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Immigrants and Health Care Access, Quality, and Cost

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Inadequate access and poor quality care for immigrants could have serious consequences for their health and that of the overall U.S. population. The authors conducted a systematic search for post-1996, population-based studies of immigrants and health care. Of the 1,559 articles identified, 67 met study criteria of which 77% examined access, 27% quality, and 6% cost. Noncitizens and their children were less likely to have health insurance and a regular source of care and had lower use than the U.S. born. The foreign born or non-English speakers were less satisfied and reported lower ratings and more discrimination. Immigrants incurred lower costs than the U.S. born, except emergency department expenditures for immigrant children. Policy solutions are needed to improve health care for immigrants and their children. Research is needed to elucidate immigrants' nonfinancial barriers, receipt of specific processes of care, cost of care, and health care experiences in nontraditional U.S. destinations.

Keywords: *immigrants; limited English proficiency; access; quality; cost*

Nearly 36 million people currently living in the United States, or 12% of the total population, are foreign born. This represents a 16% increase in the number of immigrants since 2000, which followed a 57% increase from 1990 to 2000 (Lyman, 2006). In the past 15 years, a growing proportion of immigrants have settled in a

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wide range of new destinations, including areas in the South and Midwest, where jobs in retail, service, and construction industries have been expanding. The rapid pace of immigration and the fact that immigrants are now residing in many more communities across the country are likely to keep immigration in the forefront of the national policy debate, the outcome of which is likely to influence the health care that immigrants receive in numerous ways.

Immigrants are highly heterogeneous in terms of legal and socioeconomic status and other factors that affect their ability to get health care. Approximately one third of immigrants are currently in each of the three principal legal status groups (naturalized citizens, legal permanent residents, and undocumented immigrants), however, the undocumented proportion is likely to grow larger because current immigration policy places more restrictions and delays than in the past on immigrants' ability to adjust their status (Fix, Zimmerman, & Passel, 2001). More than half of all immigrants currently living in the United States—and even a larger proportion of recent immigrants—originate from Latin America. Latin American immigrants, especially those from Mexico and Central America, have much lower levels of education and incomes than native-born populations and immigrants from Europe and Asia. The low socioeconomic status of many immigrants, along with other barriers such as limited English proficiency (LEP) and lack of familiarity with the U.S. health care system, places them at increased risk for poor health care access, quality, and outcomes. In addition, recent policy changes such as the 1996 Personal Responsibility Work Opportunity Reconciliation Act (PRWORA or "welfare reform") have restricted immigrants' eligibility for federally funded services such as Medicaid, although some states have preserved eligibility by fully funding these services. Moreover, in light of the even more recent (2007) failure to implement a federal immigration reform bill, state legislatures are considering a record number of anti-immigrant measures, many of which are likely, if passed, to further restrict immigrants' access to health care (Okie, 2007).

This article reviews recent empirical evidence regarding immigrants and health care access, quality, and cost. We focus our review on articles using data collected after 1996, both because more recent data are more informative for health reform efforts and because immigrants' eligibility for publicly funded health insurance programs changed substantially after PRWORA.

New Contributions

Until fairly recently, most health research did not collect data on nativity and immigration status. However, as the size of the immigrant population has grown in the United States and as it has begun to affect a more diverse set of regions and communities, there has been increased interest in understanding how immigration status and associated characteristics (e.g., LEP) affect this subpopulation's experiences

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with the health care system. Furthermore, the heterogeneity of the immigrant population (in terms of socioeconomic status, health status, and patterns of immigration) suggests a need for systematically reviewing the literature to identify trends among subpopulations of immigrants, to better inform policy and clinical practice. Although reviews have been conducted on immigrants' health status (Kandula, Kersey, & Lurie, 2004), none has been published previously on immigrants' health care experiences (access, quality, and/or cost). Our review fills this gap and establishes a baseline that can serve to inform health reform debates as well as identify areas of needed research.

Conceptual Framework

The conceptual underpinnings of our review are described in the Behavioral Model of Health Services Use (also known as the Socio-Behavioral Model and "the Andersen Model"). This model conceives of health services access and use as a function of predisposing factors, enabling factors, and illness level or need factors (Andersen, 1968; Andersen & Newman, 1973). Predisposing factors refer to sociodemographic characteristics that influence individuals' preferences for health care or inclination to seek care, such as age, gender, education, marital status, family size, nativity, and acculturation. Enabling factors refer to personal, family, and community resources that facilitate or hinder individuals' ability to obtain care such as family income, health insurance coverage, language, availability of providers, and ease of making an appointment. Illness level or need factors refer to acute and chronic health conditions as well as age- and gender-related preventive needs (e.g., cancer screening). Revisions of this model have expanded it to include more contextual determinants such as characteristics of the social, economic, structural, and public policy environments (Davidson, Andersen, Wyn, & Brown, 2004) and characteristics particularly relevant for vulnerable populations (Gelberg, Andersen, & Leake, 2000).

We also examine quality and cost of immigrants' care because of their important relationships to access and use. Quality in the Andersen model is largely viewed as relating to the interface and interaction between providers and patients (i.e., patient satisfaction). We expand on this to include more objective measures of quality, such as whether certain processes of care were received (also a type of access). Cost is not explicitly part of the Andersen model, but it is closely related to use. We include cost in our review because of its important contribution to policy discussions regarding immigrants and health care.

Applying this framework to immigrants can reveal several ways that they are at risk for poor access to and quality of care. Some immigrants, particularly those from Latin America and parts of Southeast Asia, are much more likely than U.S.-born populations to have low educational attainment (predisposing factor) and low incomes and work in sectors that do not provide benefits such as health insurance (enabling factors). Furthermore, immigration status (enabling factor)—whether

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someone is an undocumented or unauthorized worker, has a green card or some other legal status, or is a naturalized citizen—strongly affects access to health insurance and other coverage, particularly public programs. These differences have been exacerbated under PRWORA, which made most legal immigrants ineligible for publicly funded services such as Medicaid for the first 5 years of residence and made it more difficult for them to qualify even after the 5 years. In addition to health insurance, nonfinancial barriers such as LEP and low cultural competency of providers (enabling factors) also affect immigrants' access to and quality of care. Perceptions of being discriminated against can reinforce feelings of stigmatization and lead to decreased use of health services in the future.

To understand immigrants' access to care, we included studies that examined potential access (e.g., health insurance status, having a regular source of care) and realized access or use (e.g., number of physician visits, use of preventive health care, reported delays in getting care) (Aday & Andersen, 1974, 1981). For quality, we included studies that examined patient perceptions of care (e.g., satisfaction, ratings of care or providers, feelings of being discriminated against by providers) as well as more objective processes of care (e.g., receipt of recommended services). For cost, we included studies that examined overall health care expenditures of immigrants as compared to other groups as well as out-of-pocket costs. Our goal in including these three broad areas (access, quality, and cost) was to gain an overall understanding of immigrants' health care experiences as well as inform policy and research related to the care of immigrants.

Method

With the assistance of a research librarian, we searched PubMed for articles on immigrants and health care access, quality, and cost published between 1997 and March 31, 2008. Search terms (see Table 1) were used in various combinations. We identified additional studies by conducting related item searches on PubMed and Web of Science and reviewing reference lists of the most relevant studies. We selected original studies or review articles that used empirical, quantitative data (post-1996) to address an empirical question regarding immigrants' (or non-English speakers') health care access, quality, or cost in the United States. To be eligible, studies had to include an immigrant indicator (e.g., nativity, years in the United States, citizenship status, LEP, or non-English language preference) and had to use this indicator to assess the "effect" of being an immigrant on these health care outcomes (access, quality, and cost). We focused on population-based studies with representative samples of immigrants at the national or state levels, as studies based on smaller areas or on convenience samples are much less likely to be generalizable and may not apply to areas of actionable policy. However, we also included three articles using county-level data, as these included rare information on undocumented

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Table 1
Key Search Terms Used for Literature Search of PubMed and Web of Science, 1997 to March 31, 2008

Domain	Search Terms
Immigrant	*Immigrant(s)*, *foreign-born*, *foreign birth*, *language barrier(s)*, *limited English proficiency*
Access to health care	*Health services/utilization*, *health services accessibility*, *access to care*, *preventive health services*, *preventive medicine*, *primary prevention*, *Pap smear/test*, *mammogram*, *mammography*, *colonoscopy*, *immunizations*
Quality	*Quality*, *quality of health care*, *patient satisfaction*
Cost	*Health expenditures*, *health care costs*

immigrants and cost of immigrants' health care. We abstracted information on data sources, descriptions of samples and comparison groups, health care outcomes examined (access, quality, and cost), and principal findings (see the appendix).

Results

Our search strategy identified 1,559 articles. Title review (and abstract, if necessary) excluded 1,298 articles for not meeting study criteria. Review of the remaining 261 articles identified 56 studies meeting the criteria, and searches of reference lists and related items identified an additional 11 articles, for a total of 67 articles.

Table 2 provides a tabulation of the frequency of different health care outcomes examined in these 67 articles as well as how immigrants were defined (by immigration status, LEP, or both). Access was examined most frequently (by 52 articles, or 77%)—health insurance (23), regular source of care (14), and health care use (41) (numbers add up to more than the total number of articles because some articles examined multiple outcomes). In studies examining health care use, preventive care was examined almost as frequently as general health services use. Quality of care was examined by 18 articles (27%) and cost of care only 4 (6%).

Immigrants' Access to and Use of Health Care

On all measures of potential and realized access, immigrants consistently have lower levels of access to and use of care in comparison to U.S.-born populations, though differences exist between subgroups.

Health insurance. Immigrants have consistently lower rates of health insurance coverage than U.S.-born populations, but noncitizens have the lowest rates, and differences between naturalized citizens and the U.S.-born are often not statistically

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Table 2
Frequency of Health Care Outcomes by Immigrant Factor(s) Studied (67 Articles)

Health Care Outcome	Immigrant Indicator[a]	Immigrant + LEP Indicators[b]	LEP Indicator	Total	Articles
Access	55	12	11	78[c]	
Health insurance	20	2	1	23	Alegria et al., 2006; Angel et al., 2005; Borjas, 2003; Buchmueller et al., 2007; Callahan et al., 2006; Carrasquillo et al., 2000; Choi, 2006; Goldman et al., 2005; Guendelman et al., 2005; Huang et al., 2006; Joyce et al., 2001; Kaushal & Kaestner, 2005, 2007; Kim & Shin, 2006; Kincheloe et al., 2007; Ku & Matani, 2001; Lucas et al., 2003; Ojeda & Brown, 2005; Prentice et al., 2005; Shah & Carrasquillo, 2006; Yu et al., 2006; Yu, Huang et al., 2004; Yu, Nyman et al., 2004
Regular or usual source of care	7	2	5	14	Callahan et al., 2006; Cunningham et al., 2006; Guendelman et al., 2005; Guendelman et al., 2001; Huang et al., 2006; Javier et al., 2007; Lasser et al., 2006; Ortega et al., 2007; Pippins et al., 2007; Ponce, Hays et al., 2006; Ponce, Ku et al., 2006; Yu et al., 2006; Yu, Huang et al., 2004; Yu, Nyman et al., 2004
Use	28	8	5	41	
General health/mental health services	12	3	2	17	Abe-Kim et al., 2007; Alegria et al., 2007; Callahan et al., 2006; Guendelman et al., 2005; Guendelman et al., 2001; Huang et al., 2006; Jackson et al., 2007; Javier et al., 2007; Kaushal & Kaestner, 2007; Ku & Matani, 2001; Lasser et al., 2006; Lucas et al., 2003; Ortega et al., 2007; Pippins et al., 2007; Sentell et al., 2007; Weinick et al., 2004; Yu et al., 2006

(continued)

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Table 2 (continued)

Health Care Outcome	Immigrant Indicator[a]	Immigrant + LEP Indicators[b]	LEP Indicator	Total	Articles
Preventive (cancer screening, vaccinations)	10	2	3	15	Carrasquillo & Pati, 2004; Cohen & Christakis, 2006; De Alba et al., 2005; Echeverria & Carrasquillo, 2006; Goel et al., 2003; Kagawa-Singer et al., 2007; Kandula et al., 2006; Lees et al., 2005; Ponce, Chawla et al., 2006; Ponce, Ku et al., 2006; Rodriguez et al., 2005; Strine et al., 2002; Swan et al., 2003; Tsui et al., 2007; Wong et al., 2005
Prenatal care	2			2	Fuentes-Afflick et al., 2006; Joyce et al., 2001
ED use	3	3	1	7	Cunningham, 2006; Cunningham et al., 2006; Javier et al., 2007; Ku & Matani, 2001; Ortega et al., 2007; Weinick et al., 2004; Yu et al., 2006
Quality	7	2	9	18	
Patient satisfaction / perceptions of care	7	2	4	13	Abe-Kim et al., 2007; Alegria et al., 2007; Clemans-Cope & Kenney, 2007; Dallo et al., 2008; Halfon et al., 2004; Jackson et al., 2007; Lasser et al., 2006; Lauderdale et al., 2006; Ngui & Flores, 2006; Ortega et al., 2007; Weech-Maldonado et al., 2003; Weech-Maldonado et al., 2001; Yu et al., 2006
Processes of care			5	5	Cheng et al., 2007; De Alba & Sweningson, 2006; Grubbs et al., 2006; Mainous et al., 2007; Wilson et al., 2005
Cost	3		1	4	DuBard & Massing, 2007; Goldman et al., 2006; Mohanty et al., 2005; Yu, Nyman et al., 2004

Note: ED = emergency department.

a. Immigrant indicators included nativity, years in the United States, and immigration status (e.g., naturalized citizen, noncitizen, legal resident or green card holder, undocumented).

b. Limited English proficiency (LEP) indicators included self-reported English-language ability, preferred language, and language of interview.

c. Numbers add up to more than 67 (total number of articles) because some articles examined multiple health care outcomes.

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significant after adjustment (Carrasquillo, Carrasquillo, & Shea, 2000; Choi, 2006; Ku & Matani, 2001). Furthermore, there are other differences between immigrants based on age, race or ethnicity, time and residential location in the United States, socioeconomic characteristics, and country of origin. For example, 7% of German immigrants lacked health insurance in 1997, compared to 58% of Guatemalan immigrants (Carrasquillo et al., 2000). Disparities are even greater among the elderly—for example, the odds of being uninsured for the elderly from Latin America is 22 times that for elderly from Western Europe—and those who immigrated less than 5 years before have 31 times the odds of being uninsured compared to the nonrecently immigrated (Choi, 2006). Among Latino immigrants, those living in the South are more likely to be uninsured than those in other regions (Alegria et al., 2006), as has been found for the general population.

Immigrant children face similar patterns of lower health insurance coverage than U.S.-born children, but U.S.-born children with noncitizen and non-English-speaking parents, or with naturalized parents who immigrated after 1986, also experience reduced insurance coverage. Among lower income families, not having citizen-parents increases U.S.-born children's odds of lacking health insurance 3 to 4 times (Huang, Yu, & Ledsky, 2006) and significantly reduces the odds of eligible children being enrolled in Medicaid (Kincheloe, Frates, & Brown, 2007). Among Latinos, naturalized parents who immigrated after 1986 have nearly 2 times the odds of having an uninsured child than U.S.-born parents (Ojeda & Brown, 2005). Having non-English-speaking parents increases the odds more than 11 times among children with special health care needs (Yu, Nyman, Kogan, Huang, & Schwalberg, 2004). Finally, the effect of parental citizenship on children's health insurance status varies across cities and states (Angel, Frias, & Hill, 2005), suggesting that the local and state policy context plays a role.

Much of immigrants' lower rates of insurance coverage is due to immigrants' lower rates of private health insurance, especially employer-sponsored insurance. Noncitizens are the least likely to have employer-sponsored insurance, followed by naturalized citizens and the U.S. born, largely driven by the fact that immigrants tend to work for employers that do not offer health insurance as a benefit (Buchmueller, Lo Sasso, Lurie, & Dolfin, 2007). Among insured immigrant children, only 26% have employer-based insurance, compared to 44% of insured native-born or naturalized children (Guendelman, Angulo, Wier, & Oman, 2005). Latino noncitizens have increasingly become uninsured from 1993 to 1999, largely because of losses in Medicaid coverage and employer-based health insurance (Shah & Carrasquillo, 2006). In California, immigrants have been found to have similar rates of public health insurance participation as do the U.S. born after adjustment for age, sex, race and ethnicity, family type, health status, income, education, employment sector, and English fluency (Kim & Shin, 2006). However, public policies regarding coverage for immigrants, particularly undocumented immigrants, vary widely by state, with only about one third to one half of all U.S. states providing some type of

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coverage without regard to immigration status (Fremstad & Cox, 2004). On average, 50% of the disparities in health insurance between the U.S. born and immigrants of various statuses are attributable to socioeconomic status and about 33% to industry of employment, although more than half of the low rates of health insurance among undocumented immigrants are attributable to their lack of access to public coverage (Goldman, Smith, & Sood, 2005).

Although there are no nationally representative data on undocumented immigrants' insurance coverage, smaller studies indicate that they have the highest uninsured rates among immigrants. Data from Los Angeles County indicate that 68% of the undocumented are uninsured, compared to 23% of immigrant citizens (Goldman et al., 2005), and undocumented immigrants are more likely to lose health insurance than the U.S. born (Prentice, Pebley, & Sastry, 2005).

Regular source of care. Trends among immigrants regarding regular source of care follow those seen for health insurance. In a joint study of U.S. and Canadian adults, only the foreign born in the United States were less likely than the U.S. born of having a regular doctor (Lasser, Himmelstein, & Woolhandler, 2006). Adults 55 years of age or older with LEP have been found to be 1.86 times more likely to lack a usual source of care than their counterparts who speak English (Ponce, Hays, & Cunningham, 2006). Among young adults (ages 19 to 29), noncitizens are 1.35 times more likely to report no regular source of care than U.S. citizens. These disparities are even greater for particular immigrant subgroups; for example, noncitizens of Mexican or Central or South American origin are twice as likely to report having no regular source of care as their naturalized counterparts (Callahan, Hickson, & Cooper, 2006).

Among immigrant children, trends are similar; noncitizen children and those with non-English-speaking parents have 2 to 5 times the odds of U.S.-born children and children with English-speaking parents of having no usual source of care outside the emergency department (ED; Guendelman et al., 2005; Huang et al., 2006; Pippins, Alegria, & Haas, 2007; Yu, Huang, Schwalberg, & Nyman, 2006; Yu, Huang, & Singh, 2004; Yu, Nyman et al., 2004). Noncitizen children are less likely to have a regular source of care or to seek care outside the ED regardless of insurance status; however, among the uninsured, a delay in care of more than 1 year is more likely for foreign-born than for U.S.-born children (Guendelman, Schauffler, & Pearl, 2001).

In addition to citizenship and English proficiency, where one lives may make a difference. Analyses of the Community Tracking Study found that Spanish-speaking Latinos living in areas where there are few other Latinos were less likely to have a regular source of care than Spanish-speaking Latinos in major Latino centers (Cunningham, Banker, Artiga, & Tolbert, 2006).

Health care use. The literature on health care use covers multiple types of use, including general health and mental health services (17 articles), preventive care

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(cancer screening and immunizations) (15 articles), prenatal care (2 articles), and ED visits (7 articles). It is not surprising that these studies follow the patterns for health insurance and regular source of care. Noncitizen adults and/or children of noncitizen parents are less likely than citizens to seek ED care, see a physician or nurse, use mental health services, or have a dental visit (Abe-Kim et al., 2007; Alegria et al., 2007; Callahan et al., 2006; Cunningham, 2006; Guendelman et al., 2005; Guendelman et al., 2001; Huang et al., 2006; Jackson et al., 2007; Javier, Wise, & Mendoza, 2007; Lasser et al., 2006; Yu et al., 2006). However, although noncitizen immigrants (undocumented and those with legal status) and the non-English speaking report less use overall, there is some evidence that they are less likely to report delayed or foregone care or problems getting care and are more likely to report travel to other countries for health care or medications (Ortega et al., 2007; Yu et al., 2006). Nevertheless, LEP adults are more likely than English-proficient adults to report difficulties getting care, such as long waits in the waiting room and difficulty getting information or advice over the phone (Pippins et al., 2007). LEP is also related to a substantial reduction in the odds of receiving mental health services among those reporting a mental health need—from an odds of 0.28 among all non-English speakers (compared to English speakers) to odds of 0.19 and 0.15 among non-English-speaking Latinos and Asians, respectively (compared to English-speaking Latinos and Asians) (Sentell, Shumway, & Snowden, 2007).

Health care use patterns vary among different immigrant subgroups and across different locales. Foreign-born Black men have been found to be less likely to have seen a health care professional in the past 6 months or year than U.S.-born Blacks or Whites (Lucas, Barr-Anderson, & Kington, 2003). Substantial heterogeneity in usage exists among Latino subgroups, although overall, Latinos who immigrated to the United States within the past 10 years and those interviewed in Spanish have lower use on most measures (Weinick, Jacobs, Stone, Ortega, & Burstin, 2004). Finally, disparities for Spanish-speaking Latinos vary by geography; Spanish speakers in areas where there are relatively few Latinos (less than 5% of the population) are more likely to use the ED than Spanish-speaking Latinos in areas where Latinos represented more than 20% of the population (Cunningham et al., 2006).

In terms of preventive care, immigrants and those with LEP are less likely to receive cancer screening (mammography, Pap test, Fecal Occult Blood Test or sigmoidoscopy, and Prostate-Specific Antigen) than the U.S. born (Echeverria & Carrasquillo, 2006; Goel et al., 2003; Ponce, Ku, Cunningham, & Brown, 2006), with more recent immigrants (less than 5 to 10 years) and noncitizens at highest risk of underuse (W. Chen & Bakken, 2004; De Alba, Hubbell, McMullin, Sweningson, & Saitz, 2005; Kandula, Wen, Jacobs, & Lauderdale, 2006; Swan, Breen, Coates, Rimer, & Lee, 2003; Tsui, Saraiya, Thompson, Dey, & Richardson, 2007; Wong, Gildengorin, Nguyen, & Mock, 2005). However, Spanish-speaking women in California were more likely to receive mammography and Pap tests than women

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who speak English or an Asian language (Ponce, Chawla et al., 2006; Rodriguez, Ward, & Perez-Stable, 2005), suggesting that location and language spoken (i.e., availability of bilingual providers) may be intervening factors. Furthermore, wide variation in mammography and Pap screening rates have been found among Asian subgroups (Chinese, Filipina, Korean, Japanese, South Asian, Vietnamese, and Cambodian; Kagawa-Singer et al., 2007). Finally, once adjustments were made for insurance status, having a regular source of care, other access variables, demographics, and satisfaction, immigrants nationally (both in United States less than 10 years and more than 10 years) were equally likely to receive the Pap test and mammograms, and those with LEP were more likely to get a mammogram (Carrasquillo & Pati, 2004).

Other types of preventive care are less well studied but follow similar patterns. Spanish-speaking Latinos had about half the odds of receiving the pneumococcal vaccine and endoscopy compared to Whites (Lees, Wortley, & Coughlin, 2005). Foreign-born children (19 to 35 months old) had half the odds of U.S.-born children of having adequate vaccination coverage (Strine et al., 2002). A study in Washington state found that infants of non-English-speaking parents were half as likely to have preventive care visits compared to infants of English-speaking parents; infants of non-English-speaking parents who were White, Latino, or Black also were less likely to receive all preventive care visits than their English-speaking ethnic/racial counterparts (adjusted risk ratio = 0.77, 0.36, and 0.36, respectively, all $p < .05$); however, among Asians, there was no difference between English and non-English speakers (Cohen & Christakis, 2006).

PRWORA. The 1996 PRWORA (or "welfare reform") restricted legal immigrants' eligibility for federally funded services such as Medicaid, although some states have preserved eligibility by fully funding these services (i.e., the states do not receive any federal match). As of 2004, 25 states provided fully state-funded coverage for legal immigrants who are ineligible for Medicaid or State Children's Health Insurance Program (SCHIP) because of the 1996 restrictions and/or used the SCHIP option of providing prenatal care without regard to immigration status (including undocumented) (Fremstad & Cox, 2004). These latter policies have been adopted to ensure that pregnant women get prenatal care, which federal Medicaid does not cover for undocumented immigrants, as well as delivery, which federal Medicaid does cover.

Studies suggest that PRWORA has been associated with a substantial number of immigrants becoming ineligible for public insurance and that PRWORA and other legislation restricting immigrants' eligibility for public services have discouraged immigrants from seeking care. Nationally, PRWORA was associated with a 9.9 to 10.7 percentage point increase in uninsurance among foreign-born, less educated, single women and a 12.9 percentage point increase in uninsurance among the children of foreign-born women, whereas it had no effect on U.S.-born single women (Kaushal & Kaestner, 2005). Similar analyses found that PRWORA was associated

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with an 11.5% increase in uninsurance among single immigrant mothers, though there were no consistent effects found for their children's uninsurance rates (Kaushal & Kaestner, 2007). PRWORA may have created fear among immigrants and diminished their enrollment in safety net programs. Borjas (2003) reported that noncitizens residing in states that did not replace PRWORA funding experienced a significant decline in their Medicaid participation rates, particularly for noncitizen children, however some of this was offset by an increase in employer-sponsored insurance.

State programs to preserve eligibility can ameliorate some of the negative effects of PRWORA, but there still have been chilling effects, where all immigrants are discouraged from seeking care. Among Latino immigrant women in California, Florida, and New York, state of residence (a measure of PRWORA policy changes) was associated with use of prenatal care (Fuentes-Afflick et al., 2006). In a study comparing birth records for Latino mothers in New York City, Texas, and California, PRWORA was related to a small increase in the uninsured among Mexican immigrants in California but had little effect on prenatal care access (Joyce, Bauer, Minkoff, & Kaestner, 2001).

Immigrants' Quality of Health Care

Only 18 articles examined quality of care among immigrants, and 7 of these used an immigration indicator (foreign born), whereas 9 used a measure of English proficiency and 2 used measures of both (nativity and LEP). Few of the studies distinguished between immigrants in terms of citizenship (Ortega et al., 2007), and only one considered time in the United States (Alegria et al., 2007). Moreover, the quality measures used were all self-reported and pertain overwhelmingly to satisfaction with and perceptions of care; only four studies assessed more objective measures, such as whether certain age- and gender-appropriate screening tests had been recommended by physicians, whether linguistically appropriate services had been provided, and whether patients had received disease-specific tests (e.g., retinopathy exam for diabetics) (Cheng, Chen, & Cunningham, 2007; De Alba & Sweningson, 2006; Grubbs, Chen, Bindman, Vittinghoff, & Fernandez, 2006; Mainous, Diaz, Saxena, & Geesey, 2007).

In general, the foreign born report receiving lower quality health care than the U.S. born. Lasser et al. (2006) found that foreign-born respondents in both Canada and the United States had lower odds of reporting excellent quality of care, but only the U.S. foreign born had lower odds of being very satisfied with their care relative to the native born. Foreign-born individuals have also reported dissatisfaction with how much their physician involved them in their health care, and in particular, foreign-born Asians were more likely to report physicians not spending enough time during the medical encounter (Dallo, Borrell, & Williams, 2008). Another study found that a significantly lower percentage of Latino and Asian immigrants indicated that their general and mental health services in the past year "helped a lot" as

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compared to their U.S.-born counterparts (Latino and Asian Americans) (Abe-Kim et al., 2007; Alegria et al., 2007). Conversely, a study of Caribbean Black immigrant and African American men found that the foreign born were more likely to perceive that their mental health or general medical services were helpful compared to the U.S. born (Jackson et al., 2007), suggesting that perceptions and experiences may vary among immigrant subgroups.

Language status compounds the differences in self-reported quality, although this also varies somewhat among immigrant subgroups. Clemans-Cope and Kenney (2007) found that the foreign born interviewed in English were 6% more likely to report communication problems with their provider than the U.S. born, whereas those interviewed in Spanish were 11% more likely to do so. Spanish-speaking Latino parents have been found to be less satisfied than non-Hispanic Whites with their children's care (Halfon, Inkelas, Mistry, & Olson, 2004; Ngui & Flores, 2006). However, studies using Consumer Assessment of Healthcare Providers and Systems data found that Spanish-speaking Latinos give their health care providers the highest ratings, whereas non-English-speaking Asians and Whites gave the lowest, although Spanish-speaking Latinos and non-English-speaking Asians both report lower ratings than Whites for other aspects of care, such as staff helpfulness and timeliness of care (Weech-Maldonado et al., 2003; Weech-Maldonado, Morales, Spritzer, Elliott, & Hays, 2001).

Language proficiency also appears to affect whether Latino immigrants receive appropriate tests and services. For example, Latinas with high English proficiency had 2.2 times the odds of reporting a Pap test recommendation from their doctor compared the Latinas with low English proficiency (De Alba & Sweningson, 2006). Latino diabetic patients interviewed in Spanish had a reduced odds of 0.41 compared to Latino diabetics interviewed in English to have had an exam for retinopathy (measures of acculturation and citizenship were not independent predictors of diabetes quality) (Mainous et al., 2007). Finally, Latinos who did not speak English at home were less likely to receive all recommended health care (age-appropriate tests/services for cancer screening, cardiovascular disease prevention, influenza vaccine, and diabetes care) than non-Latino Whites, even when they were comfortable speaking English (ARR = 0.88, $p < .05$, for comfortable speaking English and ARR = 0.84, $p < .05$, for not comfortable speaking English) (Cheng et al., 2007).

Availability of a language-concordant provider is an important mitigating factor in immigrants' care. Wilson, Chen, Grumbach, Wang, and Fernandez (2005) found that LEP adults had 2 and 3 times the odds of the English proficient to have trouble understanding medical situations and to have had a bad reaction to medications because of a problem understanding instructions; however, these odds were doubled and tripled, respectively, for those LEP adults who also did not have a language-concordant provider. Seeing a language-concordant provider may be difficult even though a federal law mandates that federally funded hospitals and clinics provide services in the patient's native language. For example, Grubbs et al. (2006) found

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that minority patients' knowledge of this law was associated with increased odds of having a language-concordant doctor but did not affect the odds of having access to interpreters; 60% of patients were not aware of this law at all.

The foreign born are more likely to report feeling discriminated against in health care, particularly those who are non-White, are noncitizens, and/or have LEP. For example, foreign-born Blacks, Asians, and Latinos are more likely than foreign-born Whites to report discrimination (Lauderdale, Wen, Jacobs, & Kandula, 2006), and parents who do not speak English well or who have noncitizen children are more likely to report being discriminated against in seeking care for their children than parents who speak English at home or have citizen children (Yu et al., 2006). Undocumented Latinos and those with a green card are more likely to feel that they would get better care if of a different race or ethnicity than U.S.-born Latinos (Ortega et al., 2007).

Cost of Immigrants' Health Care

Only four studies examined health care costs among immigrants, one in Los Angeles County (Goldman, Smith, & Sood, 2006), one in North Carolina (DuBard & Massing, 2007), and two national studies (Mohanty et al., 2005; Yu, Nyman et al., 2004). Nationally, health care expenditures were 55% lower for immigrant adults and 74% lower for immigrant children than their U.S.-born adults and children, respectively, even after adjusting for age, income, insurance status, and health status; however, ED expenditures were more than three times higher for immigrant children than for U.S.-born children. Goldman et al. (2006) also found that foreign-born women and men account for fewer expenditures than native-born women and men ($1,201 and $1,086 less, respectively) and that expenditures for undocumented men and women were 39% less and 54% less, respectively, than their native-born counterparts. However, Yu, Nyman et al. (2004) found that Spanish speakers had 1.5 times the odds of spending $500 or more out-of-pocket per year on their children's health care compared to English speakers. Finally, a study in North Carolina found that Medicaid spending for people made eligible on an emergency basis (undocumented immigrants) totaled less than 1% of annual Medicaid outlays, and 80% of this spending was childbirth related (DuBard & Massing, 2007).

Discussion

Our review has identified a number of consistent findings—and gaps—in the literature on immigrants and health care access, quality, and cost. In terms of access, it is clear that immigrants, especially noncitizens and the undocumented, as well as their children (even when the children are U.S. citizens), are less likely to have health insurance and a regular source of care and have lower use of care (general health and mental health services and preventive care) than the U.S. born. Furthermore,

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although data are somewhat limited, studies suggest that the immigrant provisions of welfare reform have resulted in a large number of immigrants becoming ineligible for public insurance (especially single women, less so for their children) and have discouraged all immigrants in some states from seeking care. However, there is substantial variation in access experiences among immigrants, probably because of differing national origins and socioeconomic profiles as well as geographic differences in policy environments and in the capacity of local health care systems to provide high-quality services to immigrants.

Unfortunately, untangling this variation among immigrants is difficult because relatively few studies (about 10 of 67, or less than 15%) distinguished between immigrants from different regions (Latin America, Asia, Europe, Africa, and/or other) and/or under different policy environments. Nationally, Latin American and immigrants from places besides Europe are particularly disadvantaged in terms of not having health insurance (Alegria et al., 2006; Carrasquillo et al., 2000; Choi, 2006). However, on specific use measures such as cervical cancer screening and once access (health insurance, usual source of care, and provider visits) is taken into account, Asian immigrant women appear to be the most disadvantaged (Goel et al., 2003; Tsui et al., 2007). Furthermore, it appears that different environments play a role. For example, Latino immigrants in the South and in areas that are not traditional destinations experience worse access (Alegria et al., 2006; Cunningham et al., 2006), Latino immigrant women in California experience similar or even better access on prenatal care and cancer screening once socioeconomic factors and health insurance are taken into account (Echeverria & Carrasquillo, 2006; Joyce et al., 2001; Ponce, Chawla et al., 2006; Rodriguez et al., 2005), and Asian American infants in Washington state do not have the same disparity in pediatric preventive care based on primary language as seen in White, Latino, and Black infants (Cohen & Christakis, 2006). Certainly, more research is needed that distinguishes between immigrant subgroups (with different predisposing and enabling factors) and in different policy environments so as to inform policy makers on how to improve access for the most disadvantaged groups.

In terms of quality, available literature indicates that the foreign born and those with LEP are generally less satisfied, report lower ratings of care, and are more likely to feel discrimination in health care. Not having language-concordant providers exacerbates these disparities in self-reported quality. There are some differences between subgroups, and this may be due to different expectations (predisposing factors) and care or treatment experiences (satisfaction) as well as the particular quality outcome being examined. For example, non-English-speaking Asians appear to be the least satisfied with their care, whereas Spanish-speaking Latinos often provide higher ratings for certain aspects of their care such as provider ratings, possibly because of a bias among Spanish-speaking Latinos toward more favorable responses in satisfaction surveys (Hayes & Baker, 1998; Weech-Maldonado et al., 2003; Weech-Maldonado et al., 2001). After adjusting for acculturation variables (language, length of stay in the United States), Asian immigrants are still less satisfied with

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interactions with their physicians, particularly on time spent and involvement in decision making, whereas there is no difference for Latino immigrants and Black immigrants are more likely to perceive health services as "helpful," suggesting different expectations (Dallo et al., 2008; Jackson et al., 2007). And although immigrants in general are more likely to perceive discrimination in their health care experiences, this is particularly true for foreign-born minority groups (Blacks, Asians, and Latinos), even after adjustment for language, health status, and access to care (Lauderdale et al., 2006).

Little research has examined how citizenship status—as opposed to foreign birth or language spoken—affects quality as well as how any of these immigration-related factors affect objective measures of processes of care received. Furthermore, among the four studies that did assess processes of care (Cheng et al., 2007; De Alba & Sweningson, 2006; Mainous et al., 2007; Wilson et al., 2005), all relied on survey-based measures (self-report of receipt of recommendation or services), which are more limited than what clinically based studies (e.g., chart review) could provide. This is a serious gap in the literature that limits what we can say about quality of care for immigrants.

In terms of cost, there is a dearth of information. What information there is suggests that on average immigrants and especially undocumented immigrants incur much lower costs than the U.S. born than their presence in the population would suggest, with one possible exception—ED expenditures for immigrant children. These lower costs are probably due in part to immigrants' overall reduced access but also to the fact that the foreign born tend to report fewer health problems and experience a health advantage that is especially large among the undocumented (Goldman et al., 2006).

What is known about the relative contributions of various immigrant-related attributes (citizenship and documentation status, length of time in the country, and English-language proficiency) is somewhat limited. As noted in Table 2, the effects of immigration indicators (nativity, years in the United States, and immigration status such as naturalized, noncitizen, legal resident, or undocumented) on access have been studied far more frequently than those of LEP, whereas for quality outcomes, LEP has been studied more frequently than immigration indicators. Furthermore, teasing out the relative contributions of immigration and LEP indicators is difficult because only 7 articles of the total 67 (just more than 10%) included both types of indicators (Alegria et al., 2006; Cheng et al., 2007; Clemans-Cope & Kenney, 2007; Javier et al., 2007; Lauderdale et al., 2006; Ponce, Chawla et al., 2006; Weinick et al., 2004; Yu et al., 2006). What these 7 studies suggest collectively is that both noncitizenship or recent immigrant status and LEP contribute to reduced potential and realized access and worse quality, with some subgroup and regional exceptions. Furthermore, studies that assessed acculturation or length of time in the country (Alegria et al., 2006; Alegria et al., 2007; Carrasquillo & Pati, 2004; Choi, 2006; Kagawa-Singer et al., 2007; Kandula et al., 2006; Swan et al., 2003; Tsui et al., 2007; Weinick et al., 2004; Wong et al., 2005) consistently showed that

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generally after 10 to 15 years in the United States, many of the access problems for noncitizen and non-English-speaking immigrants become insignificant, with some exceptions for certain subgroups and/or types of use (e.g., Asian subgroups and Pap test and mammography screening, all immigrants and having an up-to-date Fecal Occult Blood Test).

Finally, it is important to consider the extent to which enabling factors, such as insurance coverage and regular source of care, account for differences in access between immigrants and the U.S. born. Providing insurance coverage to all immigrants would no doubt reduce access disparities, but given that a number of studies still found reduced use for noncitizens and persons with LEP even after adjusting for insurance status (Alegria et al., 2007; Guendelman et al., 2005; Guendelman et al., 2001; Kagawa-Singer et al., 2007; Kandula et al., 2006; Lees et al., 2005; Ortega et al., 2007; Pippins et al., 2007; Weinick et al., 2004; Wong et al., 2005), other barriers associated with being an immigrant remain. In fact, one study even found that insurance made more of a difference for citizens (U.S. born and naturalized) than for noncitizens (Guendelman et al., 2005). Having a regular source of care is important because of its overall association with improved access, use, and health. That immigrants and their children are more likely to have no usual source of care outside the ED is therefore of concern for their own health and health care outcomes but also for the health care systems serving them.

Limitations

Our review has some limitations that are important to mention. First, although our search for empirical studies of immigrants' health care access, quality, and cost was systematic and comprehensive, it is possible that some articles were missed. Second, given the tendency toward publication bias (where studies with statistically significant findings are more likely to be published) (Dickersin, 1990, 1997; Easterbrook, Berlin, Gopalan, & Matthews, 1991), we may have overestimated the evidence that immigration status is important for health care access, quality, and cost. Third, we focused our review of realized access on more general health care use measures (e.g., seeing a physician, reporting delays in care, preventive care) and did not specifically search for articles on specialty care. Finally, as noted earlier, immigrants compose an extremely heterogeneous group. We have attempted to describe the differences between subpopulations as identified by previous research; however, subgroups' and individual immigrants' own experiences undoubtedly will vary widely.

Implications for Policy and Research

Noncitizen immigrants' reduced access to care and poor quality care—and that of their citizen-children—put them at risk for deteriorating health over time. Given the

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size of this population, this has long-term implications for the health of our nation. There may also be short-term effects. A recent study found that there are negative spillover effects from the uninsured in a community to the insured not only through a higher financial burden of uncompensated and charity care at the local level but also by reducing the overall quality of care provided in the community (Pauly & Pagan, 2007). Therefore, efforts to improve health care access and quality for immigrants are likely to benefit the broader community.

Improving health care access and quality for immigrants requires changes in the financing of care, reducing other barriers to care, and improving the quality of care delivered. The low levels of health insurance coverage among noncitizen immigrants and their children can be addressed by extending eligibility for public programs or by including immigrants in broader initiatives to expand coverage that involve both employers and public programs. Of course, there are tremendous challenges to doing this in today's context, given our nation's move toward restricting immigrants' access to public programs further, rather than expanding them. However, states have a number of options to expand coverage and access to care among immigrants, including using their own funds to cover some or all immigrants who are ineligible for federal Medicaid and SCHIP, ensuring that providers give appropriate assistance to individuals with LEP, educating immigrants about availability of Emergency Medicaid, and increasing outreach efforts to enroll immigrants who are eligible for Medicaid and SCHIP (Fremstad & Cox, 2004). Outreach efforts through sources such as trusted community-based organizations are important to decrease concerns regarding how enrollment in publicly funded insurance programs might affect residency and citizenship applications. Furthermore, community-based strategies and partnerships building on the natural lay helping networks within communities (e.g., health promoters) could assist immigrants in overcoming barriers to care.

Policies should also focus on improving access to language services. Currently, there are few financing mechanisms for implementing national standards for culturally and linguistically appropriate services (U.S. Department of Health and Human Services Office of Minority Health, 2001). Although Medicaid and SCHIP have indicated that language services are eligible for federal matching funds, each state determines whether and how these programs will provide reimbursement for such services, and providers cannot be reimbursed for these services unless their state allows this (A. H. Chen, Youdelman, & Brooks, 2007). As of 2007, only 12 states (Hawaii, Idaho, Kansas, Maine, Minnesota, Montana, New Hampshire, Utah, Virginia, Vermont, Washington, and Wyoming) and the District of Columbia had elected to reimburse interpreters under Medicaid/SCHIP (A. H. Chen et al., 2007). Thus, one policy option would require Medicaid to cover access to an interpreter (when necessary) in the 38 states that do not currently cover it. There seems to be growing support for such an option. For example, major medical organizations such as the American Medical Association initially opposed mandates for providing

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language-appropriate services as placing an unreasonable burden on physician practices (Albert, 2000) but, in a matter of a few years, have come around to see trained interpreters as a "necessary expense" that can reduce time, frustration, and unnecessary testing and improve physician–patient communication and trust (Gadon, 2007).

Federal and/or state policy options might be pursued that focus specifically on immigrants in new destinations, who are likely to face barriers to quality health care above and beyond those faced by immigrants in traditional destinations. These barriers may include lack of established networks for accessing health care and lack of bilingual health care providers and/or professional interpreters. It is particularly important to strengthen the health and safety net infrastructure in these destinations, which are likely to be in states with more restrictive Medicaid policies and fewer interpreters and language-concordant providers.

There are several areas where more research would be useful. First, it is important to better understand immigrants' nonfinancial barriers to care, as insurance (especially for children) has been found to make more of a difference in nonimmigrants' use than immigrants' (Guendelman et al., 2005). Second, understanding how immigration status and/or LEP are related to specific processes of care would help inform interventions directed at providers and/or patients. Finally, very little research has examined the access and quality experiences of immigrants in new destinations and/or the effects of increased numbers of immigrants on health care systems in these destinations (Blewett, Casey, & Call, 2004; Blewett, Smaida, Fuentes, & Zuehlke, 2003; Cunningham et al., 2006). Analyses of national data on immigrants' health care access, quality, and/or costs integrated with contextual or community-level data, such as the strength of the safety net, could help delineate specific policies to support the health and safety net infrastructures in these areas and help us better understand the effects of health reform proposals on immigrant populations.

Despite current controversies in the United States regarding immigration policy, health care for immigrants cannot be ignored in U.S. health care reform debates. Doing so could consign a future generation to inadequate access and poor quality care and, ultimately, ill health, with implications for us all.

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Appendix
Summary of Selected Articles on Immigrants and Health Care Access, Quality, or Cost ($n = 67$)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Abe-Kim et al. (2007)	National Latino and Asian-American Study, 2002-2003	Nationwide sample of 2,095 Asian Americans ages 18 and older (66% response) 1. U.S. born ($n = 454$) 2. Foreign born (FB) ($n = 1,639$)	Health Care Utilization Quality of Care	A lower percentage of FB Asians than U.S.-born Asians indicated that they - Used any health services (HS) in past year (7% vs.13%, $p < .05$), - Used any mental health (MH) services in past year (2% vs. 6%, $p < .05$), - Found that general HS in past year "helped a lot" (51% vs. 73%, $p < .05$), and - Found that MH services in past year "helped a lot" (46% vs. 76%, $p < .05$).
Alegria et al. (2006)	National Latino and Asian-American Study, 2002-2003	Nationwide sample of 4,649 Latino and Asian adults (73% response) 1. Latinos ($n = 2,323$) - Puerto Rican ($n = 454$) - Cuban ($n = 461$) - Mexican ($n = 826$) - Other ($n = 582$) 2. Asians ($n = 1,931$) - Vietnamese ($n = 471$) - Filipino ($n = 461$) - Chinese ($n = 558$) - Other ($n = 441$)	Health Insurance	Asian and Latino immigrants much more likely to be uninsured than native-born counterparts, especially if recent immigrants and had LEP: - Asians with < 5 years in United States 2.66 times more likely to be uninsured than U.S.-born Asians ($p < .01$) - Latino with < 5 years in United States 2.15 times more likely to be uninsured than U.S.-born Latinos ($p < .05$) - Asians with LEP 2 times more likely to be uninsured than Asians with good/excellent English ($p < .05$) - Latinos with LEP 2 times more likely to be uninsured than Latinos with good/excellent English ($p < .001$) Among Latinos:

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		(comparisons also made by nativity and time in United States, limited English proficiency [LEP], and region)		- Mexicans 2 times more likely to be uninsured than Puerto Ricans, Cubans, and other Latinos ($p < .05$) - Those in the South more likely to be uninsured than other regions ($p < .01$) Among Asians, Vietnamese most likely to have public insurance ($p < .01$)
Alegria et al. (2007)	National Latino and Asian-American Study, 2002-2003	Nationwide sample of 2,554 Latino adults (76% response) 1. U.S. born ($n = 924$) 2. FB ($n = 1{,}630$) (comparisons of subgroups: Puerto Rican, Cuban, Mexican, and other Latino; age at immigration; and years in United States)	Health Care Utilization Quality of Care	Smaller proportion of immigrants used medical and MH services than U.S. born, and immigrants were less satisfied with their care: - Fewer FB respondents reported using any medical services or MH services in past year ($p < .01$) - Those in United States for longer periods used more general medical services and MH ($p < .05$) - Later generations of immigrant families used more services of all types ($p < .01$) - FB less likely to use MH services in past year without diagnosed MH disorder ($p < .01$) - Recent immigrants reported lower satisfaction with any medical service ($p < .01$) - FB that emigrated to United States at younger ages more likely to report that MH services were "helpful" ($p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Angel et al. (2005)	Welfare, Children and Families Project, 1999, 2001	Nationwide sample of 2,135 households with children in low-income neighborhoods (no response rate): 1. U.S. citizen parents (n = 1,817) 2. Noncitizen parents (n = 318) (comparisons also across Boston, Chicago, and San Antonio)	Health Insurance	Households with U.S. citizen parents had 1.8 times the odds of having all children insured (vs. noncitizens) and 2.09 times the odds of having the focal child insured ($p < .01$) Effects vary across cities, with citizenship having a more positive effect on odds of having insurance in San Antonio or Chicago ($p < .01$) (no effect in Boston)
Borjas (2003)	Current Population Survey, March 1994-2000 supplements	Nationwide sample of 593,763 persons younger than 65 over 7 years (no response rate): 1. U.S. born 2. Naturalized 3. Noncitizens	Health Insurance (Personal Responsibility Work Opportunity Reconciliation Act [PRWORA])	Noncitizens in states that did not replace PRWORA-eliminated funding experienced significant decline in Medicaid participation rates, particularly for noncitizen children (beta = 0.083, $p < .05$). No effect on citizens or their children Noncitizens in states that did not replace PRWORA-affected funds became substantially more likely to be covered by employer-sponsored insurance (beta = –0.098, $p < .05$); increase attenuated adverse impact of welfare cutbacks
Buchmueller et al. (2007)	Survey of Income and Program Participation, 2002	Nationwide sample of 38,041 adults 18 to 64 years of age (no response rate): 1. Native born (n = 30,256) 2. Naturalized (n = 1,791) 3. Noncitizen (n = 2,836)	Health Insurance	Lower percentage of naturalized and noncitizen immigrants have employer-based health insurance (EBHI) than natives: - 3.8% fewer naturalized immigrants ($p < .01$) - 14% fewer noncitizens ($p < .01$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
				10% fewer noncitizens worked for firms that offer EBHI than natives or naturalized immigrants ($p < .05$) Noncitizens have statistically identical EBHI uptake and eligibility rates as natives and naturalized immigrants
Callahan et al. (2006)	National Health Interview Study, 1999-2002	Nationwide sample of 18,403 Latino young adults, stratified by race/ethnicity and citizenship status (no response rate) 1. U.S. citizens 2. Noncitizens (also comparisons across subgroups: Central/South [C/S] American, Mexican, Puerto Rican, non-Hispanic White)	Health Insurance Regular Source of Care (RSOC) Health Care Utilization	Noncitizens more likely than U.S. citizens to - Be uninsured (1.56 risk ratio, $p < .05$) - Report no RSOC (1.35 risk ratio, $p < .05$) - Have no contact with health care professional in past 12 months (1.36 risk ratio, $p < .05$) Noncitizens less likely to miss or delay seeking care over past 12 months because of cost than U.S. citizens (0.72 risk ratio, $p < .05$) Noncitizen C/S Americans and Mexicans more likely than citizen counterparts to report no RSOC for their children - 51.9% C/S American noncitizens vs. 25.7% C/S American–born citizens - 58.9% Mexican noncitizens vs. 32.3% Mexican-born citizens - Noncitizen Mexican children more likely than noncitizen C/S American children to have gone more than 2 years without contact with health professional (37.5% vs. 30.1%)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Carrasquillo & Pati (2004)	Commonwealth Fund Health Care Quality Survey, 2001	Nationwide sample of 3,622 women ages 18 to 70 (53% response) 1. U.S. born ($n = 2,774$) 2. FB in U.S. less than 10 years ($n = 256$) 3. FB in United States more than 10 years ($n = 566$)	Health Care Utilization	Immigrants (less than 10 years in United States and more than 10 years in United States) were equally likely to have Pap and mammogram after adjusting for insurance status, RSOC, other access variables, demographics, and satisfaction LEP were more likely to get mammogram after adjustment for covariates
Carrasquillo et al. (2000)	Current Population Survey, March 1998 supplement	Nationwide sample of 130,000 households (86% response) 1. Immigrants who are not U.S. citizens 2. Immigrants who are U.S. citizens 3. U.S. born	Health Insurance	Noncitizens more likely than naturalized and U.S. born to be uninsured (43.6% of noncitizens vs. 18.5% of naturalized and 14.2% of U.S. born) Noncitizens less likely than naturalized and U.S. born to have - Private insurance (43.9% of noncitizens vs. 66.4% of naturalized and 72.2% of U.S. born) - Public insurance (15.8% of noncitizens vs. 26.5% of naturalized and 26.6% of U.S. born, all $p < .01$)
Cheng et al. (2007)	Medical Expenditure Panel Survey, 2003	Nationwide sample of 12,706 non-Latino Whites and 5,500 Latinos (65% response) 1. Latinos, English spoken at home ($n = 1,977$) 2. Latinos, English not spoken at home ($n = 3,523$)	Quality	Compared to non-Latino Whites, Latinos who didn't speak English at home were less likely to receive all eligible HS: - Comfortable speaking English (RR = 0.88, $p < .05$) - Not comfortable speaking English (RR = 0.84, $p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Choi (2006)	National Health Interview Survey, 2000	Nationwide sample of 1,178 FB 65 and older (no response rate) 1. In United States less than 5 years 2. In United States 5 or more years	Health Insurance	Among FB, recent immigrants and those from Latin American more likely to be uninsured: - Recent (less than 5 years) immigrants had 31 times the odds of being uninsured compared to the non-recently immigrated ($p < .01$) - FB from Mexico, C/S American had 22 times the odds of not having health insurance ($p < .01$) versus Western Europeans
Clemans-Cope & Kenney (2007)	National Survey of American Families, 1999 and 2002	Nationwide sample of 25,485 low-income children by parent language and nativity status (no response rate) 1. U.S. born (English) (79% of sample) 2. U.S. born (Spanish) (1% of sample) 3. FB (English) (7% of sample) 4. FB (Spanish) (14% of sample)	Quality of Care	FB parents (Spanish and English speaking) more likely than U.S.-born parents to report communication problems: - Spanish-speaking FB parents, 11.8 percentage points more likely ($p < .01$) - English-speaking FB parents, 6.4 percentage points more likely ($p < .01$)
Cohen & Christakis (2006)	Washington State Medicaid Billing Data, 1999-2000	Statewide sample of 38,793 infants who were continuously enrolled in Medicaid and were 15 months in age at any point during the period (no response rate) 1. Parent primary language not English ($n = 8{,}116$) 2. Parent primary language English ($n = 30{,}677$)	Health Care Utilization	Children of non-English-speaking parents less likely than the children of English-speaking parents to receive all recommended preventive care visits (ARR 0.53, $p < .05$) Children of non-English-speaking parents less likely to receive all preventive care visits than English-speaking ethnic/racial counterparts, except for Asians: - White non-English speaking, ARR 0.77 ($p < .05$) - Hispanic non-English speaking, ARR 0.36 ($p < .05$) - Black non-English speaking, ARR 0.30 ($p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Cunningham (2006)	Community Tracking Study (2003)	Survey of 60 nationally representative communities including 46,600 people (no response rate) – percentage of population noncitizen	Health Care Utilization	Noncitizens had much lower levels of ED use than citizens (about 17 fewer visits per 100 people, on average)
Cunningham et al. (2006)	Community Tracking Study, 1996-2003	Survey of 60 nationally representative communities (no response rate) 1. Hispanics in sites with more than 20% Hispanic in 1996 (major Hispanic centers) 2. Hispanics in sites with 5% to 20% Hispanic in 1996 (other areas) 3. Hispanics in sites with less than 5% Hispanic in 1996 (new growth communities)	RSOC Health Care Utilization	Spanish-speaking Hispanics in new growth communities and other areas have poorer access to care than Hispanics in major Hispanic centers: - 54% of Spanish-speaking Hispanics in new growth communities have a RSOC vs. 58% in other areas and 66% in major Hispanic centers - 51% of Spanish-speaking Hispanics in other areas reported physician visits vs. 58.2% in major Hispanic centers ($p < .05$) - 21% of Spanish-speaking Hispanics in new growth communities reported ED use vs. 13% in major Hispanic centers ($p < .05$) - 19% of ambulatory visits by Spanish-speaking Hispanics in new growth communities were ED visits vs. 18% of visits in other areas and 9.4% of visits in major Hispanic centers

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Dallo et al. (2008)	Commonwealth Fund Survey on Disparities in Quality of Health Care, 2001	Survey of 6,674 individuals (54% response) 1. U.S. born (n = 5,156) 2. FB (n = 1,518)	Quality of Care	Compared with U.S.-born, FB individuals (all FB and FB Asians) were more likely to report their physicians not involving them in their care as much as they would have liked (Odds Ratio [OR] = 1.43, $p < .05$, and OR = 3.25, $p < .05$, respectively) Compared with U.S.-born Asians, FB Asians were more likely to report physicians not spending enough time during the medical encounter (OR = 4.19, $p < .05$)
De Alba & Sweningson (2006)	National Health Interview Survey, 2000	Nationwide sample of 314 Hispanic women ages 18 and older who had a doctor's visit in the past year but no Pap test in the past 3 years (72% response) 1. High English proficiency (n = 135) 2. Low English proficiency (n = 179)	Quality of Care	English proficiency had positive effect on reports of cancer screening recommendations by a woman's primary physician - Latinas with high English proficiency had 2.2 times the odds of reporting a Pap test recommended by doctor versus LEP women ($p < .05$)
De Alba et al. (2005)	California Health Interview Survey, 2001	Statewide sample of 55,000 civilian women 18 and older (38% response) 1. Eligible for Pap test (n = 6,320) - Naturalized citizens (n = 2,976) - Noncitizens (n = 3,344)	Health Care Utilization	Naturalized citizens significantly more likely than noncitizens to have - Ever had Pap test (Adjusted Odds Ratio [AOR] 1.54, $p < .05$) - Pap test in past 3 years (AOR 1.51, $p < .05$) - Ever had a mammogram (AOR 2.15, $p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		2. Eligible for mammogram (n = 3,828) - Naturalized citizens (n = 2,472) - Noncitizens (n = 1,356)		- Mammogram in past 2 years (AOR 2.15, $p < .05$) Time in United States increases odds of all four utilization measures ($p < .05$), except having Pap test in past 3 years
DuBard & Massing (2007)	North Carolina Medicaid Data, 2001-2004	Statewide sample of 48,391 recipients of emergency care who are only eligible for emergency Medicaid coverage because of citizenship status 1. Undocumented (n = 48,018) 2. Documented (n = 373)	Cost of Care	Emergency Medicaid spending grew 28% between 2001 and 2004 (compare to 35% increase in total Medicaid spending) Emergency Medicaid spending represented less than 1% of total Medicaid spending each year
Echeverria & Carrasquillo (2006)	National Health Interview Survey, 2000	Nationwide sample of 18,342 women ages 18 to 64 (90% response) 1. U.S. born (n = 15,443) 2. Naturalized (n = 1,454) 3. Noncitizen (n = 1,445)	Health Care Utilization	Naturalized women had higher risk of no Pap test in past year vs. U.S. born ($p<.05$), and noncitizens had higher risk than naturalized ($p < .05$) Noncitizen Latinas had higher risk of no Pap test in past year vs. naturalized or U.S.-born Latinas ($p < .05$), but effects disappeared after adjusting for acculturation
Fuentes-Afflick et al. (2006)	Original Survey	Statewide (New York, Florida, and California) samples of 3,242 postpartum Hispanic women (84.6% response) 1. U.S. born (n = 428) 2. FB citizens (n = 264)	Health Care Utilization (PRWORA)	All Florida subgroups (U.S.-born citizens, FB citizens, documented, and undocumented) had increased odds of inadequate prenatal care vs. reference group (New York U.S. born) - FB citizens OR = 4.45, undocumented OR = 3.55, U.S. born OR = 2.66, documented OR = 2.47

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		3. Documented immigrants (n = 495) 4. Undocumented immigrants (n = 2,055) (stratification by state of residence)		Documented immigrants in New York had increased odds (1.90) compared to New York U.S. born PRWORA had a negative effect on undocumented and a "chilling effect" on documented in Florida
Goel et al. (2003)	National Health Interview Survey, 1998	Nationwide sample of 32,440 individuals ages 18 and older (84% response) 1. FB (n = 4,963) 2. U.S. born (n = 27,441) Eligible for: - Pap test (n = 10,486) - Mammogram (n = 4,597) - Fecal Occult Blood Test (FOBT) (n = 9,823) - Sigmoidoscopy (n = 9,968)	Health Care Utilization	FB of various race/ethnic groups less likely than U.S.-born counterparts to have Pap test in past 2 years: - FB Whites AOR = 0.58 ($p < .05$) - FB Hispanics AOR = 0.69 ($p < .05$) - FB Asian Americans and Pacific Islanders [AAPIs] AOR = 0.18 ($p < .05$) FB AAPIs less likely than U.S.-born counterparts to have FOBT in past year (AOR = 0.45, $p < .05$)
Goldman et al. (2006)	Los Angeles Family and Neighborhood Survey, 2000-2001	Countywide sample of 2,398 residents ages 19 to 64 (82% response) 1. Native born (n = 1,056) 2. FB (n = 1,342) - U.S. citizen (n = 368) - Permanent resident (n = 427) - Undocumented (n = 430) - Temporary legal immigrant (n = 117)	Cost of Care	FB account for proportionately fewer health care expenditures than native born: - FB men's expenditures $1,086 less per year than U.S.-born men - FB women's expenditures $1,201 less than U.S.-born women - Undocumented men spent 39% less and women 54% less than U.S.-born counterparts - Temporary legal immigrants spent least of all FB groups at $711 for men and $1,711 for women

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
				- FB compose 13% of U.S. population but spend only 9% of total expenditures - Undocumented represent 3% of population but only spend 2% of total expenditures
Goldman et al. (2005)	Los Angeles Family and Neighborhood Survey, 2000-2001	Countywide sample of 2,398 residents ages 18 to 64 (82% response) 1. Native born (n = 1,056) 2. Immigrant citizens (n = 368) 3. Permanent legal residents (n = 427) 4. FB with temporary visa (n = 117) 5. Undocumented FB (n = 430)	Health Insurance	FB more likely to be uninsured, with undocumented faring worst: - Uninsurance rates for FB 24% higher than natives - Uninsurance rates 68% for undocumented vs. 23% for immigrant citizens - Only 20% of those undocumented have employer-based insurance, even less have public insurance, and almost none buy own policies 50% of the disparities in health insurance attributable to socioeconomic status and 33% to industry of employment
Grubbs et al. (2006)	Original Survey, 2003	Statewide (California) sample of 1,200 adult ethnic minorities with non-English-language preference (10 languages) (74% response) 1. Those aware of language law requiring fed-funded medical centers to provide services in patient's native language (n = 371) 2. Not aware of law (n = 598)	Quality of Care	No significant association between knowledge of law and interpreter utilization ($p > .05$) Those with awareness of law had increased odds of having language-concordant provider (OR = 1.64, Confidence Interval [CI] = 1.19 to 2.26, $p < .01$) No effect of law knowledge on all type language access (interpreter or provider concordance) ($p > .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Guendelman et al. (2001)	National Health Interview Survey, 1997	Nationwide sample of children from working poor families (no response rate) 1. U.S.-born children (n = 4,876) Insured vs. uninsured 2. FB children (n = 456) Insured vs. uninsured	RSOC Health Care Utilization	FB children less likely than U.S. born to have RSOC and visited doctor in previous year, even after controlling for insurance status and health status
Guendelman et al. (2005)	California Health Interview Survey, 2001	Statewide sample of 4,440 low-income children younger than 18 (no response rate) 1. Native born / naturalized (n = 3,978) 2. Immigrant (n = 462)	Health Insurance RSOC Health Care Utilization	Immigrant children more likely to be uninsured and have poorer access and less use than native-born or naturalized children - 43.7% of immigrant children uninsured vs. 17.1% of native born or naturalized (p<.0001) - 26.0% of insured immigrant children have EBHI vs. 43.8% of native born or naturalized ($p < .0001$) - 26.3% of low-income immigrant children have no RSOC vs. 8.9% of low-income native-born or naturalized citizens ($p < .0001$) - 72.5% of low-income immigrant children use community clinics vs. 47.4% of low-income native-born or naturalized citizens ($p < .0001$) - Low-income, immigrant children consistently had less use than low-income, native-born, or naturalized children (physician, dental, and ER visits) Insurance made more of difference for nonimmigrants than for immigrants

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Halfon et al. (2004)	National Survey of Early Childhood Health, 2000	Nationwide sample of 2,068 households with children aged 4 to 35 months (no response rate) 1. Non-Hispanic Whites 2. Hispanic Spanish speakers 3. Hispanic English speakers	Quality of Care	Hispanic Spanish-speaking less satisfied than non-Hispanic Whites, particularly in the area of - Being information satisfied (OR = .32, CI = .13 to .79) - Being time satisfied (OR = .44, CI = .21 to .9) - Recommending the provider (OR = .35, CI = .16 to .78)
Huang et al. (2006)	National Survey of American Families, 1999	Nationwide sample of 35,938 parents with oversampling of lower income households (81% response) 1. U.S.-born child with U.S. citizen parents (n = 31,888) 2. U.S.-born child with noncitizen parents (n = 1,077) 3. FB child with naturalized parents (n = 190) 4. FB child with noncitizen parents (n = 837)	Health Insurance RSOC Health Care Utilization	Regardless of parent citizenship, FB children more likely than U.S.-born children with U.S. citizen parents to - Be uninsured (OR = 4.32, $p < .05$) - Have no RSOC outside the ER (OR = 1.93, $p < .05$) - Not have had dental visit (OR = 1.76, $p < .05$) nor doctor visit in past year (OR = 1.39, $p < .05$) FB children less likely than U.S.-born children with U.S. citizen parents to have public health insurance (OR = 0.37, $p < .05$)
Jackson et al. (2007)	National Survey of American Life, 2001-2003	Nationwide sample of 1,573 Caribbean Black and African American individuals ages 18 and older (72% response) 1. U.S. born (n = 432) 2. FB (n = 1,141) (subgroups by ethnicity)	Health Care Utilization Quality of Care	U.S. born with diagnosed MH disorder more likely to have used MH services than FB counterparts ($p < .05$) Those that immigrated to the United States at a younger age more likely to use MH services ($p < .05$) FB more likely to perceive that MH or general medical services were helpful than U.S. born ($p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Javier et al. (2007)	California Health Interview Survey, 2001 and 2003	Statewide sample of children ages 1 to 11 with physician-diagnosed asthma (43% response in 2001, 34% in 2003) 1. Immigrant family (n = 895) 2. Nonimmigrant family (n = 1,705) (adjusted for language of interview)	Health Care Utilization RSOC	Compared with asthmatic children in nonimmigrant families, those with asthma in immigrant families were - Less likely to visit the ED (OR = .58, $p < .01$) - Equally likely to report no RSOC, delays in medical care, and no doctor visit in last year - No differences based on language of interview
Joyce et al. (2001)	Original Survey, 1995 and 1998	Birth records for Latina mothers from New York City, Texas, and California (universal data) 1. U.S.-born mothers - delivering in 1998 vs. 1995 (reference group) 2. FB mothers - delivering in 1998 vs. 1995	Health Insurance (PRWORA) Health Care Utilization (PRWORA)	Uninsurance rates increased for Mexican-born mothers in California in 1998 vs. U.S. born, but not for any other groups ($p < .05$) Early initiation of prenatal care increased for almost all FB Latinas in 1998 vs. U.S.-born Latinas ($p < .05$) PRWORA was related to a small increase in the uninsured among Mexicans in California, but little or no effect on prenatal care access
Kagawa-Singer et al. (2007)	California Health Interview Study, 2001	Statewide sample of U.S. and FB non-Hispanic White and Asian women (38% response) 1. Non-Hispanic White women - U.S. born - FB in U.S. 10 years and more - FB less than 10 years	Heath Care Utilization	FB Whites and Asians in United States less than 10 years were less likely to receive Pap test than U.S.-born Whites and Asians ($p < .05$, .01); FB Asians also less likely to receive mammogram FB Korean and Japanese in United States more than 10 years were more likely to receive Pap test than U.S.-born Korean and Japanese women ($p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		2. Asian women - U.S. born - FB in U.S. 10 years and more - FB less than 10 years (also comparisons by Asian subgroup)		FB Chinese and Filipina in United States less than 10 years were less likely to receive mammogram than U.S.-born Chinese and Filipina women; FB Koreans in United States more than 10 years were less likely to receive mammogram than U.S.-born Korean women
Kandula et al. (2006)	California Health Interview Survey, 2001	Statewide sample of 41,598 adults ages 18 and older (38% response) 1. U.S. born 2. Living in United States more than 15 years 3. Living in United States 5 to 15 years 4. Living in United States less than 5 years	Health Care Utilization	FB in United States for fewer years less likely than U.S. born to have sigmoidoscopy/FOBT, mammography, or pap - In United States less than 5 years significant for all types ($p < .05$) - In United States 5 to 15 years significant for mammography and Pap test only ($p < .05$) - In United States more than 15 years not significant for any measures FB Asians more likely than U.S.-born non-Hispanic Whites to report that they “didn’t have symptoms” as most important reason for not having each screening test ($p < .05$)
Kaushal & Kaestner (2005)	Current Population Survey, 1994-2001	Nationwide sample of 204,291 low-educated women and men ages 18 to 44, stratified by nativity status (no response rate) 1. FB (n = 39,536) 2. Native born (n = 164,755)	Health Insurance (PRWORA)	PRWORA associated with a 10% increase (CI = 9.9 to 10.7, $p < .01$) in uninsurance among FB, less educated single women - No effect on insurance status of U.S.-born single women ($p > .05$) - No differential effects on the newly immigrated ($p > .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
				Among post-1996 immigrants, single women in states with Temporary Assistance for Needy Families or Medicaid substitutes have same coverage effects as those in states without either program. ($p > .05$)
Kaushal & Kaestner (2007)	National Health Interview Survey 1992-1996, 1998-2002	Nationwide sample of 51,074 women ages 18 to 54 and their children ages 0 to 14 years (no response rate) 1. FB women ($n = 22,748$) 2. Children of FB women ($n = 28,326$)	Health Insurance (PRWORA) Health Care Utilization (PRWORA)	For single mothers, PRWORA implementation associated with 12% increase in uninsurance ($p < .001$) Married mothers also experienced 10% increase in delaying care because of cost and 7% increase in not receiving care because of cost ($p < .05$) No consistent effects found on children's uninsurance rates or on receipt of care
Kim & Shin (2006)	California Health Interview Survey, 2001	Statewide sample of 44,434 nonelderly adults (64% response) 1. U.S. born 2. first-generation immigrants 3. second-generation immigrants (subgroups by race/ethnicity: White, Asian, Latino)	Health Insurance	After adjustment, no significant differences remained among subgroups (U.S. born, first, second generation) in terms of having public vs. private health insurance [uninsurance will be reported in another article]
Kincheloe et al. (2007)	California Health Interview Survey, 2001	Statewide sample of 2,573 children eligible for Medi-Cal and 1,431 eligible for State Children's Health Insurance Program (SCHIP) (64% response)	Health Insurance	Eligible children of parents with green card less likely (OR = 0.57, $p < .05$) to be enrolled in Medi-Cal than children of citizen parents Eligible children of one parent with a green card and one that is undocumented less likely (OR = 0.49, $p < .05$) to be enrolled in Medi-Cal than children of citizen parents

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		1. Parents hold at least one green card 2. One parent has a green card; one is undocumented 3. Citizen parents		No significant effects found for SCHIP enrollment
Ku & Matani (2001)	National Survey of American Families, 1997	Nationwide sample of 109,992 noninstitutionalized individuals younger than 65, with oversampling of low-income population (70% response) 1. Noncitizen immigrants 2. Naturalized immigrants 3. Native born	Health Insurance Health Care Utilization	Noncitizen adults and their children have lower odds of being insured or seeking care vs. native born - Adults: 3% less Medicaid ($p < .05$), 9% less job-based insurance coverage ($p < .01$), 9% higher odds of being uninsured ($p < .01$) - Children of noncitizens: 5% less Medicaid ($p < .01$), 8% less job-based insurance ($p < .01$), 8% higher odds of being uninsured ($p < .01$) than those with citizen parents - Adults (–9% chance, $p < .01$) or the children of noncitizen parents (–13% chance, $p < .01$) have lower odds of seeking ER care - Noncitizens also lower odds of seeing doctor or nurse (–6% for adults and children, $p < .01$) Access for naturalized citizens generally similar to native-born citizens

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Lasser et al. (2006)	Joint Canada – U.S. Survey of Health, 2002-2003	Nationwide samples (United States and Canada) of 8,688 non-institutionalized adults (responses 50% for Canada and 62% for United States). 1. United States vs. Canada 2. Native born vs. FB 3. White vs. non-White 4. Income categories	RSOC Heath Care Utilization Quality of Care	Only in United States did FB have lower odds of having a RSOC, using care, or being very satisfied with care versus native born - OR = .70 for FB having contacted a doctor in past month ($p < .05$) - OR = .51 of having a regular doctor ($p = .0001$) - OR = .74 of being very satisfied with care ($p = .001$) FB respondents in both countries had lower odds than native born of perceiving their quality of care as excellent (OR = .69, $p = .001$)
Lauderdale et al. (2006)	California Health Interview Survey, 2003	Statewide sample of 42,044 adults (60% response) 1. U.S. born ($n = 31{,}624$) 2. FB ($n = 10{,}420$) (Subgroups of each for race and ethnicity)	Quality of Care	FB (especially minorities and LEP) more likely to report discrimination: - OR 2.19 of reporting discrimination in health care ($p < .001$) - FB Blacks, Asians, and Latinos all had increased odds of reporting discrimination compared to FB Whites (OR = 4.45, $p < .01$; OR = 1.86, $p < .01$; OR = 2.56, $p < .001$) - Those speaking language other than English at home and having ED as RSOC were both associated with increased odds of reporting discrimination (OR = 2.3, $p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Lees et al. (2005)	National Health Interview Survey, 2000	Nationwide sample of 18,102 adults ages 40 and older (72% response) 1. Eligible for pneumococcal vaccine (n = 5,767) 2. Eligible for flu vaccine (n = 5,881) 3. Eligible for mammogram (n = 10,447) 4. Eligible for endoscopy/FOBT (n = 11,283) (subgroups by race/ethnicity and primary language)	Health Care Utilization	Spanish-speaking Hispanics less likely than Whites to receive pneumococcal vaccination (AOR = 0.54, $p < .05$) Spanish-speaking Hispanics less likely than Whites to receive endoscopy or FOBT (AOR = 0.59, $p < .05$) No significant difference between English-speaking and Spanish-speaking Hispanics on either measure No significant difference between Whites and Spanish-speaking Hispanics for receipt of influenza vaccine or mammogram, after adjustment
Lucas et al. (2003)	National Health Interview Study, 1997-2000	Nationwide sample of 97,345 men 17 and older (89% to 92% response) 1. Non-Hispanic FB Black men (n = 1,486) 2. Non-Hispanic U.S.-born Black men (n = 13,921) 3. Non-Hispanic U.S.-born White men (n = 81,938)	Health Insurance Health Care Utilization	FB Black men more likely than U.S.-born Whites to be - Uninsured (OR = 2.28, $p < .05$) - Without private insurance (57% vs. 78%, $p < .05$) - Publicly insured (13 vs. 7%, $p < .05$) Odds of uninsurance are doubled for those who have resided in the United States for less than 5 years ($p < .05$) FB Black men less likely than both U.S.-born Blacks and Whites to - Have had no contact with a health professional ever (2% vs. 1% and 0.5%, both $p < .05$) - Have had contact with a health professional in past 6 months (52% vs. 58% and 61%, both $p < .05$) - Have had contact with a health professional in past 6 months to 1 year (22.2 vs. 16% and 16%, both $p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Mainous et al. (2007)	National Health Interview Survey, 2003	Nationwide sample of adult Latinos previously diagnosed with diabetes (no response rate) Latino diabetics (n = 373) 1. Interviewed in English 2. Interviewed in Spanish	Quality of Care	Latino diabetic patients (Spanish) were less likely to have exam for retinopathy compared to Latino diabetics (English) (OR = .41) Measures of acculturation and citizenship were not independent predictors of diabetes quality of care
Mohanty et al. (2005)	Medical Expenditures Panel Survey, 1998; National Health Interview Survey, 1996-1997	Nationwide sample of merged data on 22,953 U.S. civilian adults (no response rate) 1. U.S. born (n = 18,398) 2. Immigrants (n = 2,843)	Cost of Care	Per capita immigrant health care expenditures 55% lower than for U.S. born ($1,139 vs. $2,546) Expenditures for uninsured and publicly insured immigrants one half those of U.S.-born counterparts Immigrant children had 74% lower per capita health care expenditures than U.S.-born children ED expenditures were more than 3 times higher for immigrant children than for U.S.-born children
Ngui & Flores (2006)	National Survey of Children With Special Health Care Needs, 2000-2002	Nationwide sample of 35,946 parents of children age younger than 18 with special health care needs (61% response) 1. White/English (n = 28,916) (reference group) 2. Black/English (n = 3,820) 3. Hispanic (n = 3,210) - English speaking - Spanish speaking	Quality of Care	Spanish-speaking more likely than English-speaking to be dissatisfied with children's care (OR = 2.25, $p < .05$) Spanish-speaking equally as likely as English-speaking to report problems with children's care ($p > .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Ojeda & Brown (2005)	Current Population Survey, 2001	Nationwide sample of 21,214 U.S.-born children in two-parent households, weighted to represent 43.4 million (no response rate) 1. Immigrated after 1986 2. Immigrated before 1986 3. U.S. born (subgroups by race/ethnicity and naturalization status)	Health Insurance	Naturalized Latino parents (immigrated after 1986) had an OR = 1.96 of having uninsured children vs. U.S. born ($p < .05$) White noncitizen parents (immigrated after 1986) had OR = 3.2 of having uninsured kids vs. U.S.-born Whites ($p < .05$) White naturalized immigrant parents (arrived after 1986) had a OR = 6 of having uninsured kids vs. U.S.-born Whites ($p < .05$) Noncitizen Latino parents have an OR = 0.6 of having employer-insured children vs. U.S.-born Latinos
Ortega et al. (2007)	California Health Interview Study, 2003	Statewide sample of 42,044 households (34% response) 1. U.S.-born Mexican ($n = 2{,}851$) 2. Naturalized Mexican ($n = 1{,}218$) 3. Mexican with green card ($n = 1{,}352$) 4. Undocumented Mexican ($n = 1{,}317$) 5. U.S. born other Latino ($n = 852$) 6. Naturalized other Latino ($n = 546$) 7. Other Latinos with green card ($n = 327$) 8. Undocumented other Latino ($n = 271$)	RSOC Health Care Utilization Quality of care	Undocumented and green card Mexicans were less likely to have a usual source of care than U.S.-born Mexicans (OR = 0.70, $p < .01$) Compared to U.S.-born Mexicans and other Latinos, undocumented and green card Mexicans and other Latinos: - Had consistently lower use (fewer physician visits, less likely to have 1 or more physician or ED visit) - Were less likely to report difficulty obtaining health care - Were more likely to report negative experiences

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Pippins et al. (2007)	National Latino & Asian American Study 2002-2003	Nationwide sample of 1,792 insured adult Latinos (76% response). 1. English proficient (n = 1,036) 2. LEP (n = 750) (comparisons also by Latino subgroups)	RSOC Health Care Utilization	LEP were more likely to report no RSOC or lack in continuity of care than English proficient (OR = 2.20, $p < .05$) LEP were more likely to report difficulties getting care than English proficient: - Long waits in waiting room (OR = 1.88, $p < .05$) - Difficulty getting information/advice by phone (OR = 1.76, $p < .05$) No significant differences among Latino subgroups
Ponce, Chawla et al. (2006)	California Health Interview Survey, 2001 & 2003	Statewide sample of 38,931 adult females 18 to 64 (36% response) 1. U.S. born and those who have resided in the United States for more than 5 years (n = 37,642) 2. FB that have lived in the United States for less than 5 years (n = 1,289) (subgroups by race/ethnicity, language of interview)	Health Care Utilization	Recent immigrants less likely to have cancer screening in past 3 years - FB in United States less than 5 years had 0.58 times the odds of having at least 1 Pap test in past 3 years ($p < .05$) Spanish speaking had 1.65 times the odds of having had cancer screening than English- or Asian-language speakers ($p < .05$) All Asian language groups were less likely to have Pap test than English or Spanish speaking ($p < .05$)
Ponce, Hays et al. (2006)	California Health Interview Survey, 2001	Statewide sample of 18,659 adults 55 and older (38% response) 1. LEP (n = 1,242) 2. English proficient but other language spoken at home (n = 2,452) 3. English only (n = 14,956)	RSOC	LEP adults 55 and older had an adjusted RR of 1.86 of having no RSOC compared English only (English proficient were no different from English only)

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Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Ponce, Ku et al. (2006)	California Health Interview Survey, 2001 & 2003	Statewide sample of 18,948 adults 65 and older with Medicare (no response rate) 1. English proficient 2. LEP (subgroups by type of Medicare coverage and race/ethnicity)	RSOC Health Care Utilization	LEP less likely to have an RSOC than English-only speakers (OR = 0.51, $p < .05$) LEP less likely to have recommended cancer screenings in the past 2 years - LEP Asians 0.24 times more likely to have mammogram in past 2 years vs. White English-only speakers ($p < .05$) - LEP 0.57 times more likely to have FOBT in past year vs. English-only speakers ($p < .05$) - LEP Asians 2.31 times more likely to have FOBT vs. White English-only speakers ($p < .05$)
Prentice et al. (2005)	Los Angeles Family and Neighborhood Survey, 2000-2001	Countywide probability sample of 2,130 adults younger than 65 stratified by poverty (no response rate) 1. Undocumented immigrants 2. Legal resident immigrants 3. Naturalized citizens 4. Native-born citizens	Health Insurance	Undocumented immigrants had - OR = 0.29 of gaining insurance versus the native born ($p < .05$) - Highest uninsured rates and were the most disadvantaged; also had OR = 2.17 of losing insurance after adjustment ($p < .05$) Legal residents had OR = 0.6 of gaining insurance vs. the native born ($p < .05$) After adjustment, naturalized citizens not significantly different from native born in ability to gain or keep insurance ($p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Rodriguez et al. (2005)	California Women's Health Survey, 1998	Statewide sample of 3,340 women 18 and older (70% response) 1. FB Latina (n = 510) 2. U.S.-born Latina (n = 342) 3. Non-Latina Whites (n = 2,489)	Health Care Utilization	FB Latinas more likely than U.S.-born White women to receive recommended preventive care exams after adjustment for insurance and socioeconomic status: - AOR = 0.60 of not having mammogram in past 2 years ($p < .05$) vs. Whites - AOR = 0.59 of not having Pap test in past 3 years ($p < .05$) vs. Whites No significant difference for clinical breast exams
Sentell et al. (2007)	California Health Interview Survey, 2001	Statewide sample of 41,984 adults providing responses to English-language proficiency (47% response) 1. English only (n = 29,992) 2. Bilingual (n = 9,243) 3. No English (n = 2,750)	Health Care Utilization	Among those reporting an MH need, non-English speaking were less likely to receive needed MH services compared to English speakers: - All non-English speakers (OR = 0.28, $p < .05$) - Non-English-speaking Asians/Pacific Islanders (OR = 0.15, $p < .05$) compared to English-speaking Asians/Pacific Islanders - Non-English-speaking Latinos (OR = 0.19, $p < .05$) compared to English-speaking Latinos Nativity and years in United States not significant
Shah & Carrasquillo (2006)	Current Population Survey, 1994-2005	Nationwide sample of about 20,000 adult noninstitutionalized U.S. residents, over 12 years 1. U.S. born 2. Latinos - naturalized citizens 3. Latinos - noncitizens (subgroups by race/ethnicity)	Health Insurance	U.S.-born Latinos had 5% increase in uninsurance from 1993 to 1998, because of losses in Medicaid that were not offset by increases in EBHI Naturalized Latinos saw slight increases in EBHI from 1993 to 1999, while Medicaid rates stayed stable Latino noncitizens increasingly became uninsured from 1993 to 1999, because of losses in Medicaid coverage (only group with increased uninsurance rates from 1993 to 2004)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Strine et al. (2002)	National Immunization Survey, 1999 & 2000	Nationwide survey of parents with 19- to 35-month-old children (no sample size given) (66% response) 1. U.S. born 2. FB	Health Care Utilization	FB children less likely than U.S.-born children to have adequate vaccination coverage (4:3:1:3) (AOR = 0.55)
Swan et al. (2003)	National Health Interview Survey, 2000	Nationwide sample of 32,374 adults (18 and older) (72% response) 1. U.S. born (n = 12,939) 2. In United States less than 10 years (n = 613) 3. In United States 10 years or more (n = 1,563)	Health Care Utilization	FB women in United States less than 10 years less likely than U.S. born and FB in United States more than 10 years to have mammogram in past 2 years or Pap test in past 3 years ($p < .05$) FB in United States less than 10 years less likely than U.S. born and FB in United States more than 10 years to have FOBT or endoscopy in recommended screening interval ($p < .05$) FB men in United States less than 10 years less likely than U.S. born and FB in United States more than 10 years to have Prostate-Specific Antigen test in past year ($p < .05$)
Tsui et al. (2007)	National Health Interview Survey, 1998-2000, 2003	National sample of 70,775 adult women (72% response) 1. FB (n = 9,863) 2. U.S. born (n = 60,912)	Health Care Utilization	Recent and established immigrants more likely to report no Pap test in lifetime: - FB, less than 25% lifetime in United States (19% no pap) - FB, more than 25% lifetime in United States (10% no pap)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
				- U.S. born (6% no pap) - Adjusted prevalence of no Pap test was highest among women from Asia, Southeast Asia, India (20%), then other countries (16%), South America (13%), Mexico (11%), Caribbean (11%), Europe (10%), and Central America (9%)
Weech-Maldonado et al. (2001)	Consumer Assessment of Health Plans Study, 1997-1998	Multistate sample of 9,540 children enrolled in Medicaid-managed care plans (42% response) 1. White, English speaking 2. White, other language 3. Hispanic, Spanish 4. Hispanic, bilingual 5. Asian, other language	Quality of Care	Ratings of health care were lower for - Asian-other language group vs. Whites (beta = –3.83, $p < .05$) - Asian non-English speakers for staff helpfulness (beta = –20.10), timeliness of care (beta = –18.65), provider communication (beta = –17.19), plan service (beta = –10.95), and getting needed care (beta = –8.11) (all $p < .05$) vs. Whites - Hispanic Spanish speakers for staff helpfulness (beta = –6.09), timeliness of care (beta = –9.24), provider communication (beta = –4.37), and plan service (beta = –6.93) (all $p < .05$) vs. Whites - Disparities mostly accounted for by language status Hispanic Spanish speakers rated doctor, specialist, and health plan significantly higher than Whites (all $p < .05$)
Weech-Maldonado et al. (2003)	Consumer Assessment of Health Plans Study, 2000	Multistate sample of 49,327 Medicaid enrolled adults (38% response) 1. White, English speaking 2. White, other language	Quality of Care	All provider ratings lowest for Asian-other language group ($p < .01$) and similarly low for White-other language group ($p < .01$) vs. White-English Hispanic-Spanish had highest ratings for all providers vs. White-English ($p < .01$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		3. Hispanic, Spanish 4. Hispanic, bilingual 5. Asian, other language		Hispanic-Spanish and Asian-Other had lower ratings ($p < .01$) than White-English, particularly for timeliness and staff helpfulness Plan service, provider communication, and timeliness of care worse for Hispanic-Spanish than Hispanic-bilingual ($p < .01$)
Weinick et al. (2004)	Medical Expenditures Panel Survey, 1997	Nationwide sample of 34,551 individuals (oversampling of Hispanics) (66% response) 1. Ancestry/country of origin - Non-Hispanic Whites (reference group) - Mexicans - Central Americans/Caribbean - Cubans - Puerto Ricans - South Americans 2. Length of time in United States - U.S. born (reference group) less than 5 years, 5 to 9 years, 10 to 14 years, 15 years or more (subgroups by language)	Health Care Utilization	Mexican, Cubans, Central Americans/Caribbean have decreased odds of having any ambulatory visits (OR = .64, $p < .001$; OR = .62, $p < .05$; OR = .65, $p < .01$) Mexicans, Cubans have decreased odds of having any ED visits (OR = .71, $p < .001$; OR = .44, $p < .01$), while Puerto Ricans have increased odds (OR = 1.27 $p = .056$) Mexicans, Central Americans/Caribbean, South Americans have decreased odds of having any prescription medications (OR = .74, $p < .001$; OR = .67, $p < .01$; OR = .60, $p <.05$) Hispanics-Spanish had decreased use (ambulatory & ED visits, prescription medications, hospitalizations) (OR = .61, $p < .001$; OR = .58, $p < .001$; OR = .65, $p < .001$; OR = .72, $p < .05$) Hispanics in United States less than 10 years have decreased odds of ambulatory and ED visits (OR = .79, $p > .05$; OR = .67, $p < .05$) All FB Hispanics have decreased odds of having any prescription medications ($p < .05$)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Wilson et al. (2005)	Original Survey, 2003	Statewide (California) sample of 1,200 ethnic minorities conducted in 11 languages (74% response) 1. LEP ($n = 592$) 2. English proficient ($n = 608$) (reference group) (Subgroups for those with and without language-concordant physicians)	Quality of Care	LEP more likely compared to English proficient of having - Problems understanding medical situations (OR = 3.16, CI = 2.1 to 4.8) - Bad reaction to meds because of problem understanding instructions (OR = 2.34, CI = 1.3 to 4.4) Disparities even worse when those with LEP and without language-concordant providers were examined separately
Wong et al. (2005)	California Health Interview Survey, 2001	Statewide sample of 1,771 Asians ages 50 and older (64% response) 1. U.S. born 2. FB - In United States for less than 15 years - In United States for 15 or more years	Health Care Utilization	FB more likely to not have recommended cancer screening visits, with more recent immigrants at higher risk - FB in United States less than 15 years had 0.48 times the odds of ever having had an FOBT or Sigmoidoscopy/colonoscopy (Sig/Col) screening ($p < .01$) - FB in United States 15 years or more had 0.8 times the odds of having either an FOBT or Sig/Col screening ($p < .05$) - FB in United States less than 15 years had 0.5 times the odds of having an up-to-date Sig/Col screening ($p < .05$) but no effect for FOBT
Yu et al. (2006)	California Health Interview Survey, 2001	Statewide sample of 12,797 adults with children age 18 and younger (no response rate)	Health Insurance Health Care Utilization	Noncitizen children more likely than U.S. born to - Be uninsured (OR = 4.23, $p < .05$) - Have no doctor contact in past 12 months (OR = 1.39, CI = 1 to 1.94)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
		1. English speaker at home (n = 7,233) 2. Parent speaks English very well (n = 1,954) 3. Parent speaks English well (n = 1,312) 4. Parent does not speak English well or at all (n = 2,298) (subgroups by citizenship status)	RSOC Quality of Care	Children with parents who speak English less than "very well" (Groups 3 & 4) less likely than those whose parents speak English "very well" to - Visit the ER in past year (OR = 0.6, $p < .05$) - Report delayed or foregone care in past year (OR = 0.5, $p < .05$) Children with parents that do not speak English well or at all were more likely than those whose parents speak English at home to - Be uninsured (OR = 2.05, $p < .05$) - Report travel to other countries for care or medications (AOR = 6.39, CI = 15.32 to 10.68) Parents' self-reported English ability was not related to whether they reported an RSOC for children Noncitizen children had OR = 2.86 of having no RSOC compared to U.S.-born children No English had about half the odds of reporting being discriminated against in seeking care for children compared to English-speaking parents ($p < .05$) Parents with noncitizen children have increased odds compared to parents with citizen children saying their children were discriminated against in health care (OR = 2.75, CI = 1.22 to 6.18; parents with naturalized children had reduced odds of 0.44, CI = .03 to 7.83)

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Appendix (continued)

Author and Date	Data Source	Sample Description and Comparison Groups	Dependent Variable	Principal Findings
Yu, Huang et al. (2004)	National Health Interview Survey, 1997-2000	Nationwide sample of 30,625 children under the age of 18 (89% to 92% response) 1. Race/ethnicity - Non-Hispanic White ($n = 29{,}106$) - Chinese ($n = 334$) - Filipino ($n = 287$) - Asian Indian ($n = 292$) - Other Asian/Pacific Islander ($n = 696$) 2. Citizenship status - U.S. born - Naturalized citizen - Non-U.S. citizen	Health Insurance RSOC	Noncitizen children more likely than citizen non-Hispanic Whites to - Be uninsured (AOR = 3.50, $p < .05$) - Not have an RSOC (AOR = 5.21, $p < .05$) No significant differences were found for naturalized citizens versus U.S. born
Yu, Nyman et al. (2004)	National Survey of Children With Special Health Care Needs, 2001	Nationwide survey of 38,866 children with special health care needs under age 18, stratified by parent language preference (62% response) 1. English-language interview ($n = 38{,}011$) 2. Non-English-language interview ($n = 855$)	Health Insurance RSOC Cost of Care	Non-English interviewees had 11.29 times the odds of having inadequate insurance vs. English interviewees ($p < .05$) Disparity between insurance coverage of Hispanic interviewees vs. White interviewees is eliminated when language is introduced in the model Non-English interviewees had 1.89 times the odds of lacking an RSOC for their children vs. English interviewees ($p < .05$) Non-English interviewees had 1.98 times the odds of lacking personal doctor or nurse for children vs. English interviewees ($p < .05$) Non-English interviewees had 1.49 times the odds of spending more than $500 per year out-of-pocket for their children vs. English-language interviewees ($p < .05$)

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