. Finally, to allow cross group comparisons and covariate adjustment we aggregated data from 11 MEPS yearly files and consequently the findings generalize to cumulative differences in the first decade of the twenty first century. Our sample size was underpowered to allow for yearly trends examination. Further research on hospitalization and prescription medication use among disabled persons is required to understand the determinants of differences due to nativity.

Our findings have important policy implications. The Affordable Care Act (ACA) includes provisions aimed at increasing access to appropriate healthcare and eliminating disparities in access among vulnerable populations, including persons with disabilities.^{8,75,76} In order to succeed, the ACA must enhance equity in access to healthcare and quality of care provided and align consumption of healthcare resources to achieve system efficiencies (e.g. increase use of primary care). This will partly depend on the ability to target and reach high need, high cost, vulnerable populations with potential modifiable risks, in particular immigrants and working-age adults with disabilities, and immigrants in particular. The ACA provisions aimed at increasing access to health insurance and primary care units, serving large immigrant populations (e.g. federally qualified health centers) can potentially align the consumption patterns of US- and foreign-born adults. However, several researchers have cast doubt on the potential for the ACA to successfully affect the foreign-born population,⁷⁷⁻⁸⁰ and media reporting of early implementation indicate that some immigrant groups are facing substantial barriers to benefit from its provisions. Our study provides a baseline assessment of differences between US- and foreign-born respondents with disabilities and identifies factors that contribute to explaining these differences and warrant the special attention of policy makers and public health stakeholders.

CONCLUSION

Working-age immigrants with disabilities have lower levels of healthcare use and expenditures compared to their US-born counterparts. Predisposing and enabling factors explain overall and outpatient/office-based differences in spending on healthcare due to nativity. However, hospitalization and prescription medication spending levels remained higher among the US-born after adjusting for predisposing, need, health behaviors, and enabling factors. Our findings suggest that success in expanding access to insurance and boosting primary care use can reduce healthcare disparities among working-age immigrants with disabilities. However, exclusive focus on such policy provisions might fall short of balancing differences in spending on specific health services resources. The findings from this study can be used as a benchmark for future research after the implementation of the ACA.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Unadjusted (%) differences in 1) the propensity to use healthcare and 2) average health expenditures among spenders by nativity status and disability type. Results based on data from working-age adults (18-64) from the Medical Expenditures Panel Survey (2000-2010).

Figure 2.

Estimated marginal differences in per-capita healthcare expenditures by nativity status and disability type. Estimates are based on two-part models using data on working-age adults (18-64) from the Medical Expenditures Panel Survey (2000-2010).

Note 1: Fully Adjusted for age, sex, geographic region, Metropolitan Statistical Area (MSA), survey year, race/ethnicity, poverty status, employment, education, insurance, a usual source of care, self-reported health status, two indices of physical and mental health based on the SF-12, count of 9 health conditions, obesity, physical activity, and smoking

status. The models for physical disability also adjust for cognitive and sensory disabilities. The models for cognitive disability also adjust for physical and sensory disabilities. Finally the models for sensory disability also adjust for physical and cognitive disabilities.

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Table 1

Sample descriptive statistics by nativity status and disability type for working-age adults (18-64) in the Medical Expenditures Panel Survey (2000-2010).

	Physical		Cognitive		Sensory	
	FB (n=2,550)	USB (n=18,359)	FB (n=1,160)	USB (n=7,693)	FB (n=2,012)	USB (n=14,251)
	% / Mean					
Age (mean)	30.1	30.3	30.2	27.6	28	29.1
Sex (%)						
Female	60.2	58.1	55.1	56.4	50.5	47.3
MSA (%)						
Yes	93.5	77.1	96.2	77.7	92.9	77.7
Region (%)						
Northeast	24.2	15.1	30.7	17.1	19.5	14
Midwest	11.6	24.5	10.7	22.5	12.5	26.2
South	28.3	39.9	25	38.2	31.2	37.6
West	35.9	20.5	33.5	22.1	36.8	22.3
Poverty Status (%)						
Poor	23.9	20.5	32.1	30.9	17.6	14.6
Near Poor	6.2	5.2	9.5	6.7	6.3	4
Low Income	15.6	14.6	19.8	17.7	16.9	12
Middle Income	29.6	28.3	23.1	25.1	30.6	30.6
High Income	24.8	31.4	15.5	19.7	28.5	38.8
Employment (%)						
Unemployed	43.1	41.7	59.9	58.5	26	25.2
Employed	46.9	49.4	32.7	31.1	65.9	66.6
Partial Employment	10	8.9	7.4	10.5	8.1	8.2
Race/Ethnicity (%)						
Non-Latino White	24.6	77.2	22.3	72.3	27	81.7
Blacks	5.7	14.1	5.2	16.2	4.7	9.9
Latino	49	5	50.5	6.9	48.6	4.9
Other	20.7	3.8	22	4.7	19.7	3.5
Education (%)						
Less than High School	38.6	21.6	45.9	29.2	33.4	17.7
High School	21.4	36.4	23.6	37.6	21.3	34.5
Some College	10.8	16.1	8.7	14.9	11.1	16
College	29.1	25.9	21.7	18.2	34.2	31.8
Insurance (%)						
Medicare Only	2.9	5.6	4.2	8.5	1.2	3
Medicaid Only	19.4	12.7	32.7	22.1	12.6	8.2
Medicare and Medicaid	5	5.7	7.8	11.3	1.6	3
Other Insurance	2.9	2	2.1	1.9	1.8	1.8

	Physical		Cognitive		Sensory	
	FB (n=2,550)	USB (n=18,359)	FB (n=1,160)	USB (n=7,693)	FB (n=2,012)	USB (n=14,251)
	%/ <i>Mean</i>					
Private Insurance	49	59.6	33.4	42.3	54.8	68.5
Uninsured	20.7	14.3	19.9	13.9	28	15.6
USC (%)						
Yes	79	87	79.6	85.7	70.4	81.7
Fair/Poor Health (%)						
Yes	46.3	43.3	<i>57.7</i>	<i>54.6</i>	30.3	25.5
SF-12 - Physical (Mean)	38.6	36.9	<i>38.5</i>	<i>38</i>	47	45.7
SF-12 - Mental (Mean)	44.9	45.8	<i>39.2</i>	<i>38.5</i>	<i>46.7</i>	<i>47.3</i>
Number of Conditions (Mean)	1.6	2	1.7	2	1.1	1.5
Obese (%)						
Yes	33.5	47	27.6	40.2	27.3	35.7
Physical Activity (%)						
Yes	<i>42.4</i>	<i>42.4</i>	<i>38.5</i>	<i>39.5</i>	49.1	54.7
Current Smoker (%)						
Yes	19.5	34.7	21.6	42.1	20.4	32

Note 1: The disability indicators were measured dichotomously (0=No, 1=Yes). Physical limitations were measured based on reports of difficulties in “walking, climbing stairs, grasping objects, reaching overhead, lifting, bending or stooping, or standing for long periods of time.” Cognitive limitations were measured as endorsement of any of the following: “(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety.” Sensory limitations were measured as either vision impairment based on self-reported “difficulty seeing (with glasses or contacts, if used)” or hearing impairment based on self-report of “aural difficulty (with hearing aid, if used)”.

Note 2: FB indicate foreign-born; USB indicate US-born; MSA indicate Metropolitan Statistical Area; USC indicates usual source of care; SF-12 indicate the 12-item Short-Form Health Survey

Note 3: Bolded characteristics are statistically significant and italicized numbers are not significant ($p>0.05$) based on survey adjusted chi-squared tests (categorical indicators), and t-tests (continuous indicators).

Note 4: The included group specific sample sizes are unweighted n.

Table 2

Unadjusted rates of healthcare services use and average health expenditures by nativity status and disability type among working-age adults (18-64) from the Medical Expenditures Panel Survey 2000-2010.

	Spenders (Yes/No)			Spending Among Users (\$)		
			2-test			t-test
	%			Mean		
	FB	USB		FB	USB	
Physical						
Total Expenditures	92.9	95.8	P = 0.0000	9198	12203	P = 0.0000
Outpatient/Office Based	84.2	90.1	P = 0.0000	3359	4051	P = 0.008
Prescription Medication	82.2	89.1	P = 0.0000	2322	3008	P = 0.0000
Inpatient	13.0	17.3	P = 0.0000	17757	20634	P = 0.244
Emergency Department	20.4	24.7	P = 0.0003	1281	1399	P = 0.402
Cognitive						
Total Expenditures	93.0	95.3	P = 0.0141	10564	13708	P = 0.004
Outpatient/Office Based	85.7	89.1	P = 0.0205	3473	4060	P = 0.210
Prescription Medication	84.3	89.6	P = 0.0005	2931	3750	P = 0.001
Inpatient	14.2	19.8	P = 0.0008	20160	19303	P = 0.842
Emergency Department	20.6	28.8	P = 0.0000	996	1477	P = 0.000
Sensory						
Total Expenditures	85.4	92.0	P = 0.0000	4978	7486	P = 0.0000
Outpatient/Office Based	73.4	82.3	P = 0.0000	2282	2829	P = 0.029
Prescription Medication	67.8	79.0	P = 0.0000	1536	2091	P = 0.0000
Inpatient	6.4	10.8	P = 0.0000	12432	16305	P = 0.037
Emergency Department	13.4	18.5	P = 0.0000	1109	1238	P = 0.356

Note 1: The disability indicators were measured dichotomously (0=No, 1=Yes). Physical limitations were measured based on reports of difficulties in “walking, climbing stairs, grasping objects, reaching overhead, lifting, bending or stooping, or standing for long periods of time.” Cognitive limitations were measured as endorsement of any of the following: “(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety.” Sensory limitations were measured as either vision impairment based on self-reported “difficulty seeing (with glasses or contacts, if used)” or hearing impairment based on self-report of “aural difficulty (with hearing aid, if used)”.

Note 2: FB indicate foreign-born; USB indicate US-born.

Note 3: All reported dollar estimates are rounded to the nearest integer.

Table 3

Estimates of adjusted per-capita average healthcare expenditures by nativity and disability type. Results are based on two-part models using data from working-age adults (18-64) in the Medical Expenditures Panel Survey (2000-2010).

Total Expenditures		Outpatient/Office Based		Prescription Medication		Inpatient		Emergency Department								
Model 1: Age and Sex Adjusted																
	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE						
Physical																
FB	8685	586	***	2853	202	***	1915	123	***	2418	392	***	263	31	**	
USB	11662	305		3650	84		2693	57		3562	211		345	14		
Cognitive																
FB	9771	1101	***	2814	337	**	2393	200	***	2827	716	ns	210	26	***	
USB	13083	455		3647	139		3379	85		3829	301		425	26		
Sensory																
FB	4536	302	***	1754	152	***	1080	92	***	823	136	***	150	21	***	
USB	6891	158		2331	63		1657	40		1752	90		229	11		
Model 2: Fully Adjusted																
	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE	E(Y)	SE
Physical																
FB	10815	958	ns	3400	267	ns	2442	205	ns	2528	324	***	295	37	ns	
USB	11502	267		3608	78		2746	59		3494	170		339	14		
Cognitive																
FB	11209	1168	ns	3338	413	ns	2892	198	**	2823	590	ns	277	37	***	
USB	12879	385		3599	123		3383	87		3695	221		411	23		
Sensory																
FB	6072	393	**	2245	178	ns	1407	124	**	1185	209	**	182	27	ns	
USB	6957	169		2280	59		1732	45		1709	84		223	10		

Note 1: The disability indicators were measured dichotomously (0=No, 1=Yes). Physical limitations were measured based on reports of difficulties in "walking, climbing stairs, grasping objects, reaching overhead, lifting, bending or stooping, or standing for long periods of time." Cognitive limitations were measured as endorsement of any of the following: "(1) experience confusion or memory loss, (2) have problems making decisions, or (3) require supervision for their own safety." Sensory limitations were measured as either vision impairment based on self-reported "difficulty seeing (with glasses or contacts, if used)" or hearing impairment based on self-report of "aural difficulty (with hearing aid, if used)".

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Note 2: FB indicate foreign-born; USB indicate US-born.

Note 3: Fully Adjusted for age, sex, geographic region, Metropolitan Statistical Area (MSA), survey year, race/ethnicity, poverty status, employment, education, insurance, a usual source of care, self-reported health status, two indices of physical and mental health based on the SF-12, count of 9 health conditions, obesity, physical activity, and smoking status. The models for physical disability also adjust for cognitive and sensory disabilities. The models for cognitive disability also adjust for physical and sensory disabilities. Finally the models for sensory disability also adjust for physical and cognitive disabilities.

Note 4: All reported dollar estimates are rounded to the nearest integer.

ns=not significant

*** P<0.01

** P<0.05

* P<0.10