

# Health Care Expenditures of Immigrants in the United States: A Nationally Representative Analysis

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The United States is a nation of immigrants. In 2000, the immigrant population of the United States was 28.4 million, 10.4% of the total population.<sup>1</sup> In one of the most comprehensive analyses to date on the costs and benefits of immigrants to the US economy, the National Research Council concluded that immigrants add as much as \$10 billion to the economy each year and that immigrants will pay on average \$80 000 per capita more in taxes than they use in government services over their lifetimes.<sup>2</sup> The Social Security Administration estimates that workers without valid social security numbers contribute 8.5 billion dollars annually to Social Security and Medicare. Such workers, most of them immigrants, usually receive no eligibility credits for their contributions.<sup>3</sup> Taxpayers and politicians in states such as New York, California, Texas, Arizona, and Florida have expressed concern about the potential extra burden immigrants place on their states' health care systems,<sup>5–8</sup> particularly state welfare and Medicaid programs.<sup>9</sup>

Researchers from the Center for Immigration Studies have concluded that because immigrant labor has “limited value . . . in an economy that increasingly demands educated workers,” providing insurance to immigrants is “at the taxpayer expense.”<sup>10</sup> These views have resulted in legislative initiatives such as California's Proposition 181, which attempted (before it was ultimately overturned in court) to bar undocumented immigrants from receiving nonemergency health services.<sup>11</sup> Similarly, the 1996 Personal Work and Responsibility Reconciliation Act made most legal immigrants who entered the United States after 1996 ineligible for Medicaid for 5 years after entry.<sup>12</sup>

Although more recent surveys suggest that public attitudes toward immigrants' contributions, particularly with regard to economic impact, are becoming more positive,<sup>13</sup> public fears after September 2001 may reverse this trend.

**Objectives.** We compared the health care expenditures of immigrants residing in the United States with health care expenditures of US-born persons.

**Methods.** We used the 1998 Medical Expenditure Panel Survey linked to the 1996–1997 National Health Interview Survey to analyze data on 18 398 US-born persons and 2843 immigrants. Using a 2-part regression model, we estimated total health care expenditures, as well as expenditures for emergency department (ED) visits, office-based visits, hospital-based outpatient visits, inpatient visits, and prescription drugs.

**Results.** Immigrants accounted for \$39.5 billion (SE=\$4 billion) in health care expenditures. After multivariate adjustment, per capita total health care expenditures of immigrants were 55% lower than those of US-born persons (\$1139 vs \$2546). Similarly, expenditures for uninsured and publicly insured immigrants were approximately half those of their US-born counterparts. Immigrant children had 74% lower per capita health care expenditures than US-born children. However, ED expenditures were more than 3 times higher for immigrant children than for US-born children.

**Conclusions.** Health care expenditures are substantially lower for immigrants than for US-born persons. Our study refutes the assumption that immigrants represent a disproportionate financial burden on the US health care system. (*Am J Public Health.* 2005;95:1431–1438. doi:10.2105/AJPH.2004.044602)

In this study, we used nationally representative data to compare the health care expenditures of immigrants and US-born individuals.

## METHODS

### Survey Instrument

We analyzed data from the Agency for Healthcare Research and Quality's 1998 Medical Expenditure Panel Survey (MEPS). This survey is designed to provide nationally representative estimates of expenditures and health services for the US civilian noninstitutionalized population.<sup>14</sup> To provide estimates for specific priority populations, MEPS oversamples low-income families and ethnic minorities. MEPS data are compiled through information obtained from the Household Component, the Medical Provider Component, the Insurance Component of MEPS. In the MEPS Household Component, respondents use a computer-assisted program to report sociodemographic characteristics, health and functional status, use of medical care ser-

vices, health insurance coverage, income, and employment. The MEPS Medical Provider Component supplements and validates information on medical care events reported in the Household Component by contacting providers and facilities identified by household respondents. The Medical Provider Component includes expenditure data from hospitals, outpatient medical providers, home health agencies, and pharmacies.

We analyzed total health expenditures during 1998, including expenditures for several specific population subgroups and categories of health care. MEPS defines expenditures as the sum of payments for care provided during 1998. This figure includes payments such as out-of-pocket payments, insurers' payments, and imputed payments for free care received in public hospitals or clinics. The Agency for Healthcare Research and Quality uses weighted sequential hot-deck imputation<sup>15</sup> for any missing values (for a respondent with missing data, values are imputed from the nearest preceding respondent in the sequence

who has similar characteristics and complete information).<sup>16</sup> MEPS combines facility and physician expenses when tabulating emergency department, hospital-based outpatient, and inpatient expenditures. Payments for over-the-counter drugs and for alternative medicine (e.g., acupuncture, chiropractic care) are not included in MEPS. MEPS expenditure estimates exclude costs for health care administration and institutionalized care. However, after adjustment for these omissions, MEPS estimates of national health expenditures substantially agree with those of the US Department of Health and Human Services' National Health Accounts.<sup>17</sup>

MEPS expenditure data include estimates of free care and bad debt in public hospitals or clinics. These imputed expenditure data are designed to account for payments, made from government budgets, that are not tied to specific patients. However, MEPS expenditure data do not cover uncollected liabilities, negotiated discounts, bad debt, and free care associated with private providers.<sup>15</sup> By some estimates, US hospitals (public and private) write off as much as \$2 billion a year in unpaid medical bills to treat illegal immigrants.<sup>18</sup> Therefore, we performed a separate confirmatory analysis of MEPS total charges (rather than expenditures) for health care, which include free care delivered at any site. Charge variables should be interpreted with caution, because they do not represent actual dollars exchanged for services or the resource costs of those services.<sup>15</sup>

To obtain data on the immigration status of respondents, we combined the Household Component file of the 1998 MEPS with the 1996–1997 National Health Interview Survey (NHIS), which asked respondents about their place of birth. Each year, MEPS draws a new panel from the previous year's NHIS sample. The NHIS includes self-reported data on place of birth as well as on a variety of other sociodemographic and household characteristics not included in the MEPS. As described elsewhere,<sup>19</sup> NHIS and MEPS data sets can be linked. In 1998, MEPS sampled 24 072 individuals and assigned positive person-level weights for 22 953 individuals. We were able to link 21 241 individuals in the MEPS sample (18 398 US-born persons and 2843 immigrants) with the NHIS sample.

Individuals sampled in MEPS were not linked with the NHIS sample (or did not receive a person-level weight) if they were not a member of an NHIS household at the time of the 1996–1997 NHIS interview but had entered the household by the time of the MEPS interview (e.g., newborns; those returning from military service, college, or travel; those newly married or moving into a new household).

We found that when these files were linked, 7.4% of the MEPS sample was omitted. This factor remains a limitation of the MEPS–NHIS merge, because no weighting adjustment was made for these missing individuals. Despite this limitation, the merging of these 2 national data sets is an accepted methodology.<sup>20</sup> An individual was defined as US born if he or she was born in one of the 50 states or the District of Columbia. All others were classified as foreign born. Foreign-born persons included naturalized citizens, permanent residents, visa holders, refugees, and undocumented immigrants. However, data on specific resident categories were not provided in the NHIS. For the purposes of this study, the terms “foreign born” and “immigrant” were considered to be synonymous.

### Statistical Analysis

To obtain nationally representative estimates, we used person-level weights (which reflect population distributions and account for each household's probability of selection), ratio adjustment to national population estimates at the household level, and adjustment for nonresponse. Because population estimates may be unstable if cells have fewer than 100 respondents, we combined such small cells with other subgroups for our analyses.<sup>21</sup> To obtain estimates of variability, we used a Taylor Series estimation approach with the SUDAAN software package.<sup>22</sup> We performed  $\chi^2$  analyses to examine the distribution of categorical variables among immigrants and US-born persons. We used *t* tests to compare mean per capita health expenditures among groups.

To obtain estimates of health expenditures adjusted for potential covariates, we used the Rand Health Insurance Experiment 2-part regression model.<sup>23–25</sup> This model is used to analyze heteroscedastic and highly skewed data such as health care expenditures (many peo-

ple report no health care expenditures). The model uses an initial multivariate logistic regression to predict the probability of having any expenditure. This probability is multiplied by the predicted log-transformed expenditure of any individual with nonzero expenditures (as determined from a multivariate linear regression model of individuals with nonzero expenditures). For this 2-part model, we used SUDAAN statistical software, which allows adjustment for complex survey design.

Covariates in the 2-part model included the following: age (analyzed as both a continuous and a categorical variable), gender, race/ethnicity, family income (dichotomized as either <200% or ≥200% of the federal poverty level [FPL]), education, insurance status, self-reported health status, residence in a metropolitan statistical area, and geographic region. In preliminary models, we found that after adjustment for other covariates, gender, education, geographic region, and metropolitan statistical area were no longer significant predictors of health care expenditures, nor did they improve the model fit. They were therefore excluded, leaving the following covariates in the final regression models to predict expenditures: age (as a continuous variable), race/ethnicity, insurance status, family income, and self-reported health status. Additionally, we explored the possibility of interactions of the covariates with immigrant status. We found a significant interaction between immigrant status and race/ethnicity, and therefore included an interaction term in the multivariate regression analyses.

As in other studies,<sup>26,27</sup> we used smearing factors to retransform the final estimates<sup>28,29</sup> and calculated standard errors for predicted expenditures, using bootstrapping with 2000 iterations.<sup>30</sup> We also conducted a stratified regression analysis of health care expenditures by insurance status and income, again controlling for the other covariates in the model. We opted to perform these stratified analyses because income and insurance status are important predictors of health service use.

We also performed a subgroup analysis of government payments (Medicare, Civilian Health and Medical Program of the Uniformed Services of the United States [CHAMPUS], Civilian Health and Medical

**TABLE 1—Demographic and Health Characteristics of US-Born Persons and of Immigrants Residing in the United States: 1998**

|   | US-Born Persons,<br>% (n = 18 398) <sup>a</sup> | Immigrants,<br>% (n = 2843) <sup>b</sup> | P      |
|---|---|--|--------|
| Age, y                                      |   |  | <.0001 |
| Birth-11                                    | 16.7  | 3.0                                      |        |
| 12-17                                       | 9.7   | 4.4                                      |        |
| 18-44                                       | 38.8  | 55.5                                     |        |
| 45-64                                       | 22.0  | 25.9                                     |        |
| ≥ 65  | 12.9  | 11.3                                     |        |
| Gender                                      |   |  | NS     |
| Male  | 48.5  | 49.7                                     |        |
| Female                                      | 51.5  | 50.3                                     |        |
| Race/ethnicity                              |   |  | <.0001 |
| White                                       | 77.4  | 28.4                                     |        |
| Black                                       | 13.1  | 6.0                                      |        |
| Hispanic                                    | 7.8   | 42.6                                     |        |
| Asian/Pacific Islander                      | 1.1   | 23.0                                     |        |
| Insurance status                            |   |  | <.0001 |
| Any private                                 | 74.9  | 58.1                                     |        |
| Public only                                 | 15.0  | 17.3                                     |        |
| Uninsured                                   | 10.0  | 24.6                                     |        |
| Family income as % of federal poverty level |   |  | <.0001 |
| Poor (<100)                                 | 12.0  | 16.1                                     |        |
| Near-poor (100 to <125)                     | 4.0   | 5.7                                      |        |
| Low (125 to <200)                           | 12.7  | 17.8                                     |        |
| Middle (200 to <400)                        | 32.7  | 29.9                                     |        |
| High (≥400)                                 | 38.6  | 30.6                                     |        |
| Health status                               |   |  | .03    |
| Excellent                                   | 35.1  | 29.2                                     |        |
| Very good                                   | 31.2  | 30.4                                     |        |
| Good  | 22.9  | 27.6                                     |        |
| Fair  | 7.8   | 9.7                                      |        |
| Poor  | 3.1   | 3.2                                      |        |
| Education (among adults)                    |   |  | <.0001 |
| <Grade 8                                    | 4.8   | 18.3                                     |        |
| Grades 8-12                                 | 46.8  | 38.1                                     |        |
| >Grade 12                                   | 48.2  | 43.2                                     |        |
| Region of country                           |   |  | <.0001 |
| Northeast                                   | 18.4  | 24.9                                     |        |
| Midwest                                     | 25.1  | 9.3                                      |        |
| South                                       | 36.3  | 23.0                                     |        |
| West  | 20.2  | 42.8                                     |        |
| Residence in metropolitan statistical area  |   |  | <.0001 |
| Yes   | 78.9  | 95.1                                     |        |
| No  | 21.1  | 4.9                                      |        |

Note. NS = nonsignificant. Data are from the 1998 Medical Expenditure Panel Survey and the 1996-1997 National Health Interview Survey.

<sup>a</sup>Total US-born population = 229 million.

<sup>b</sup>Total immigrant population = 25 million.

Program of the Veterans Administration [CHAMPVA], Tricare, Medicaid, and other public hospital/physician coverage) by using a 2-part multivariate regression model similar to that described in this section.

Because children's health care use differs from that of adults and is of particular policy interest,<sup>26,31,32</sup> we performed separate analyses comparing immigrant children (n = 276) with US-born children (n = 5657) younger than 18 years. For children, we also used a 2-part model regression analysis similar to that described in this section, controlling for age, race/ethnicity (including a term capturing the interaction of race/ethnicity with immigrant status), poverty level, insurance status, and functional status. In our model for children, we included 2 variables that have been used as surrogates for a child's functional status<sup>20,26</sup>: (1) whether a child resists illness well (reported by a parent) and (2) whether a child performs age-appropriate tasks (also reported by a parent).

## RESULTS

In 1998, immigrant health care expenditures were \$39.5 billion (SE = \$4.0 billion), or 7.9% of the US total. This figure included \$25.0 billion (SE = \$3.4 billion) in payments made by private insurers on behalf of immigrants, \$2.8 billion (SE = \$0.4 billion) paid directly by immigrants, and \$11.7 billion (SE = \$1.7 billion) paid by government sources. US-born individuals (90% of the population) accounted for 93% of private insurer expenditures and 92% of both government and out-of-pocket payments.

We found that immigrants differ from US-born persons in demographics, unadjusted per capita health expenditures, and adjusted health expenditures. Demographic data are presented in Table 1. Immigrants overall were younger, although the immigrant population contained a lower proportion of children than did the US-born population. In addition, compared with US-born persons, immigrants had lower incomes and educational attainment and lower self-reported health status, and were more likely to live in the West, the Northeast, and urban regions.

Unadjusted per capita total health care expenditures were lower for immigrants than

**TABLE 2—Unadjusted Per Capita Health Care Expenditures of US-Born Persons and Immigrants Residing in the United States: 1998.**

|   | Per Capita Expenditures, \$ |                 |
|---|-----------------------------|-----------------|
|   | US-Born Persons (SE)        | Immigrants (SE) |
| Age, y***                                     |                             |                 |
| 0-11***                                       | 573 (34)                    | 291 (66)        |
| 12-17***                                      | 932 (65)                    | 220 (51)        |
| 18-44*  | 1408 (61)                   | 994 (158)       |
| 45-64**                                       | 2716 (105)                  | 1833 (196)      |
| ≥ 65  | 5247 (222)                  | 4776 (745)      |
| Gender***                                     |                             |                 |
| Male**  | 1703 (67)                   | 1244 (131)      |
| Female  | 2290 (71)                   | 1916 (246)      |
| Race/ethnicity***                             |                             |                 |
| White   | 2153 (59)                   | 2351 (338)      |
| Black   | 1632 (136)                  | 1539 (374)      |
| Hispanic                                      | 1184 (109)                  | 1233 (150)      |
| Asian/Pacific Islander                        | 1776 (853)                  | 1295 (347)      |
| Insurance status***                           |                             |                 |
| Any private                                   | 1906 (54)                   | 1711 (213)      |
| Public only                                   | 3447 (192)                  | 2749 (364)      |
| Uninsured                                     | 629 (59)                    | 459 (66)        |
| Family income as % of federal poverty level   |                             |                 |
| <200***                                       | 2189 (100)                  | 1419 (180)      |
| ≥200  | 1932 (57)                   | 1687 (206)      |
| Health status***                              |                             |                 |
| Excellent/very good/good*                     | 1469 (38)                   | 1167 (124)      |
| Fair/poor**                                   | 6449 (298)                  | 4465 (730)      |
| Education (adults only)***                    |                             |                 |
| <Grade 8                                      | 5186 (535)                  | 1804 (261)      |
| Grades 8-12***                                | 2479 (95)                   | 1483 (190)      |
| >Grade 12                                     | 2184 (86)                   | 1831 (287)      |
| Region of country*                            |                             |                 |
| Northeast                                     | 1971 (161)                  | 1650 (242)      |
| Midwest                                       | 2034 (74)                   | 1550 (564)      |
| South   | 2,032 (94)                  | 1758 (216)      |
| West  | 1952 (68)                   | 1454 (271)      |
| Residing in metropolitan statistical area *** |                             |                 |
| Yes*  | 1964 (57)                   | 1563 (155)      |
| No  | 2158 (105)                  | 1935 (499)      |
| Total sample, mean expenditures***            | 2005 (50)                   | 1582 (149)      |

Note. Data are from the 1998 Medical Expenditure Panel Survey and the 1996-1997 National Health Interview Survey. \* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$  (for comparison between immigrants and US born).

for the US born across all age groups (the difference for those 65 years and older was not statistically significant) (Table 2). For example, per capita expenditures of immigrant children younger than 12 years were 49% lower than those of US-born children, and ex-

penditures of immigrant children aged 12 to 17 years were 76% lower than those of US-born adolescents. The differences in expenditures between immigrants and nonimmigrants were substantially greater for men than for women. Poorer immigrants and immigrants

with government insurance had lower expenditures than did the poorer US born and the US-born publicly insured.

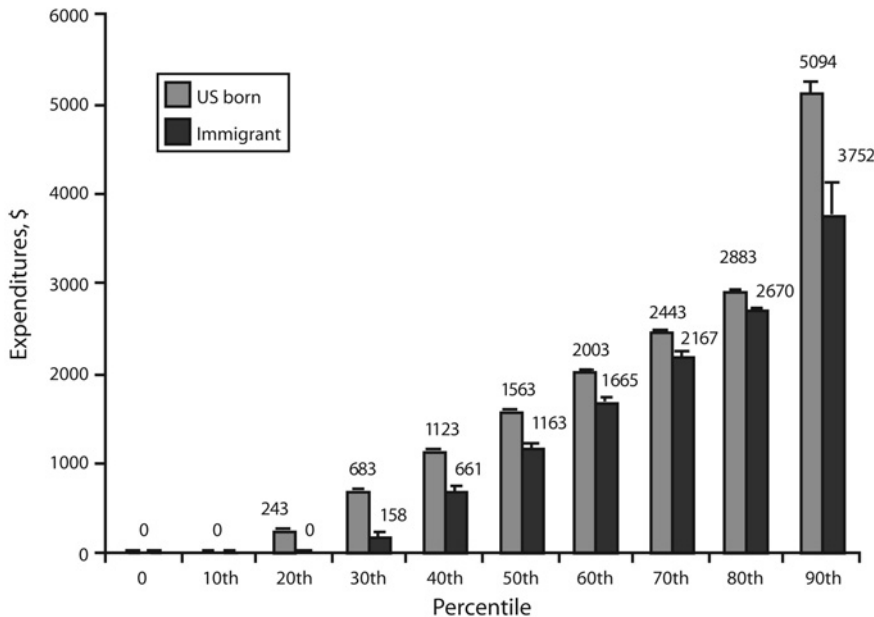
In Figure 1, we present percentile distributions of total health care expenditures, comparing US-born persons and immigrants. Total health care expenditures for both groups were highly skewed. The median total expenditure for health care was \$1563 for US-born persons versus \$1163 for immigrants ( $P < .0001$ ). For all deciles shown, health care expenditures for US-born individuals were significantly higher than those for immigrants. In the lowest 3 deciles of health care expenditures, immigrants had no reported expenses. In the top decile, US-born individuals had expenditures that were \$1342 higher than those for immigrants in 1998.

In our 2-part multivariate logistic regression model, immigrants had a lower probability of expenditures and a lower probability of expenditures for emergency care, office-based visits, and prescription medications than US-born persons (data not shown).

Adjusted expenditures were lower for all immigrants than for all US-born persons across all expenditure subgroups (Table 3). Health care expenditures for immigrants averaged \$1139 per person in 1998, compared with \$2546 for US-born persons ( $P < .0001$ ). Immigrants also had lower adjusted expenditures for emergency care, office-based visits, outpatient visits, inpatient visits, and prescription drugs. Our confirmatory analysis of charges rather than expenditures found virtually identical trends (data not shown).

We also performed a multivariate analysis of health care expenditures stratified by insurance status and income. Per capita total expenditures of insured immigrants (those with any private or public insurance) were 52% lower than those of insured US-born individuals; expenditures for uninsured immigrants were 61% lower than those for the US-born uninsured. In a subgroup analysis limited to persons with public coverage, per capita expenditures of publicly insured immigrants were 44% lower than those of US-born persons who were publicly insured (\$2774 [SE=\$231] vs \$4963 [SE=\$189];  $P < .0001$ ). Expenditures of higher-income immigrants (those with incomes  $\geq 200\%$  of the FPL)





Note. Dollar figures are for median total health care expenditures within each decile.

**FIGURE 1—Percentile distributions of total 1998 health care expenditures of US-born persons and immigrants residing in the United States in 1998.**

were 53% lower than those of higher-income US-born persons; health care expenditures of lower-income immigrants (those with incomes <200% of the FPL) were 60% lower than those of lower-income US-born individuals. Similar patterns were seen in analyses of expenditures for emergency care, office-based visits, outpatient visits, inpatient visits, and prescription drugs stratified by insurance and income status.

Immigrant children were much more likely than US-born children to be uninsured (29% vs 9%,  $P<.0001$ ) or publicly insured (31% vs 20%,  $P<.0001$ ). However, immigrant children's rates of public coverage were disproportionately low compared with the same children's poverty rates; 43% of immigrant children lived in low-income families, compared with 23% of US-born children ( $P<.0001$ ).

Results of the unadjusted and adjusted models for children are shown in Table 3. Expenditures for total health care, office-based visits, outpatient visits, inpatient visits, and prescription drugs were markedly lower for immigrant children than for US-born children. However, per capita emergency department

expenditures were more than 3 times higher among immigrant children than among US-born children.

We performed a stratified analysis by insurance status and income of children's health care expenditures. Health care expenditures for insured immigrant children were 60% lower than those for insured US-born children. Health care expenditures for uninsured immigrant children were 86% lower than those for uninsured US-born children. Expenditures among higher-income immigrant children were 53% lower than those among higher-income US-born children. Expenditures of immigrant children in lower-income brackets were 84% lower than those of lower-income US-born children.

We also estimated health care expenditures among all US-born persons and immigrants according to race/ethnicity. As shown in Table 4, after multivariate adjustment, non-Hispanic Whites had the highest per capita expenditures, whereas Hispanics and Asians had the lowest per capita expenditures. Health care expenditures were similar for US-born and immigrant Asians. In contrast, adjusted health expenditures for immigrant non-

Hispanic Whites, non-Hispanic Blacks, and Hispanics were lower than those for US-born individuals from these groups.

## DISCUSSION

Immigrants have less access to health care and less health care use than do US-born individuals, as reflected in their lower health care expenditures. Studies have shown that insurance coverage increases access to care and thus utilization of care, as well as improving health outcomes.<sup>33–35</sup> In our study, we found that per capita health care expenditures for immigrants in 1998 were far lower than expenditures for the US born. In addition, among adults and children enrolled in publicly financed insurance programs, immigrants had lower per capita publicly-financed health care expenditures than did the US born. We also found grave disparities in expenditures among most racial/ethnic groups, particularly among immigrants who were non-Hispanic White, non-Hispanic Black, or Hispanic.

When stratified by age, immigrants in every age group but 65 years and older had health care expenditures that were 30% to 75% lower than those for US-born persons. Disparities among children were greatest, particularly among adolescents 12–17 years old. Combined with our finding of higher per capita emergency department expenditures for immigrant children, our data suggest that access to routine and ongoing care may be especially problematic for immigrant children. These findings are consistent with those of a 1999 study using NHIS data<sup>36</sup> that showed foreign-born children were 5 times more likely than US-born children to lack a usual source of health care.

Ku and Matani<sup>37</sup> found that noncitizen children were less likely than citizen children to have made both ambulatory and emergency department visits. Like Ku and Matani, we found a significantly lower mean number of emergency department visits among immigrant children than among US-born children (data not shown); however, per capita emergency department expenditures for immigrant children were significantly higher because immigrant children's costs per visit were much higher. This finding suggests that immigrant

**TABLE 3—Unadjusted and Adjusted Mean Per Capita Health Care Expenditures for All Ages and Subgroup Analysis for Children: 1998**

|                      | Per Capita Expenditures, \$ |                |                       |                |
|----------------------|-----------------------------|----------------|-----------------------|----------------|
|                      | All Ages <sup>a</sup>       |                | Children <sup>b</sup> |                |
|                      | US Born (SE)                | Immigrant (SE) | US Born (SE)          | Immigrant (SE) |
| Total health care    |                             |                |                       |                |
| Unadjusted           | 2005 (50)                   | 1582 (149)**   | 704 (32)              | 249 (43)***    |
| Adjusted             | 2546 (38)                   | 1139 (62)***   | 1059 (11)             | 270 (22)***    |
| Emergency department |                             |                |                       |                |
| Unadjusted           | 63 (3)                      | 42(8)*         | 42 (3)                | 32 (10)        |
| Adjusted             | 91 (1)                      | 33 (1)***      | 18 (1)                | 45 (3)***      |
| Office visits        |                             |                |                       |                |
| Unadjusted           | 432 (13)                    | 323 (26)***    | 189 (13)              | 65 (18)***     |
| Adjusted             | 410 (5)                     | 209 (11)***    | 215 (2)               | 63 (5)***      |
| Outpatient visits    |                             |                |                       |                |
| Unadjusted           | 228 (10)                    | 231 (53)       | 66 (8)                | 29 (14)*       |
| Adjusted             | 241 (3)                     | 102 (3)*       | 84 (1)                | 25 (2)***      |
| Inpatient visits     |                             |                |                       |                |
| Unadjusted           | 647 (36)                    | 537 (94)       | 100 (14)              | 7 (6)***       |
| Adjusted             | 932 (22)                    | 634 (44)***    | 167 (1)               | 16 (1)***      |
| Prescription drugs   |                             |                |                       |                |
| Unadjusted           | 310 (9)                     | 195 (14)***    | 65 (3)                | 25 (7)***      |
| Adjusted             | 507 (10)                    | 159 (11)***    | 86 (1)                | 24 (2)***      |

Note. Data are from the 1998 Medical Expenditure Panel Survey and the 1996–1997 National Health Interview Survey.  
<sup>a</sup>For all age groups, mean per capita expenditures were predicted by a 2-part model with adjustments for age, ethnicity, poverty level, insurance status, patient-reported health status, and a term for the interaction of immigrant status and ethnicity.  
<sup>b</sup>For children, mean per capita expenditures were predicted by a 2-part model with adjustments for age, race/ethnicity, poverty level, insurance status, parent-reported health status (whether a child resisted illness well and whether a child performed age-appropriate social roles), and a term for the interaction of immigrant status and ethnicity.  
 \**P* < .05; \*\**P* < .01; \*\*\**P* < .001 (for comparison with US born).

did US citizens. However, welfare reform and other policies established a 5-year ban on Medicaid eligibility for nonrefugee immigrants entering the United States after August 1996. The reform also stated that the income of immigrants' sponsors would be counted in determining eligibility and that sponsors could be held financially liable for public benefits used by immigrants. These policies created confusion about eligibility and appeared to lead even eligible immigrants to believe that they should avoid public programs. Even in states that have attempted to continue public insurance for immigrants, lack of awareness of eligibility for these programs remains a problem.<sup>41</sup>

Our findings remained robust even after adjustment for health insurance status, suggesting that immigrants compared with the US born, face additional unmeasured access barriers, including cultural and linguistic barriers.<sup>42–44</sup> As an example 1 study at an inner-city clinic found that 1 in 9 immigrant parents reported that they had not brought their children in for care because they felt that the medical staff did not understand Latino culture.<sup>45</sup> Additionally, among the 5–10 million immigrants residing in the United States who are undocumented, fear of deportation is a barrier.<sup>46</sup>

Our finding of lower health care expenditures among immigrants cannot be explained by free care. The MEPS captures free care (and bad debt) in public (but not private) institutions as expenditures; the MEPS captures free care at any site as a charge. Our charge-based analysis yielded results very similar to those of our primary, expenditure-based analysis, indicating that adjustment of expenditure data for free care at private institutions would not change our results. This conclusion is also supported by a recent study that found no relationship between a state's uncompensated care burden and its percentage of noncitizen immigrants.<sup>47</sup> The deficit of care among immigrants is probably not because of less need; immigrants in our study had slightly worse self-reported health than US-born persons.

Several limitations of this study should be noted. First, because the 1998 MEPS, like the 2000 US census,<sup>1</sup> did not ask about immigration or citizenship status, we could not distinguish between naturalized citizens and

**TABLE 4—Adjusted Per Capita Health Care Expenditures Among US-Born Persons and Immigrants of All Ages, by Race/Ethnicity<sup>a</sup>**

| Race/Ethnicity         | Per Capita Expenditures, \$ |                 |
|------------------------|-----------------------------|-----------------|
|                        | US-Born Persons (SE)        | Immigrants (SE) |
| Non-Hispanic White     | 3117 (40)                   | 1747 (115)***   |
| Non-Hispanic Black     | 2524 (80)                   | 1030 (123)***   |
| Hispanic               | 1870 (60)                   | 962 (53)***     |
| Asian/Pacific Islander | 1460 (198)                  | 1324 (82)       |

Note. Data are from the 1998 Medical Expenditure Panel Survey and the 1996–1997 National Health Interview Survey.  
<sup>a</sup>Mean per capita expenditures were predicted by a 2-part model with adjustments for age, poverty level, insurance status, and patient-reported health status.  
 \*\*\**P* < .001 (for comparison with US born).

children may be sicker when they arrive at the emergency department. The higher emergency department expenditures we found for immigrant children probably reflect poor access to primary care (as evidenced by such childrens' low outpatient, office-based visit health expenditures).

Some of our findings may be explained by the limits that the 1996 welfare reform legislation<sup>38,39</sup> imposed on immigrants' eligibility for government health services. The Personal Responsibility and Work Opportunity Reconciliation Act<sup>12</sup> and the Illegal Immigration Reform and Immigrant Responsibility Act<sup>40</sup> substantially restricted recent immigrants' eligibility for Medicaid and other public benefits.

Before 1996, all legal permanent residents and other legal immigrants had the same access to public benefits, including Medicaid, as

other immigrant groups. Thus, our immigrant category included many European-born persons who resided in the United States for decades, had already become US citizens, and had fully assimilated into US culture and the US economy and health care system. Had we been able to exclude such immigrants, we would probably have found greater disparities. Similarly, we could not specifically identify undocumented persons, whom we suspect have the lowest health care expenditures.

Our study also could not capture health care expenditures outside the United States, where some immigrants may travel to obtain care or prescription drugs. For example, immigrants near the Mexican border may obtain medications from pharmacies in Mexico. However, these omitted out-of-country expenditures could not be viewed as a burden on the US health care system. MEPS also omits expenditures for medical care received by institutionalized persons (including nursing home residents) and for nonprescription drugs. Studies have consistently found that racial/ethnic minority populations reside in nursing homes less often than do non-Hispanic Whites.<sup>48</sup>

Our findings show that widely held assumptions that immigrants are consuming large amounts of scarce health care resources are invalid; these findings support calls to repeal legislation proposed on the basis of such assumptions. The low expenditures of publicly insured immigrants also suggest that policy efforts to terminate immigrants' coverage would result in little savings. In addition, lower health care expenditures by immigrants suggest important disparities in health care use, especially for children. Immigrant children will grow up to become a major segment of the US workforce in the coming years. Ensuring access to health services needed for proper growth and development should be a national priority. Policies that may improve immigrants' access to care include providing interpreter services, ending restrictions on Medicaid and State Children's Health Insurance Program eligibility, improving employer-provided coverage for immigrant workers, and implementing universal national health insurance.<sup>49</sup> Our study lends support to these and other initiatives aimed at

reducing and ultimately eliminating disparities in access to and use of health services. ■

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### Contributors

S.A. Mohanty originated the study, supervised all aspects of it, and completed the analyses. S. Woolhandler, D.U. Himmelstein, S. Pati, and O. Carrasquillo helped with conception of the study, interpretation of the findings, and writing the article. D.H. Bor assisted with interpretation of findings and editing the article. All authors contributed to study conception and design, acquisition of data, analysis and interpretation, and writing the article.

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### References

- Schmidley AD. *Profile of the Foreign-Born Population in the United States: 2000*. Washington, DC: US Census Bureau; 2001. Current Population Reports, series P23-206.
- Smith JP, Edmonston B. *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*. Washington, DC: National Academy Press; 1997.
- Porter E. Illegal immigrants are bolstering social security by billions. *New York Times*. April 5, 2005;sect. A:1 and sect. C:6.
- Carrasquillo O, Carrasquillo AI, Shea S. Health insurance coverage of immigrants living in the United States: differences by citizenship status and country of origin. *Am J Public Health*. 2000;90(6):917-923.
- Health Care for Undocumented Immigrants: Who Pays?* Austin: House Research Organization, Texas House of Representatives; October 19, 2001. Report 77-13.

- The costs of illegal immigration to Arizonans: a report by the Federation for American Immigration Reform, June 2004. Available at: <http://www.fairus.org/news/NewsPrint.cfm?ID=2442&c=55>. Accessed May 3, 2005.
- Hawryluk M. States might get help with immigrant care. October 21, 2002. Available at: [http://www.ama-assn.org/sci-pubs/amnews/pick\\_02/gvsa1021.htm](http://www.ama-assn.org/sci-pubs/amnews/pick_02/gvsa1021.htm). Accessed March 6, 2003.
- Levin M. Must Texas taxpayers subsidize their own dispossession? July 31, 2001. Available at: [http://www.vdare.com/misc/levin\\_illegals\\_in\\_er.htm](http://www.vdare.com/misc/levin_illegals_in_er.htm). Accessed March 6, 2003.
- Allen C. Immigration and the budget. *The Austin Review*, April 29, 2003. Available at: [www.austinreview.com](http://www.austinreview.com). Accessed May 15, 2003.
- Without Coverage: Immigration's Impact of the Size and Growth of the Population Lacking Health Insurance*. Washington, DC: Center for Immigration Studies; July 2000.
- Proposition 187: Illegal Aliens. Ineligibility for Public Services. Verification and Reporting. California Ballot Pamphlet: General Election*. Sacramento: Secretary of State; November 8, 1994:54-55.
- Personal Responsibility and Work Opportunity Reconciliation Act, Pub L 104-193, 110 Stat 2105, August 22, 1996. Available at: <http://wdr.doleta.gov/readroom/legislation/pdf/104-193.pdf>. Accessed May 3, 2005.
- Demographic shifts divide races: no consensus on the census. The Pew Research Center for the People and the Press, May 13, 2001. Available at: <http://people-press.org/reports/display.php3?PageID=104>. Accessed March 15, 2003.
- Cohen JW, Monheit AC, Beauregard KM, et al. The Medical Expenditure Panel Survey: a national health information resource. *Inquiry*. 1996;33(4):373-389.
- MEPS HC-028: 1998 full year consolidated data file. Agency for Healthcare Research and Quality, December 2001. Available at: <http://www.meps.ahrq.gov/Pubdoc/HC028/H28DOC.pdf>. Accessed April 2003.
- Monheit AC, Wilson R, Arnett RH. *Informing American Health Care Policy: The Dynamics of Medical Expenditure and Insurance Surveys, 1977-1996*. San Francisco, Calif: Jossey-Bass Publishers; 1999.
- Selden TM, Levit KR, Cohen JW, et al. Reconciling medical expenditure estimates from the MEPS and the NHA, 1996. *Health Care Financ Rev*. 2001;23(1):161-178.
- Canady D. Hospitals feeling strain from illegal immigrants. *New York Times*. August 25, 2002;sect 1:16.
- Public use file main data results. April 2002. Agency for Healthcare Research and Quality, Rockville, Md. Available at: <http://www.meps.ahrq.gov/Puf/PufDetail.asp?ID=69>. Accessed April 4, 2003.
- Newacheck PW, Inkelas M, Kim SE. Health services use and health care expenditures for children with disabilities. *Pediatrics*. 2004;114(1):79-85.
- Cochran WG. *Sampling Techniques*. 3d ed. New York, NY: John Wiley; 1977.
- Shah BV, Barnwell BG, Bieler GS. *SUDAAN User's Manual*. Research Triangle Park, NC: Research Triangle Institute; 1997.



23. Manning WG, Bailit HL, Benjamin B, Newhouse JP. The demand for dental care: evidence from a randomized trial in health insurance. *J Am Dent Assoc*. 1985; 110(6):895-902.
24. Brook RH, Ware JE Jr, Rogers WH, et al. Does free care improve adults' health? Results from a randomized controlled trial. *N Engl J Med*. 1983;309(23): 1426-1434.
25. Duan N, Manning W, Morris C, Newhouse J. A comparison of alternative models for the demand for medical care. *J Bus Econ Stat*. 1983;1:115-126.
26. Pati S, Shea S, Rabinowitz D, Carrasquillo O. Does gatekeeping control costs for privately insured children? Findings from the 1996 Medical Expenditure Panel Survey. *Pediatrics*. 2003;111(3):456-460.
27. Chen AY, Chang RK. Factors associated with prescription drug expenditures among children: an analysis of the Medical Expenditure Panel Survey. *Pediatrics*. 2002;109(5):728-732.
28. Duan N. Smearing estimate: a nonparametric retransformation method. *JAMA*. 1983;78:605-610.
29. Manning WG. The logged dependent variable, heteroscedasticity, and the retransformation problem. *J Health Econ*. 1998;17(3):283-295.
30. Mooney CZ, Duval R. *Bootstrapping: A Nonparametric Approach to Statistical Inference*. Newbury Park, Calif: Sage Publications; 1993.
31. Agency for Healthcare Research and Quality. HCUP Fact Book No. 4. Care of Children and Adolescents in US Hospitals. Available at: <http://www.ahrq.gov/data/hcup/factbk4/factbk4.htm>. Accessed April 8, 2003.
32. Pati S, Shea S, Rabinowitz D, Carrasquillo O. Health expenditures among privately insured adults enrolled in managed care gatekeeping vs indemnity plans. *Am J Public Health*. 2005;95:286-291.
33. Kaiser Family Foundation. Immigrants' health care: coverage and access. August 2000. Available at: <http://www.kff.org>. Accessed November 4, 2002.
34. Eisert S, Gabow P. Effect of Child Health Insurance Plan enrollment on the utilization of health care services by children using a public safety net system. *Pediatrics*. 2002;110(5):940-945.
35. Salganicoff A, Wyn R. Access to care for low-income women: the impact of Medicaid. *J Health Care Poor Underserved*. 1999;10(4):453-467.
36. Brown ER, Wyn R, Yu H, Valenzuela A, Dong L. The health and nutritional status of analyses of the Hispanic Health and Nutrition Examination Survey. In: Hernandez DJ, ed. *Children of Immigrants: Health, Adjustment, and Public Assistance*. Washington, DC: National Academy Press; 1999:126-186.
37. Ku L, Matani S. Left out: immigrants' access to health care and insurance. *Health Aff (Millwood)*. 2001; 20(1):247-256.
38. Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Services. Summary of immigrant eligibility restrictions under current law, October 2002. Available at: <http://aspe.hhs.gov/hsp/immigration/restrictions-sum.htm#top>. Accessed November 8, 2002.
39. Zimmerman W, Tumlin K. *Patchwork Policies: State Assistance for Immigrants Under Welfare Reform*. Washington, DC: The Urban Institute; 1999. Assessing the New Federalism Occasional Paper, report 24.
40. Illegal Immigration Reform and Immigrant Responsibility Act, Pub L 104-208, 110 Stat 3009, September 30, 1996. Available at: [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104\\_cong\\_public\\_laws&docid=f:publ208.104.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104_cong_public_laws&docid=f:publ208.104.pdf). Accessed May 3, 2005.
41. Massachusetts Immigrant and Refugee Advocacy Coalition. Unequal access: a report on barriers children in low-income immigrant families face in accessing food stamps and health insurance. 2000. Available at: [www.miracoalition.org](http://www.miracoalition.org). Accessed March 6, 2002.
42. The Commonwealth Fund. Insuring the children of New York City's low-income families: focus group findings on barriers to enrollment in Medicaid and Child Health Plus. December 1998. Available at: [www.cmwf.org/programs/newyork/feld\\_insuring\\_children\\_nyc\\_305.asp](http://www.cmwf.org/programs/newyork/feld_insuring_children_nyc_305.asp). Accessed April 10, 2002.
43. Woloshin S, Bickell NA, Schwartz LM, Gany F, Welch HG. Language barriers in medicine in the United States. *JAMA*. 1995;273(9):724-728.
44. Jacobs EA, Lauderdale DS, Meltzer D, Shorey JM, Levinson W, Thisted RA. Impact of interpreter services on delivery of health care to limited-English-proficient patients. *J Gen Intern Med*. 2001;16(7):468-474.
45. Flores G, Abreu M, Olivar MA, Kastner B. Access barriers to health care for Latino children. *Arch Pediatr Adolesc Med*. 1998;152(11):1119-1125.
46. Asch S, Leake B, Gelberg L. Does fear of immigration authorities deter tuberculosis patients from seeking care? *West J Med*. 1994;161(4):373-376.
47. Castel LD, Timbie JW, Sendersky V, Curtis LH, Feather KA, Schulman KA. Toward estimating the impact of changes in immigrants' insurance eligibility on hospital expenditures for uncompensated care. *BMC Health Serv Res*. 2003;3(1):1.
48. Dey AN. Characteristics of elderly home health care users: data from the 1994 National Home and Hospice Care Survey. *Adv Data*. 1996(279):1-12.
49. Schur CL, Feldman J. *Running in Place: Characteristics, Immigrant Status, and Family Structure Keep Hispanics Uninsured*. Bethesda, Md: Project HOPE Center for Health Affairs; 2001.



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