

**UCSF**

**UC San Francisco Previously Published Works**

**Title**

How Many Nurse Practitioners Provide Primary Care? It Depends On How You Count Them

**Permalink**

<https://escholarship.org/uc/item/6k37n60z>

**Journal**

Medical Care Research and Review, 72(3)

**ISSN**

1077-5587

**Authors**

Spetz, Joanne

Fraher, Erin

Li, Yin

et al.

**Publication Date**

2015-06-01

**DOI**

10.1177/1077558715579868

Peer reviewed

# How Many Nurse Practitioners Provide Primary Care? It Depends On How You Count Them

Medical Care Research and Review

1–17

© The Author(s) 2015

Reprints and permissions:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/1077558715579868

mcr.sagepub.com



Joanne Spetz<sup>1</sup>, Erin Fraher<sup>2</sup>, Yin Li<sup>2</sup>,  
and Timothy Bates<sup>1</sup>

## Abstract

This study compares different approaches to measuring the number of nurse practitioners (NPs) providing primary care services using data from the 2012 U.S. National Sample Survey of Nurse Practitioners, North Carolina licensing data from 2011, and a 2010 California survey of nurse practitioners and nurse midwives. Estimates of the number and share of NPs providing primary care depend on how one defines primary care. If the definition is based on the field of NP education, the estimated shares in primary care specialties are 83.5% in North Carolina and 90.7% in California; if the definition is based on current or past fields of certification, the estimated shares are 79.9% in North Carolina and 74.5% nationally. The estimated number is even smaller if one considers employment setting (58.4% in North Carolina, 66.8% in California, and 67.8% nationally), and shrinks to about half of NPs if focusing on current field of clinical specialization.

## Keywords

primary care, nurse practitioners, measurement, nurses, workforce

## Background

Numerous studies have questioned whether the United States will have the workforce in place to meet the demand generated by an aging population, the increasing care

---

This article, submitted to *Medical Care Research and Review* on December 29, 2014, was revised and accepted for publication on March 7, 2015.

<sup>1</sup>University of California, San Francisco, CA, USA

<sup>2</sup>University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

## Corresponding Author:

Joanne Spetz, Philip R. Lee Institute for Health Policy Studies, University of California, San Francisco, 3333 California Street, Suite 265, San Francisco, CA 94118, USA.

Email: joanne.spetz@ucsf.edu

burden of patients with chronic disease, and insurance expansions under the Affordable Care Act (Colwill, Cultice, & Kruse, 2008; Hofer, Abraham, & Moscovice, 2011; Ormond & Bovbjerg, 2011; Petterson et al., 2012; Schwartz, 2012). Particular concern has focused on anticipated shortages of primary care physicians nationally (Anderson & Horvath, 2004; Bodenheimer & Pham, 2010; Colwill et al., 2008; Ku, Jones, Shin, Bruen, & Hayes, 2011; Nicholson, 2009; Petterson et al., 2012; Sargen, Hooker, & Cooper, 2011) and in specific regions of the country (Huang & Finegold, 2013). Most of the studies that report current and impending primary care shortages have focused exclusively on primary care physician supply.

Some observers have suggested that more intensive use of other health care professionals could alleviate potential shortages of primary care physicians (Auerbach et al., 2013; Goodell, Dower, & O'Neil, 2011; Green, Savin, & Lu, 2013). A growing number of health policy experts have proposed that nurse practitioners (NPs) can play an important role in addressing ongoing and worsening shortages of primary care physicians (Cooper, 2007; Elsom, Happell, & Manias, 2009; Fairman, Rowe, Hassmiller, & Shalala, 2011; Naylor & Kurtzman, 2010; U.S. Government Accountability Office, 2008). In fact, the Health Resources and Services Administration (HRSA) recently published projections suggesting that a projected shortage of 20,400 full-time equivalent primary care physicians could be reduced to only 6,400 full-time equivalents with full deployment of NPs and physician assistants in new models of team-based care (HRSA, 2013).

HRSA's projections reflect a trend toward increased utilization of NPs. The number of Medicare patients receiving care billed by NPs grew 15-fold between 1998 and 2010 (Kuo, Loresto, Rounds, & Goodwin, 2013). Patient surveys find that patients are open to a greater role for NPs, most people have seen nonphysician providers, and most were satisfied with the care they received (Dill, Pankow, Erikson, & Shipman, 2013). Prior research indicates that up to 75% of primary care services could be provided by NPs and other advanced practice nurses (Sullivan-Marx, 2008). A large and growing body of research demonstrates that the quality of care delivered by NPs is at least equivalent to that of physicians, and some research has found that NPs have stronger patient communication skills (Horrocks, Anderson, & Salisbury, 2002; Laurant et al., 2005; Lenz, Mundinger, Kane, Hopkins, & Lin, 2004; Mundinger, 2000; Newhouse et al., 2011).

Despite growing attention to the potential for NPs to offset projected shortages of primary care services, HRSA's model and other workforce projections are hampered by significant variation in data estimating the number of NPs in active practice in the workforce. There also are few sources of data on the number of NPs practicing in specialty versus primary care, and the reported data often use different measures. The American Association of Nurse Practitioners (AANP) reports that there are 192,000 practicing NPs in the United States (AANP, 2013), and the 2012 National Sample Survey of Nurse Practitioners (NSSNP) estimated that 154,057 NPs held state certification (HRSA, 2014). Of these, 132,368 had a job title of "nurse practitioner," indicating that a significant share of licensed NPs do not work, or work but not in NP roles. These data are consistent with a report that there were 106,113 NPs with

National Provider Identification numbers in 2010 (Skillman, Kaplan, Fordyce, McMenam, & Doescher, 2012). Estimates of the proportion of NPs who work in primary care range from about one third to 80% (AANP, 2013; McMenam, 2014; Naylor & Kurtzman, 2010). About 45% of NPs employed in NP positions were estimated to work in ambulatory or primary care in the 2012 NSSNP (HRSA, 2014), while 52% were estimated to work in primary care by the Agency for Healthcare Research and Quality (2011).

Similar long-standing challenges exist in enumerating the physicians practicing in primary care in the United States. Many physicians often considered part of the primary care workforce do not practice primary care because they went into subspecialty training after completing a primary care residency, practice as hospitalists, or practice outside their area of training. For example, in 2012 only 72% of internal medicine physicians were engaged in patient care in office-based settings where most primary care is delivered (authors' calculations from Table 3.1 in American Medical Association [AMA], 2014). Similarly, NPs can practice in specialized fields of ambulatory care, as well as in acute care, regardless of their field of study. About 84% of NP graduates in 2012 studied primary care fields (adult, family, pediatrics, gerontology, and women's health; Pohl, Barksdale, & Werner, 2013), but it is not clear how many provide primary care services now or will do so in the future.

What accounts for the wide range of estimates of the share of NPs who practice primary care? A likely explanation is that the sources from which these data are derived vary in how the data were collected, and how NPs are asked to report their area of work. For example, the AANP asks NPs, "What is your specialty?" An NP could interpret this question to refer to the field in which they were educated, the certifications they hold, or their practice setting. Other surveys, such as the California Board of Registered Nursing Survey of Nurse Practitioners and Nurse Midwives (Spetz, Keane, Herrera, Chu, & Lin, 2011), ask questions that specifically refer to current employment: "Do you work in primary care, involving common health problems and preventive measures, in your APRN position(s)?" In this case, NPs might report "yes" even if they spend only 10% of their time providing primary care services within a cardiology practice. Thus, in order to understand how many NPs practice primary care, one must take a closer look at how primary care is measured and reported.

### *New Contribution*

This study examines the factors that affect estimates of the number of NPs practicing in primary care. We use two different state-level data sources: one from a long-standing data set collected as part of the NP license renewal process in North Carolina, and one from a sample survey in California. We compare these state data sets to the 2012 NSSNP. Each of these data sources contains different, but sometimes overlapping, information about NP education and employment. Using these data sources, we examine different approaches that can be used to identify NPs in primary care, and we conduct a sensitivity analysis of how estimates of the number of NPs in primary care vary both by analytic approach and between data sources.

## Method

### *Data Sources and Variables*

We obtained data about NPs from two states: North Carolina and California. North Carolina has maintained a full census of licensure data since 1979, which includes information about NPs' demographic, education, and practice characteristics. California conducted a one-time sample survey of NPs and nurse midwives residing in California in 2010, using a stratified sampling strategy. The California survey asked questions about education, employment, work setting, job title, clinical specialty, patient population, provision of primary care, and recognition as a primary care provider (PCP) by private insurers.

*North Carolina Licensure Data.* In North Carolina, data are collected through the North Carolina Board of Nursing initial and annual renewal forms. In North Carolina, NPs must have an active approval to practice and an agreement with a supervising physician. NPs are regulated by both the Joint Subcommittee of the Medical Board and the Board of Nursing. All NP graduates have been required to have a master's degree since 2005, and national certification as an NP has been required since 2000. Licensure data are transmitted to the North Carolina Health Professions Data System at the Sheps Center for Health Services Research at the University of North Carolina at Chapel Hill. Health Professions Data System staff clean, geocode, and warehouse the data, which can be accessed with permission from the North Carolina Board of Nursing for research and policy analyses.

We used 2011 data for this study, which included 3,972 active, in-state NPs with an active approval to practice in North Carolina in 2011, and excluded NPs employed by federal agencies and facilities. As seen in Table 1, the average age of the North Carolina NP workforce was 44.9. Male NPs comprised just 6.9% of the workforce. Black/African American NPs represented 7.5% of the NP workforce in the state; 1.5% were Asian/Pacific Islander, 1.1% Hispanic/Latino, 1% Native American/Alaskan, and 1.2% reported an "other or mixed race/ethnicity. There were 3.8 licensed NPs per 10,000 population in North Carolina.

*California Board of Registered Nursing Survey.* In 2010, the California Board of Registered Nursing (BRN) conducted a sample survey to study the NP and certified nurse-midwife (CNM) population of California. NP certification in California can be obtained by successful completion of a NP program that meets BRN standards, or by certification through a national organization whose standards are equivalent to those of the BRN; thus, in contrast with North Carolina, national certification is optional. California has required that new NP applicants have a master's degree in nursing, a master's degree in a clinical field related to nursing, or a graduate degree in nursing since 2008. The survey included questions about NPs' and CNMs' education, employment, work environment, clinical specialty, scope of practice, reasons for discontinuing work in nursing, and plans for future employment.

**Table 1.** Characteristics of the Data Sets.

	North Carolina 2011	California 2010		NSSNP 2012	
	Population data	Sample data	Weighted data	Sample data	Weighted data
Number in state	4,036	1,120	13,669	12,923	154,057
Number working as NP	3,972	839	10,113 (74.0%)	11,091	132,368
Age (mean)	44.9	51.7	50.2	N/A <sup>a</sup>	48 <sup>a</sup>
Gender					
Male	6.9%	23.9%	24.5%	6.7%	6.9%
Female	93.1%	76.1%	75.5%	92.5%	92.4%
Race-ethnicity					
White	87.7%	74.9%	70.6%	83.4%	82.9%
Non-White				13.8%	14.3%
Black/African American	7.5%	4.6%	4.7%	N/A <sup>a</sup>	N/A <sup>a</sup>
Hispanic/Latino	1.1%	7.0%	8.3%	N/A <sup>a</sup>	N/A <sup>a</sup>
Asian/Pacific Islander	1.5%	10.7%	15.2%	N/A <sup>a</sup>	N/A <sup>a</sup>
Native American/Alaskan	1.0%	2.0%	2.2%	N/A <sup>a</sup>	N/A <sup>a</sup>
Other/mixed	1.2%	0.8%	1.0%	N/A <sup>a</sup>	N/A <sup>a</sup>
NPs per 10,000 population	3.8		3.6		4.9

Note. NSSNP = National Sample Survey of Nurse Practitioners; NP = nurse practitioner. *North Carolina*: Number in state is number with active approval to practice, number work as NP includes only those in state in active practice and excludes federally employed NPs who do not hold a NC license; 354 NPs missing race/ethnicity data. *California*: Number in state is number with active approval to practice, number working as NP includes those with active approval to practice employed in any setting.

<sup>a</sup>The NSSNP public-use file provides age categories only; the published report provides average age. The NSSNP public-use file does not provide detailed race/ethnicity categories.

The state's licensing records included 14,636 NPs and 1,070 CNMs who lived in California in 2010. NPs and CNMs who also held certification as Clinical Nurse Specialists were excluded by the BRN from the eligible population, leaving 13,870 NPs and 1,065 CNMs eligible for this survey. Questionnaires were mailed to a stratified sample of 2,250 NPs and CNMs, with oversampling of CNMs and those with dual NP-CNM certification, due to the smaller number of people in these groups. Useable responses were received from 1,384 of those sampled, resulting in an overall response rate of 61.5%. Poststratification weights by type of certification and age group were used to ensure that all analyses reflect the full population of NP and CNMs with active California certificates who do not have CNS or CRNA certificates. Note that federal health care facilities, such as Veterans Health Administration clinics, can employ NPs who are licensed in any state, even if that state is different from the facility location. Thus, the California survey data will not include NPs who are licensed in other states but work in California-based federal facilities.

As seen in Table 1, the average age of the California NP workforce was 50.2 years, which is significantly older than the North Carolina average age (44.9 years). There were 3.6 licensed NPs per 10,000 population in California.

*National Sample Survey of Nurse Practitioners.* In 2012, the HRSA conducted the NSSNP. The survey was sent by mail to a stratified sample of 22,000 NPs with state licenses or certification to practice, with a 60.1% response rate. Weights were computed to permit the computation of unbiased national estimates. The survey included questions about education, certification, and practice patterns.

As seen in Table 1, the average age of NPs in the national data was 48 years, which is 2 years younger than in California and 3 years older than in North Carolina. The national NP population is less diverse than that of California, with fewer men and more Whites. North Carolina's NP workforce mirrors the national workforce with respect to gender but is less diverse than California or the national workforce, with nearly 88% of NPs reporting that they are White. The national NP-to-10,000 population ratio is 4.9, which is notably higher than in both North Carolina and California.

## Analysis

We used descriptive analyses to measure the number and share of NPs engaged in primary care for each alternative method of defining "primary care" practice.

The data from North Carolina offered four methods of identifying primary care practice:

1. Education: "Category of Nurse Practitioner program completed" (12 options, and more than one may be selected)
2. NP National Certification: Credentialing body, certification number, expiration date, and certification type (12 categories, more than one may be selected).
3. Practice setting (18 categories, along with the practice name and address)
4. Medical Specialty of primary supervising physician (fill-in space provided)

The California survey included four questions that can be used to identify primary care preparation or practice. Many of these questions requested information for up to three advanced practice registered nurse (APRN) positions; we examined only the principal position for this study.

1. Please indicate your areas of APRN educational preparation. Fields associated with primary care include Family/individual across the lifespan; Women's/gender health; Pediatrics; and School/college health. NPs could select more than one area of focus for their NP education.
2. Which one of the following best describes the type of setting of your APRN position(s)? Relevant choices include Hospital outpatient clinic; a list of specific types of clinics and private practices; Family planning; Correctional system; HMO/managed care; Military/Department of Defense; Veterans

Administration. It should be noted that NPs in all of these settings—particularly the last three—may work in managerial or administrative departments.

3. Mark the clinical fields in which you most frequently provide direct care in your APRN positions. Fields related to primary care are Ambulatory/outpatient; Corrections/prison; Geriatrics/gerontology; Pediatrics; and School health.
4. Are you recognized as a PCP in these insurance networks in which your practice(s) participate? This yes/no question listed eight specific insurance companies and had an option for “other.”
5. Do you work in primary care, involving common health problems and preventive measures, in your APRN positions? Those who responded “yes” were asked: “what percent of your time does this include?”

The NSSNP had three questions that could be used to identify primary care preparation or practice. Employment questions were asked for two positions; we examined only the principal position. NP employment can be identified in two sections of the survey. First, the survey asks about all nursing employment. A subsequent question asks the respondent to describe their principal position and employment setting. Later in the survey, respondents are asked to indicate whether they work for pay as an NP, and the specialty of the practice/facility in which they work as an NP. A later question asks: “Do you provide any direct patient care in your main NP position?”

1. In which area(s) have you ever received certification from a national certifying organization for NPs? Fields associated with primary care include adult, family, pediatric, and women’s health.
2. In what type of setting do you work in your principal position? This question was asked about all nursing employment; we limit our analysis to those who indicated their position is as an NP in clinical practice. Settings associated with primary care include private physician office/practice, private NP office/practice, nurse managed clinic, federal clinic, hospital outpatient clinic, community clinic, rural health clinic, and school/college health services.
3. Check the one term below that best describes the specialty of the practice/facility in which you work for your main NP position. This question is asked only of those who indicate they work for pay as an NP. Specialties associated with primary care, as designated in the survey, are internal medicine, family practice, geriatrics, general pediatrics, and pediatric subspecialties. Pediatric subspecialties are not usually considered primary care specialties. The survey does not denote women’s health or school health as primary care specialties.

## Results

### *Education and Certification*

The number of NPs qualified to provide primary care could be measured as those with education in primary care fields. Areas of recognized NP specialization include family,



**Table 2.** Type of Education Program Completed by NPs Residing in North Carolina and California, and Current Certifications Maintained by North Carolina and U.S. NPs.

	North Carolina		California		United States	
	Number	Percentage	Number	Percentage	Number	Percentage
<b>Education specialty</b>						
Family NP	2,165	54.5%	5,459	40.0%		
Adult/geriatric NP	767	19.3%	3,162	23.2%		
Pediatric NP	312	7.9%	2,841	20.8%		
Women's health NP	72	1.8%	3,704	27.1%		
School NP	0	0.0%	593	4.3%		
Non-primary care or not reported	656	16.5%	1,268	9.3%		
<b>Total</b>	<b>3,972</b>	<b>100.0%</b>	<b>13,669</b>	<b>100.0%</b>		
<b>Current certifications (North Carolina) or "ever" certifications (NSSNP)</b>						
Family NP	2,024	51.0%			67,577	43.9%
Pediatric NP	310	7.8%			15,485	10.0%
Women's health NP	86	2.2%				
School NP	1	0.01%				
Adult NP	712	17.9%				
Other primary care certification					28,289	18.4%
Multiple certifications—All primary care	9	0.2%				
Multiple certifications—At least one primary care	31	0.8%			3,366	2.2%
No primary care certification or not reported	799	20.1%			39,340	25.5%
<b>Total</b>	<b>3,972</b>	<b>100.0%</b>			<b>154,057</b>	<b>100.0%</b>

Note. NSSNP = National Sample Survey of Nurse Practitioners; NP = nurse practitioner. California respondents could report multiple areas of study; North Carolina respondents are classified in only one area of study. Certification detail was not asked in the California survey.

adult, geriatric, pediatric, women's health, and school-based care. NPs also may study in non-primary care fields, such as psychiatric/mental health, acute care, and neonatal care. The North Carolina and California surveys allowed respondents to report multiple fields of study. Table 2 summarizes the data of the two state surveys. More than half of North Carolina's NPs and 40% of California's NPs have education as Family Nurse Practitioners. Adult or geriatric NP education was reported for 19% of North Carolina NPs and 23% of California NPs. A much larger share of NPs in California reports pediatric training than in North Carolina—20.8% versus 7.9%. This may be the result of California NPs being allowed to report multiple areas of study; an NP with family-focused education could also report that they have pediatric education. Nearly 17% of North Carolina's NPs did not report a primary care field of education,

compared with 9.3% of those in California. The educational preparation data suggest that there are 3,316 NPs in North Carolina and 12,401 NPs in California prepared to provide primary care.

North Carolina NPs also were asked to report whether they had current national certifications in specific fields, and NSSNP respondents were asked if they had ever been nationally certified in specific fields; in both surveys, NPs were allowed to report multiple certifications. Slightly more than half of NPs in North Carolina had Family NP certification, and another 18% had Adult NP certification. The share of NPs in the United States who ever had Family NP certification was lower than in North Carolina, at 44%, while a slightly higher percentage had been certified as a Pediatric NP (10% U.S. vs. 7.8% North Carolina). About 20% of NPs in North Carolina did not have any primary care certification, which is a higher share than those for whom primary care was not their educational focus. About one fourth of NPs in the United States have never been nationally certified in primary care.

### *Practice Settings*

NPs report their employment settings using the same categories as physicians in the North Carolina data system; the California and federal surveys asked respondents to select from lists of settings that were distinct from each other and the North Carolina list. Primary care employment settings were reported by 58% of NPs in North Carolina, 67% of NPs in California, and 68% of NPs nationally (Table 3). These shares of NPs employed in primary care are notably lower than those educated and/or certified in primary care fields. The most common employment settings across all three data sources are physician group practices and hospital-based outpatient departments. The percentages are somewhat lower than data from the U.S. Bureau of Labor Statistics (2014), which reports that 46.6% of NPs are employed in offices of physicians. In the two state surveys, community health settings (which include federally qualified health centers) also are commonly reported. In the national data, federal clinics were also among the most frequently reported settings. The BLS estimated that 7.2% of NP jobs were in “outpatient care centers,” which includes these types of clinics as well as ambulatory surgery and other outpatient care settings (U.S. Bureau of Labor Statistics, 2014). HMOs are common settings in California, likely due to the large presence of Kaiser Permanente, which is a group-model HMO. Hospital-based departments and physician group practices can be primary care focused, or be specialty practices; these categories thus likely overstate the share of NPs engaged in primary care. Similarly, NPs employed in HMOs, long-term care, home health, the Department of Veterans Affairs, and correctional facilities could be in case management, administrative, or specialized roles.

The most common non–primary care setting of NPs is hospital non-outpatient departments. This setting accounts for 1,065 NPs in North Carolina (26.8% of all NPs), 1,706 NPs in California (12.5%), and 24,670 NPs nationally (20.8%). Overall, at least 42% of NPs in North Carolina and one third of NPs in California are employed in non–primary care settings. Nearly one third of NPs in the United States are employed in non–primary care settings.

**Table 3.** Employment Settings of NPs in North Carolina, California, and the United States.

	North Carolina		California		United States	
	Number	Percentage	Number	Percentage	Number	Percentage
<b>Primary care settings</b>						
Physician group practice/ private physician office	1,562	39.3%	3,355	24.5%	37,587	31.6%
Home health	13	0.3%	65	0.5%	819	0.7%
Community health	281	7.1%	2,195	16.1%		
Community clinic					4,598	3.9%
Health department					1,546	1.3%
Long-term care or hospice	91	2.3%	182	1.3%	4,709	4.0%
School health	33	0.8%	664	4.9%	2,592	2.2%
Hospital outpatient	315	7.9%	1,341	9.8%	12,833	10.8%
HMO	11	0.3%	837	6.1%	1,357	1.1%
Nursing group practice/ private NP office	12	0.3%	47	0.3%	5,649	4.7%
Correctional facility			199	1.5%	981	0.8%
Veterans Affairs, Department of Defense/federal clinic			246	1.8%	7,940	6.7%
<b>Total</b>	<b>2,318</b>	<b>58.4%</b>	<b>9,131</b>	<b>66.8%</b>	<b>80,611</b>	<b>67.8%</b>
<b>Non-primary care</b>						
Hospital, non-outpatient	750	26.8%	1,706	12.5%	24,670	20.8%
Industry	63	1.6%	247	1.8%		
Mental health	79	2.0%	266	1.9%	1,259	1.1%
Academic	25	0.6%	173	1.3%	3,673	3.1%
Retail clinic	67	1.7%	223	1.6%	2,676	2.2%
Urgent care clinic					2,125	1.8%
Other or missing data	670	8.9%	1,923	14.1%	3,806	3.2%
<b>Total</b>	<b>1,654</b>	<b>41.6%</b>	<b>4,538</b>	<b>33.2%</b>	<b>38,209</b>	<b>32.2%</b>

Note. NSSNP = National Sample Survey of Nurse Practitioners; NP = nurse practitioner. The category of "other or missing data" includes NPs who are not employed. California NPs who reported employment in a "private MD/DO office" or "private primary care group practice" were categorized as "Physician Group Practice" to align with the North Carolina data. The California survey did not have a single "Community Health" category; NPs whose settings were community health centers, homeless/indigent clinics, public health clinics, rural clinics, or other clinics were grouped into this category. California NPs who reported employed in College Health clinic or School clinic were categorized as School Health to align with the North Carolina data. Correctional facility, Veterans Affairs, and Department of Defense settings are not among the categories in the North Carolina data and are likely classified within "physician group practice." In the NSSNP, community health centers and rural health clinics were categorized as "Community Health"; it is likely that some NP practices and nurse-managed clinics also are community health settings.

### Clinical Specialties

The North Carolina data system categorizes NPs into specialties that align with those used by the Medical Board. Each NP is assigned to one category in these data. The most common clinical specialization of NPs in North Carolina is family medicine, accounting for 25% of NPs. Another 8% specialize in each of internal medicine and pediatrics. Together the primary care fields reported in North Carolina indicate that 46% of NP practice in primary care (see Table 4).

**Table 4.** Self-Reported Clinical Specialization of NPs in North Carolina, California, and the United States.

	North Carolina		California		United States	
	Number	Percentage	Number	Percentage	Number	Percentage
<b>Primary care clinical fields</b>						
Family medicine	988	24.9%				
Internal medicine	314	7.9%				
General practice	97	2.4%				
Pediatrics	308	7.8%	1,921	14.1%		
Geriatrics	121	3.0%	1,302	9.5%		
Community/public health			1,465	10.7%		
Correctional/prison			279	2.0%		
Home health care			212	1.6%		
School health			639	4.7%		
Ambulatory/outpatient			3,482	25.5%		
<b>Total</b>	<b>1,828</b>	<b>46.0%</b>	<b>7,100<sup>a</sup></b>	<b>51.9%<sup>a</sup></b>	<b>60,507<sup>b</sup></b>	<b>48.1%<sup>b</sup></b>
<b>Non–primary care clinical fields</b>						
Psychiatry/mental health	175	4.4%	946	6.9%	7,034	5.6%
Neonatal/perinatal	215	5.4%	431	3.2%		
Obstetrics/gynecology	208	5.2%	2,156	15.8%		
Emergency medicine	114	2.9%	815	6.0%		
Hospice/palliative	101	2.5%	342	2.5%		
Neurology/vascular neurology	102	2.6%				
Gastroenterology	48	1.2%				
Cardiology			952	7.0%		
Diabetes			2,200	16.1%		
Med-surg/telemetry/intensive care			1,074	7.9%		
Oncology			634	4.6%		
Orthopedics			712	5.2%		
Surgical/perioperative			318	2.3%		
Internal medicine subspecialties					16,675	13.3%
Pediatric subspecialties					3,880	3.1%
Surgical subspecialties					11,047	8.8%
Other	1,175	29.6%	2,436	17.8%	25,079	20.0%
Not involved in patient care			318	2.3%		
Not reported	6	0.2%	107	0.8%		
<b>Total</b>	<b>2,144</b>	<b>54.0%</b>	<b>6,569<sup>a</sup></b>	<b>48.1%<sup>a</sup></b>	<b>63,715</b>	<b>50.8%</b>

Note. NSSNP = National Sample Survey of Nurse Practitioners; NP = nurse practitioner. The category of “other” for California includes dialysis, rehabilitation, step-down/transitional care, and other clinical area.

<sup>a</sup>The primary care total for California measures the share that reported any one of the primary care categories. The non–primary care total for California measures the share that did not report any of the primary care categories. <sup>b</sup>The NSSNP reports only aggregated fields of specialization in the summary report and public-use file.

The California survey allowed NPs to report multiple clinical specialties, some of which overlapped with the medical specialties reported in the North Carolina data. The most common field reported by California NPs was ambulatory care/outpatient, which

was its own category. For this analysis, we identified NPs who reported this category but not any of the specialized clinical fields; this accounted for 3,482 NPs, or 26% of California's NP workforce. Other common clinical fields included pediatrics (14.1%), community/public health (10.8%), and geriatrics (9.5%). In total, approximately 7,100 California NPs (51.9%) reported one or more primary care clinical fields.

The NSSNP allowed respondents to select one clinical specialty from a list of 35, but reported the data in aggregated groupings. About 48% of respondents were in primary care fields, which included internal medicine, family practice, pediatrics, and geriatrics. The shares of NPs working in other non-primary care specialties were aggregated and thus are not easily compared with the state-level data.

### *Recognition as Primary Care Provider by Private Insurance*

The California survey asked NPs whether they were recognized as a PCP by insurance companies. As seen in Table 5, only 24% responded that they had such recognition. Recognition as a PCP varied across fields of clinical specialization and employment settings. More than 34% of NPs who indicated that their clinical field was geriatrics or ambulatory/outpatient care (but not also a non-primary care specialty) were recognized by private insurers as PCPs, while only about 20% of those specializing in home health or school health were recognized.

NPs employed in HMOs were more likely to be recognized as a PCP by private insurance than those in any other work setting, with 64% having such recognition. This is likely because a large share of HMO-employed NPs are in the Kaiser Permanente system. Larger shares of NPs were recognized as PCPs by private insurers in long-term care settings (43.7%), community health centers (32.4%), and home health (31.1%) than those in other settings. Only about 21% to 24% of NPs employed in private medical practices had recognition by private insurance as PCPs.

### *Self-Reported Provision of Primary Care*

The California survey asked respondents to indicate whether they provide any primary care, and what share of time they spend providing primary care. Table 6 presents the percentages of NPs that reported they provide any primary care and that spend at least 50% of their time providing primary care, by clinical specialty and setting. The clinical fields for which NPs were most likely to report they provide any primary care are school health (96.4%) and corrections/prison health (92.1%). NPs who provide primary care in these settings also were more likely to report they spend at least 50% of their time doing so. About 82% to 85% of NPs who specialize in pediatrics, geriatrics, and community health report they provide any primary care, and 61% to 64% spend at least half their time providing primary care. NPs who specialize in home health care were less likely to report they provide primary care (65.1%) or spend at least half their time doing so (45.4%).

The percentages of NPs that report they provide any primary care varies widely, even when considering only primary care settings. While all the respondents in homeless/indigent clinics, rural health clinics, nursing group practices, and home health settings

**Table 5.** Recognition as a Primary Care Provider, by Employment Setting and Primary Care Specialization, California.

	Recognized by private insurance		Not recognized by private insurance	
	Number	Percentage	Number	Percentage
All nurse practitioners	3,296	24.3%	10,250	75.7%
Primary care clinical fields				
Pediatrics	468	23.4%	1,530	76.6%
Geriatrics	460	34.7%	866	65.3%
Community/public health	381	25.7%	1,103	74.3%
Home health care	43	19.0%	185	81.0%
School health	134	20.0%	535	80.0%
Ambulatory/outpatient and none of the non-primary care specialties	1,189	34.1%	2,298	65.9%
Primary care settings				
Private MD/DO practice	463	20.9%	1,753	79.1%
Private primary care group	303	23.6%	980	76.4%
Hospital outpatient	302	22.9%	1,014	77.1%
Community health center	376	32.4%	786	67.6%
Homeless/indigent clinic	23	18.2%	102	81.8%
Rural health clinic	64	28.1%	164	71.9%
Public health clinic	0	0.0%	186	100.0%
Nursing group practice	0	0.0%	49	100.0%
School health (K-12)	86	23.3%	285	76.7%
HMO	527	64.3%	293	35.7%
Home health	21	31.1%	47	68.9%
Long-term care	86	43.7%	111	56.3%

indicated they provide primary care, only 65% to 70% in private MD/DO practices, hospital outpatient settings, school health settings, long-term care, and health maintenance organizations do. Nearly 95% of NPs in community health centers provide primary care. About 83% of NPs employed in private primary care groups report providing primary care, and two thirds indicate they spend at least half their time doing so.

## Discussion

Determining the supply of PCPs is dependent on the definition of primary care. Is being a PCP a function of how you were educated, what your certifications are, what you report as your primary specialty, where you work, or what services you provide? The data presented here demonstrate that the answer to this question is not simple. If one defines primary care by the education of providers, about 83% of NPs in North Carolina and 91% of NPs in California are in primary care. If one defines by certifications currently or ever held, the estimate drops to 74% to 80% in primary care.

**Table 6.** Provision of Primary Care Provider, by Employment Setting and Primary Care Specialization, California.

	Provides any primary care		At least 50% of time providing primary care	
	Number	Percentage	Number	Percentage
All nurse practitioners	8,926	65.9%	6,200	45.8%
Primary care clinical fields				
Pediatrics	1,653	83.5%	1,267	64.0%
Geriatrics	1,130	84.9%	819	61.5%
Community/public health	1,230	82.3%	910	61.5%
Home health care	146	65.1%	102	45.4%
School health	649	96.4%	529	78.6%
Corrections/prison health	253	92.1%	231	83.9%
Ambulatory/outpatient and none of the non-primary care specialties	2,788	78.8%	2,135	60.3%
Primary care settings				
Private MD/DO practice	1,422	66.1%	941	43.8%
Private primary care group	1,062	82.7%	848	66.0%
Hospital outpatient	901	65.0%	560	40.4%
Community health center	1,064	93.9%	750	66.2%
Homeless/indigent clinic	125	100.0%	90	71.9%
Rural health clinic	222	100.0%	201	90.8%
Public health clinic	109	53.2%	85	41.3%
Nursing group practice	48	100.0%	48	100.0%
School health (K-12)	278	68.4%	125	30.9%
HMO	525	69.5%	404	53.4%
Home health	23	100.0%	0	0.0%
Long-term care	130	68.2%	42	22.1%

Note. The category of "other" for California includes dialysis, rehabilitation, step-down/transitional care, and other clinical area. The primary care total for California measures the share that reported any one of the primary care categories. The non-primary care total for California measures the share that did not report any of the primary care categories.

An even more limited supply is estimated if one focuses on the settings in which NPs practice, ranging from 58% in North Carolina to 68% nationally. And, if one considers the self-reported field of clinical specialization of NPs, the share in primary care drops even further, to 46% in North Carolina, 52% in California, and 48% nationally.

The data from California indicate that the provision of primary care varies substantially within settings and clinical specialties. In the most common clinical specialties of NPs, about 82% to 85% of NPs provide primary care. NPs are more likely to provide primary care in some community health settings, such as community health centers, rural health centers, and nursing group practices, where at least 94% do so. They are less likely to provide primary care in hospital outpatient departments, private MD/

DO practices, public health clinics, school health settings, long-term care, and health maintenance organizations.

These data are all limited by the questions asked in the surveys, the use of sample surveys in some cases, and the potential for inaccurate reporting and response bias. The North Carolina data have the advantage of being a census of actively licensed providers, but some of the survey questions are written using categories common in medicine and not well-aligned for NPs. The California and national surveys are more detailed, including many questions about education, practice setting, and other factors, but are based on samples of the population and thus are subject to response bias. Survey data often cannot be used for regional analysis, due to small sample sizes, whereas census data can be used to examine the supply of providers in small areas.

Most surveys of clinicians do not account for the potential of physicians, NPs, and physician assistants to provide primary care even when they work in non-primary care specialties. The California survey included questions about whether the NP provides any primary care, and what share of his or her time is spent providing such care. Among NPs employed in acute-care departments of hospitals, 18.2% said they provide some primary care, and 7.9% reported they spent least half their time providing primary care. These reports suggest that NPs may provide important primary care services even when they are not clearly employed in primary care roles. This may be particularly true in specialty physician offices.

Projections of primary care workforce shortages grab headlines and stimulate discussions about whether shortages could be offset by better use of NPs and provoke discussions about scope of practice, payment, and education changes. These discussions assume that we fully understand the capacity of the NP workforce to provide primary care services. We may not yet have adequate understanding in this area, and future models should include alternate scenarios describing the capacity of the NP workforce to provide primary care.

### **Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### **Funding**

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Supported by the Robert Wood Johnson Foundation, multiple small grants to UCSF and UNC-CH.

### **References**

- Agency for Healthcare Research and Quality. (2011). *The Number of nurse practitioners and physician assistants practicing primary care in the United States: Primary Care Workforce Facts and Stats No. 2*. Rockville, MD: Author. Retrieved from <http://www.ahrq.gov/research/findings/factsheets/primary/pcwork2/index.html>
- American Association of Nurse Practitioners. (2013). *American Association of Nurse Practitioners fact sheet*. Retrieved from <http://www.aanp.org/images/documents/about-nps/npfacts.pdf>



- American Medical Association. (2014). *Physician characteristics and distribution in the US*. Chicago, IL: Author.
- Anderson, G., & Horvath, J. (2004). The growing burden of chronic disease in America. *Public Health Reports, 119*, 263-270.
- Auerbach, D. I., Chen, P. G., Friedberg, M. W., Reid, R., Lau, C., Buerhaus, P. I., & Mehrotra, A. (2013). Nurse-managed health centers and patient-centered medical homes could mitigate expected primary care physician shortage. *Health Affairs, 32*, 1933-1941.
- Bodenheimer, T., & Pham, H. H. (2010). Primary care: Current problems and proposed solutions. *Health Affairs, 29*, 799-805.
- Colwill, J. M., Cultice, J. M., & Kruse, R. L. (2008). Will generalist physician supply meet demands of an increasing and aging population? *Health Affairs, 27*, w232-w241.
- Cooper, R. A. (2007). New directions for nurse practitioners and physician assistants in the era of physician shortages. *Academic Medicine, 82*, 827-828.
- Dill, M. J., Pankow, S., Erikson, C., & Shipman, S. (2013). Survey shows consumers open to a greater role for physician assistants and nurse practitioners. *Health Affairs, 32*, 1135-1142.
- Elson, S., Happell, B., & Manias, E. (2009). Nurse practitioners and medical practice: Opposing forces or complementary contributions? *Perspectives in Psychiatric Care, 45*(1), 9-16.
- Fairman, J. A., Rowe, J. W., Hassmiller, S., & Shalala, D. E. (2011). Broadening the scope of nursing practice. *New England Journal of Medicine, 364*, 193-196.
- Goodell, S., Dower, C., & O'Neil, E. (2011). *Primary care workforce in the United States*. Princeton, NJ: Robert Wood Johnson Foundation.
- Green, L.V., Savin, S., & Lu, Y. (2013). Primary care physician shortages could be eliminated through use of teams, nonphysicians, and electronic communication. *Health Affairs, 32*, 11-19.
- Health Resources and Services Administration. (2013). *Projecting the supply and demand for primary care practitioners through 2020*. Rockville, MD: U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis.
- Health Resources and Services Administration. (2014). *Highlights from the 2012 National Sample Survey of Nurse Practitioners*. Rockville, MD: U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis.
- Hofer, A. N., Abraham, J. M., & Moscovice, I. (2011). Expansion of coverage under the Patient Protection and Affordable Care Act and primary care utilization. *Milbank Quarterly, 89*, 69-89.
- Horrocks, S., Anderson, E., & Salisbury, C. (2002). Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors. *British Medical Journal, 324*, 819-823.
- Huang, E. S., & Finegold, K. (2013). Seven million Americans live in areas where demand for primary care may exceed supply by more than 10 percent. *Health Affairs, 32*, 614-621.
- Ku, L., Jones, K., Shin, P., Bruen, B., & Hayes, K. (2011). The states' next challenge—Securing primary care for expanded Medicaid populations. *New England Journal of Medicine, 364*, 493-495.
- Kuo, Y.-F., Loresto, F. L., Rounds, L. R., & Goodwin, J. S. (2013). States with the least restrictive regulations experienced the largest increase in patients seen by nurse practitioners. *Health Affairs, 32*, 1236-1243.

- Laurant, M., Reeves, D., Hermens, R., Braspenning, J., Grol, R., & Sibbald, B. (2005). Substitution of doctors by nurses in primary care. *Cochrane Database of Systematic Reviews*, (2), CD001271.
- Lenz, E. R., Mundinger, M. O., Kane, R. L., Hopkins, S. C., & Lin, S. X. (2004). Primary care outcomes in patients treated by nurse practitioners or physicians: Two-year follow-up. *Medical Care Research and Review*, 61, 332-351.
- McMenamin, P. (2014). *Yes, nurse practitioners are primary care providers*. Retrieved from <http://www.medscape.com/viewarticle/820818>
- Mundinger, M. O., Kane, R. L., Lenz, E. R., Totten, A. M., Cleary, P. D., Friedewald, W. T., Siu, A. L., & Shelanski, M. L. (2000). Primary care outcomes in patients treated by nurse practitioners or physicians: A randomized trial. *Journal of the American Medical Association*, 283, 59-68.
- Naylor, M. D., & Kurtzman, E. T. (2010). The role of nurse practitioners in reinventing primary care. *Health Affairs*, 29, 893-899. doi:10.1377/hlthaff.2010.0440
- Newhouse, R. P., Stanik-Hutt, J., White, K. M., Johantgen, M., Bass, E. B., Zangaro, G., . . . Weiner, J. P. (2011). Advanced practice nurse outcomes 1990-2008: A systematic review. *Nursing Economics*, 29, 230-250.
- Nicholson, S. (2009). *Will the United States have a shortage of physicians in 10 years?* Princeton, NJ: Robert Wood Johnson Foundation.
- Ormond, B. A., & Bovbjerg, R. R. (2011, October). *Assuring access to care under health reform: The key role of workforce policy*. Washington, DC: Urban Institute.
- Petterson, S. M., Liaw, W. R., Phillips, R. L., Rabin, D. L., Meyers, D. S., & Bazemore, A. W. (2012). Projecting US primary care physician workforce needs: 2010-2025. *Annals of Family Medicine*, 10, 503-509.
- Pohl, J., Barksdale, D., & Werner, K. (2013). *The latest data on primary care nurse practitioners and physicians: can we afford to waste our workforce?* Retrieved from <http://healthaffairs.org/blog/2013/06/18/the-latest-data-on-primary-care-nurse-practitioners-and-physicians-can-we-afford-to-waste-our-workforce/>
- Sargen, M., Hooker, R. S., & Cooper, R. A. (2011). Gaps in the supply of physicians, advanced practice nurses, and physician assistants. *Journal of the American College of Surgeons*, 212, 991-999.
- Schwartz, M. D. (2012). Health care reform and the primary care workforce bottleneck. *Journal of General Internal Medicine*, 27, 469-472.
- Skillman, S. M., Kaplan, L., Fordyce, M. A., McMenamin, P. D., & Doescher, M. P. (2012). *Understanding advanced practice registered nurse distribution in urban and rural areas of the United States using National Provider Identifier Data*. Seattle, WA: WWAMI Rural Health Research Center. Retrieved from [http://depts.washington.edu/uwrhrc/uploads/RHRC\\_FR137\\_Skillman.pdf](http://depts.washington.edu/uwrhrc/uploads/RHRC_FR137_Skillman.pdf)
- Spetz, J., Keane, D., Herrera, C., Chu, L., & Lin, J. (2011). *Survey of Nurse Practitioners and Certified Nurse Midwives in California, 2010*. Sacramento, CA: California Board of Registered Nursing.
- Sullivan-Marx, E. (2008). Lessons learned from advanced practice nursing payment. *Policy, Politics, & Nursing Practice*, 9, 121-126.
- U.S. Bureau of Labor Statistics. (2014). *Occupational employment and wages, May 2013*. Retrieved from <http://www.bls.gov/oes/current/oes291171.htm>
- U.S. Government Accountability Office. (2008). *Primary care professionals: Recent supply trends, projections, and valuation of services* (No. GAO-08e472T). Washington, DC: Author.