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Estimating the de-designation of single-county HPSAs in the United States by counting naturopathic physicians as medical doctors

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Abstract

An incomplete database containing approximately one-third of the known work addresses of naturopathic physicians (NDs) was compiled for seven US states in 2003. NDs were factored into the criteria used by the Shortage Designation Branch to determine shortage status. Three out of 93 counties within the seven states lost health professional shortage area (HPSA) designation when NDs were included in the supply of primary care providers. Assuming a complete ND location database, and using simple extrapolation, estimates of HPSA de-designations were calculated for the study area and for all 50 US states and territories. It was estimated that up to nine counties would lose HPSA status in the seven state study areas and 33–142 counties could lose HPSA status within the United States and territories. With a continued spread of state licensing for naturopathic physicians and a phenomenal increase in the workforce, the impact of a fully diffused profession could dramatically reduce the number of HPSAs should the Bureau of Health Profession count NDs on par with medical doctors MDs.

Keywords: Health professional shortage areas; Naturopathic physicians; Medical geography

Introduction

Naturopathic physicians fit within the rubric of what some call complementary and alternative medicine (CAM) and others integrated medicine (Hoffman, 2001).

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Naturopathic physicians (NDs) embrace natural and holistic approaches to health care that recognize the interconnections between mind, body, and spirit. Six pillars uphold the philosophy and practice of naturopathic medicine; while elaborated elsewhere (Hough, Dower, & O'Neil, 2001; Smith & Logan, 2002) these include:

- the healing power of nature
- identify and treat the causes
- do no harm
- doctor as teacher
- treat the whole person, and
- prevention

To be considered for licensure, NDs must have graduated from a school sanctioned by the Council on Naturopathic Medical Education (CNME, 2003); in the United States these include: Bastyr University (Seattle, WA), National College of Naturopathic Medicine (Portland, OR), Southwest College of Naturopathic Medicine (Tempe, AZ), and the University of Bridgeport College of Naturopathic Medicine (Bridgeport, CT). Further, NDs must pass one or more parts of the Naturopathic Physicians Licensing Examinations (NPLEX) to meet licensing requirement (North American Board of Naturopathic Examiners, 2002). While the scope of practice varies from state to state, this quote from the US Department of Labor provides a succinct description of a naturopathic physician:

> The US Department of Labor defines the naturopathic physician as one who 'diagnoses, treats, and cares for patients, using a system of practice that bases its treatment of all physiological functions and abnormal conditions on natural laws governing the body, utilizes physiological, psychological and mechanical methods, such as air, water, heat, earth, phytotherapy (treatment by use of plants), electrotherapy, physiotherapy, minor or orificial surgery, mechanotherapy, naturopathic corrections and manipulation, and all natural methods or modalities, together with natural medicines, natural processed foods, herbs, and natural remedies. Excludes major surgery, therapeutic use of X-ray and radium, and use of drugs, except those assimilable substances containing elements or compounds which are compounds of body tissues and are physiologically compatible to body processes for maintenance of life' (as posted on Bastyr University' Internet Site, 2004).

While state licensing of naturopathic physicians is presently midway through the early majority stage of spatial diffusion with about a 25% adoption rate (Albert & Butar, 2004a), the recent passage of SB 907, 'The Naturopathic Act', in California is apt to provide a stimulus to the continued success of the naturopathic profession within the United States (California Association of Naturopathic Physicians, 2003). On January 1, 2004, California joined 12 other states that license naturopathic physicians (Fig. 1). Might the reemergence of a licensed naturopathic profession help reduce the shortage of primary care providers in underserved counties? Using this question as a premise the authors explore the following two ideas: (1) to count naturopathic physicians (NDs) on par with medical doctor (MD) primary care physicians, and (2) to include not only primary care MDs, but NDs into the population to physician ratios used by the Shortage Designation Branch to designate

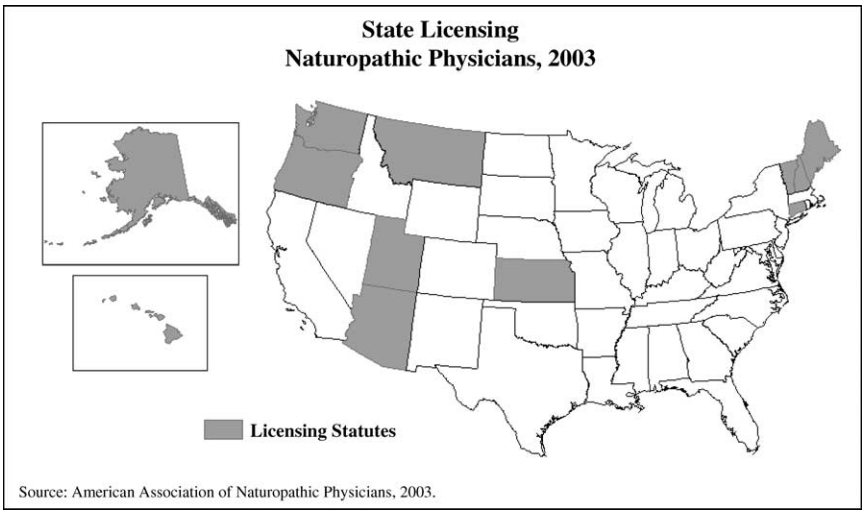

Fig. 1. State naturopathic physicians' licensing statutes, 2003.

health professional shortage areas (HPSAs). Since numerous federal programs allocate financial resources to individuals and institutions operating within HPSAs (GAO, 1995), reducing the number of counties so designated could translate into potential savings or at least the redistribution of resources to more underserved populations (Albert & Butar, 2003).

Naturopathic medicine is reviving from decades of decline and stagnation (Baer, 2001). With continued passage of state licensing the probability of other states adopting licensing statutes increases (Zhou, 1993). States providing for ND licensing have experienced explosive growth in their ND workforce (Albert & Butar, 2002, 2004a,b). Two examples illustrate this point; these include a 53% increase in licensed NDs from 1995 to 2002 in Washington State, and a staggering 38% jump from 2000 to 2001 in Arizona (Albert & Butar, 2004b). With such a dynamic ongoing process unfolding the idea of counting NDs as MDs and including these to evaluate whether shortages of primary care physicians exist is apt to be considered controversial and perhaps premature (Albert & Butar, 2003; Williams, 2003). Our purpose is to illustrate, even at such an incipient juncture, that counting NDs as primary care physicians would improve access (i.e. distance to care) and availability (i.e. population-to-primary care physician ratio) to underserved populations. This case study illustrates the idea of including NDs in population-to-physician ratios used to assess a geographic unit's shortage status. It is not the authors' intent to develop an argument here for the widespread uptake of complementary and alternative therapies as primary care in shortage areas, but merely to illustrate a specific geographical statistical method for measuring and estimating NDs' potential influence on shortage designation. Some background in naturopathic medicine, nevertheless, is warranted on the grounds of providing context for a later case study involving seven states.

Controversy clouds this topic because vested interests within allopathic medicine (western biomedicine) often pounce on complementary and alternative therapies, asserting

these to be ineffective at best and unsafe at worst (Williams, 2003). Biley (2002, p. 57) has a sensible recommendation that might alleviate some concerns, as she states that:

> Allopathic medicine is slowly realizing the negative impact of iatrogenesis and is starting to develop systems to monitor such events in order to reduce or eliminate their existence. It is suggested that a similar development is needed in complementary and alternative therapies so that it can be ensured that, at a minimum *primum non nocere*, the therapy should firstly do no harm.

Databases and registries on clinical trials and medical *faux pas* would do much to keep the dialogue between NDs and MDs founded on fact and not misinformation or anomalous cases. In fact critics often fail to recognize that serious efforts are ongoing by the National Center for Complementary and Alternative Medicine (2003) and the Cochrane Collaboration to track, monitor, and review clinical trails in complementary and alternative medicine. For example, clinical trials supported by the NCCAM can be searched online by (1) treatment or therapy, (2) disease or condition, or (3) NCCAM clinical trials in Bethesda, MD. Additionally, systematic reviews and a registry of randomized controlled and clinical controlled trials are available through Complementary Medicine Field of the Cochrane Collaboration. William 'Mac' Beckner, director of Information Resources for the Center for Integrative Medicine at the University of Maryland School of Medicine, recently provided the authors an update. Dr Beckner stated that 'the Complementary Medicine Field is still active and has recently received funding from the NIH. There are now about 100 systematic reviews in CAM on the Cochrane Library as well and 7500 clinical trials in the registry' (personal communication).

Access to health care and why physician shortage areas exist

Availability of physicians, clinics, and hospitals does not guarantee entrance into the health care systems; as Guagliardo (2004, p. 3) mentions, '[A] number of barriers can impede progression from potential to realized access'. Potential access implies a mere physical coexistence between people and health care provider services. However, juxtaposition alone is an insufficient measure; realized access occurs upon receipt of health care, and therefore is a better indicator of access to the system. Penchansky and Thomas' (1981) seminal taxonomic model considers five dimensions or barriers to care: availability, accessibility, accommodation, affordability, and acceptability. The first two dimensions have been noted by Guagliardo (2004) as being spatial, and the later three aspatial. Availability measures the supply of health care facilities and providers within some geographic unit. Accessibility measures distance from the patient to the point of service. Perhaps this distance is viewed as straight-line distance, weighted network distance, time distance, or other techniques to capture the fiction induced by distance. The elements from Penchansky and Thomas' model most appropriate for geographic analysis are availability or accessibility, or better yet, both.

Rosenthal and Frederick (1984, p. 60) noted that '[P]hysician maldistribution is a widely recognized problem facing virtually all health care systems'. Others employed the phase 'universal and transient' in describing the problem of physician maldistribution

(Shannon & Cutchin, 1994). Using data from the late 1980s, Blumenthal (1994) compared physician to population ratios for 26 developing and 15 developed countries found severe imbalances within almost all states. Severe imbalances in physician to population ratios between urban and rural areas were evident for most developing countries, for example: Nepal, Mali, Afghanistan, Malawi, Guinea, and Burkina Faso. Even between geographic subdivisions (i.e. state, provinces) of developed countries imbalances persist, but these were less dramatic than for least developed counties (Blumenthal, 1994). Greece had the smallest ratio of lowest/highest physician per 10,000 population (0.16) of the 15 developed countries most of which had ratios between 0.31 and 0.57. Notwithstanding numerous national policies and programs to foster physician redistribution, and regardless of development status, these have been of 'limited success' (Blumenthal, 1994).

Physician shortages have been explained using push–pull theory from migration studies. Gordon, Meister, and Hughes (1992) provide a list of pulls and pushes operating at four scales that discourage physicians from rural locations. Overall, factors at the individual, community, state, and national scales conspire to repel physicians from rural locations and draw physicians toward urban areas. One scenario, among numerous possible situations, that describes pressures pushing physicians from rural areas includes urban origin of physicians or spouses, insufficient population threshold and structure, no or scant continuing medical educational opportunities, and insufficient federal support (Gordon et al., 1992). It is clear from the preceding discussion that physician misdistribution is perhaps inevitable; nevertheless, attempts should be made to service isolated populations. Perhaps counting nonphysician biomedical providers (i.e. physician assistants, nurse practitioners) and complementary and alternative (chiropractors, naturopathic physicians, acupuncturists) practitioners together would provide a more comprehensive picture of available health care personnel resources (Albert & Butar, 2003; Cooper, Laud, & Dietrich, 1998; Cooper & Stoflet, 1996; Gesler, 1988; Kippenbrock, Stacy, Tester, & Richey, 2002). Adams (2004) suggests that studies be initiated that explore the interface between general practice (MDs) and complementary and alternative medicine, specifically in rural settings. This investigation is a response to Adams' call for research by demonstrating possible synergy between biomedical and complementary providers (i.e. NDs and MDs), therefore, improving availability and accessibility to the most underserved and isolated populations, particularly those whole counties designated as health professional shortage areas. Since 65% of all HPSA are nonmetropolitan counties, our results have significance in particular to rural and isolated populations.

Health professional shortage areas and recent attempts of measuring accessibility

HPSAs are designated by the Shortage Designation Branch of the Bureau of Health Professions to indicate shortages of primary medical care physicians, dentists, and mental health professionals. Of specific interest here are the primary medical care HPSAs, which label whole or part counties (i.e. contiguous census tracts) as having an inadequate inventory of physicians in general and family practice, pediatrics, internal

medicine, and obstetrics/gynecology specialties (Lee, 1991). Numerous federal programs use HPSA designation to allocate personnel and financial resources including:

- National Health Service Corps
- National Health Service Corps Scholarship Programs
- National Health Service Corps Loan Repayment
- Rural Health Clinic Act
- Area Health Education Center Program
- Federal Employees Health Benefits Program
- Public Health Service Grant Programs

While detailed guidelines are available online from the Shortage Designation Branch, the following items form the core criteria for determining the adequacy of primary medical care resources: (1) geographic area is rational for the delivery of health care services; (2) exceeds population-to-primary care physician ratio of 3500:1; less than 3500 but greater than 3000:1 if 'unusually high needs for primary care services or insufficient capacity of existing primary care providers' (Bureau of Health Professions, 2004); and (3) adjacent areas must be over utilized, excessively distant, i.e. greater than 30 min, or otherwise inaccessible.

Perhaps the recent studies proposing alternative methodologies for identifying primary care physician shortage areas are a belated response to a GAO (1995, p. 45) report titled, 'Health care shortage areas: Designation not a tool for directing resources to the underserved'. Rather emphatically, the GAO recommended "that the Congress remove legislative requirements for HPSA or MUA designation as a condition for participation in federal programs" (p. 45). With majority of US counties designated as HPSAs or MUAs (medically underserved areas or MUAs is another shortage designation index also supported by the Shortage Designation Branch), the meaningfulness of these indices is questionable.

Luo (2004) examined a nine county region of northern Illinois to identify primary care shortage areas using floating catchment method function within a geographic information system (GIS). A circle, with some specified radius (i.e. 30 miles), is drawn around a census tract centroid. The number of physicians and population enclosed within the buffer is extracted to produce a physician to population ratio. If the physician to population ratio at the centroid is at less than 1:3500, then the entire census tract is designated as having a shortage of primary care physicians. The circle then 'floats' iteratively over the remaining centroids until there is a physician to population ratio associated with each centroid; those tracts with a ratio less than 1:3500 are designated as 'shortage areas'. The ease of working with finer spatial units (i.e. census tracts) within a GIS and also incorporation of data from adjacent or border counties limits problems associated with the 'potential cross border patient–physician interactions' (Luo, 2004, p. 1).

In a subsequent article, Wang and Luo (2005) further refined this methodology for identifying shortage areas by integrating spatial and nonspatial factors influencing access to care. Wang and Luo's use of a two-step floating area catchment method, together with factor analysis, allowed them to define four types of shortage areas. The first floating catchment area (i.e. buffer enclosing a 30 min drive time) is, iteratively, drawn around physician locations to calculate physician to population ratios. A second floating catchment, again using 30 min to conform to HPSA guidelines, is drawn around each

population centroid (in this case population weighted census tract centroids). This second floating circle sums the previously calculated physician to population ratios to produce a spatial accessibility score for each census tract. Factor analysis was then employed 'to group various socio-demographic variables into three factors' (Wang & Luo, 2005, p. 14). Wang and Luo proposed four types of shortage areas by integrating spatial accessibility and factor scores. Three set of factors scores were included, these factor sets contained variables indicating socio-economic disadvantages, socio-cultural barrier, or high health care needs. The integration of accessibility and factor scores revealed four types of shortage areas, two for geographic areas, and two for population groups (see Wang and Luo for specific criteria):

Geographic areas

(1) Areas of poor spatial access
(2) Areas of marginally poor spatial access high needs

Population groups

(3) Disadvantaged population
(4) Marginally disadvantaged population with socio-cultural barriers

According to Wang and Luo (2005, p. 15) the method just described 'defines HPSAs in a systematic way using quantitative criteria that are consistent, precise, and flexible'.

Our research suggests that naturopathic physicians should count as primary care physicians. Whether an ND should count as equal to, or some fraction of, a general practitioner (MD), for example, is debatable. Might naturopathic physicians be predisposed to practice in rural areas as one legislator suggested with the following statement, '[A]t a time when the medical community is talking about the shortage of doctors in rural and other underserved areas, licensing naturopathic physicians trained in the US by accredited medical schools needs to be considered' (Exodus On-Line, 2002). While we recognize that yet unanswered questions exist about how naturopathic physicians ought to contribute to our health care system, our research simply explores the what-if-scenario of counting NDs as primary care physicians and plugging them into the population to physician ratios used to determine shortage designation. In counting NDs as MDs, no change, other than expanding the definition of primary care physician to include NDs, would be required on part of the Shortage Designation Branch. With an additional layer of information on ND locations, more robust designation methods as proposed by Luo (2004) and Wang and Luo (2005) could also factor NDs into calculating their spatial accessibility scores.

Study area

Thirteen states have licensing statutes as of January 1, 2004 (Fig. 1). The geography of state licensure is described as forming two clusters. The first cluster is composed of four states in New England, three forming a contiguous group (Maine, New Hampshire, and Vermont), and the fourth, Connecticut, separated by just one state (Massachusetts).

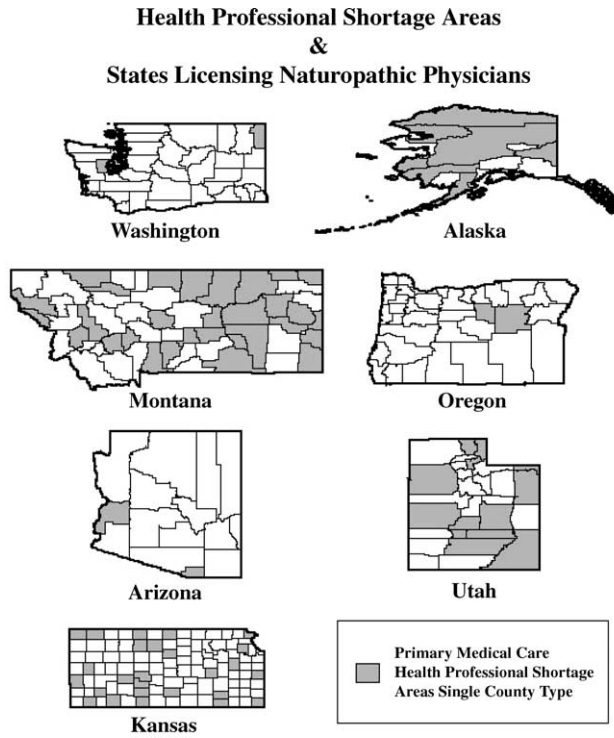

Fig. 2. States with N.D. licensing statutes and whole-county health professional shortage areas, 2003.

Eight states, including California, form a large, noncontiguous block west of the Rocky Mountains. Kansas is an outlier, licensed but surrounded by nonadopting states on all sides (Kansas State Board of Healing Arts, 2003). In vivid contrast to these two clusters is the void encompassing the states of the Midwest, South, Southeast, and the Mid-Atlantic.

Of the 12 states with licensing statutes as of January 2003 (this excludes California), just seven states have whole counties designated as primary medical care HPSAs. Since there are no whole counties designated as HPSAs from the New England states, only Alaska, Arizona, Kansas, Montana, Oregon, Utah, and Washington can be considered. The study area is defined as those states with whole-county HPSAs, which license naturopathic physicians, and excludes California, which joined too late to be included in these analyses (Fig. 2).

Data and methods

HPSAs data

Data on HPSAs was extracted from the Shortage Designation Branch (2003) web site titled ‘Ad-Hoc Database Query Selection’. Users can limit queries to regions, states, or

counties, and select shortage discipline (primary medical care, dental, and mental health), status (designated, withdrawn, proposed withdrawal, rejected, all statutes), metro (metropolitan, nonmetropolitan, and frontier), and type (single county, geographic area or service area, population group). Updates are made on a weekly basis.

A report was extracted on June 26, 2003 for the 12 states that currently license naturopathic physicians. Sample output from the query selection is shown for Washington State in Table 1. Note that this report includes the number of full-time equivalent (FTE) primary care physicians and number of physicians short for each HPSA.

Developing a naturopathic physician database

Two data sources were accessed to find names and addresses of NDs located in the 12 states licensing naturopathic physicians. The first and most important of the two sources was a searchable database, entitled 'Find An ND', available online from the American Association of Naturopathic Physicians (2003). The MSN Yellow Pages (2003) provided a second data source on naturopathic physicians; however, it contained numerous listings that had to be omitted. For example, excluded were names of practices and clinics where it was uncertain if NDs were employed. Also excluded were medical doctors (MDs), osteopathic doctors (DOs), registered nurses (RNs), acupuncturists, herbalists, and other health care practitioners listed under the heading 'Naturopathic Physicians'. Only practitioners with the ND credential were considered from the MSN Yellow Pages. Both these databases included the name and address with ZIP code, but not the county of practice. To determine if these NDs were in shortage counties, a ZIP code-county lookup table was accessed from zipinfo.com (2003).

The advantage of using the AANP 'Find an N.D.' and the MSN Yellow Pages is that the addresses are practice locations. While it would be possible to get more complete lists of naturopathic physicians from respective state licensing authorities, the address fields are often of questionable use for geographic analysis. In some instances, physicians list convenient mailing addresses (i.e. residential, post office box) rather than practice locations. In other situations, just one practice location is given while secondary and tertiary practice locations are not reported. It is difficult to use listings from state licensing boards except where state authorities explicitly solicit practice locations, or without doing a tremendous amount of cross-references using other sources (i.e. AANP or Yellow Pages). For example, one can request a list of the business addresses of naturopathic physicians from the Oregon Board of Naturopathic Examiners (2002); whereas, no such address distinction is available from the Washington State Department of Health (2002). Therefore, the disadvantage of using AANP and MSN Yellow Pages is that together these sources produce an incomplete database on naturopathic physicians. How incomplete are these databases in comparison to the state licensing databases? A recent study found that an integrated AANP/Yellow Pages database was only 44, 35, and 34% complete for Oregon, Arizona, and Connecticut, respectively, when matched against state medical board databases (Albert & Butar, 2002). In other words, the undercount is estimated to be substantial; however, since the purpose of this study is to illustrate a method, this disadvantage, while recognized, is not considered a limiting factor.

Table 1
Sample output from ad hoc database

Name	HPSAID	Status	Type	Discipline	Metro	Updated	FTE	# Short	Score	Date of designation
Washington										
Ferry	153019	Designated	SCTY	Primary care	Frontier		1.3	0.8	16	02/02/2001
Garfield	153023	Designated	SCTY	Primary care	Frontier	02/25/2002	0	0.7	11	03/31/1993
Mason	153045	Designated	SCTY	Primary care	Nonmetro	09/28/2001	8.6	5.5	10	10/28/1993
Pend Oreille	153051	Designated	SCTY	Primary care	Frontier	03/23/2001	3.3	0.0	9	08/04/1978
Skamania	153059	Designated	SCTY	Primary care	Frontier	09/28/2001	1.8	1.0	11	10/01/1978

Source: Bureau of Health Profession, June 26, 2003.

Setting confidence intervals

The proportion is one of the most frequently reported statistics, and it is often reported with a margin of error or a confidence interval of a population. It is known that a point estimate produces an unbiased estimator of the parameter and, therefore, is the best estimate, which has the minimum variance among all unbiased estimators. When a simple random sample of size n is obtained from a finite population where each individual is categorized as yes or no, then the best point estimate of the population proportion, p, denoted by $\hat{p}$, is given by $\hat{p} = x/n$, where x is the number of individuals in the sample with specified characteristics (for example: the number of shortage counties to total counties).

When the sample size, n, times p and $n(1-p)$ is 5 or more, then the distribution of $\hat{p}$ is approximately normally distributed with mean p and standard deviation, $\sigma_{\hat{p}} = \sqrt{p(1-p)/n}$. The sampling distribution of $\hat{p}$ is used to construct a confidence interval of the population proportion p. A $(1-\alpha)$ 100% confidence interval for p is given by point estimate $\pm$ margin of error, where margin of error, $E = z_{\alpha/2}\sqrt{\hat{p}(1-\hat{p})/n}$.

Results

Our results show that by, simply expanding the current definition of primary care physicians to include naturopathic physicians and using shortage criteria from the Shortage Designation Branch (i.e. '# short' = number of primary care physicians short, see sample output on HPSAs from an Ad-Hoc Database Selection), some counties would not qualify as health professional shortage areas. Since a complete national level database on ND locations is not available, the current exercise uses databases known to be incomplete to get baseline values; then, assuming a simple linear exploration estimates on the number of counties losing HPSA designations in the seven state study area, and then nationally, are calculated.

Ninety-three whole-county HPSAs were identified in the seven state study area. Sixty of these counties were identified as frontier, and the remaining 33 nonmetropolitan for a total of 93 counties (Table 2). As of June 26, 2003, there was a shortage of 70.2 primary care physicians in these states. Assuming NDs were given equal weight as family practitioners, for example, a rather small cadre of NDs strategically placed would eliminate the whole-county HPSAs in the study area.

Montana and Kansas had the greatest number of HPSAs with 31 and 26, respectively; 44 (77%) of these were in isolated frontier counties and accounted for just over half of the 70 primary care physicians short in the study area. Arizona, Oregon, and Washington had only nine whole-county HSPAs combined and accounted for only 15% of the physician shortage (Table 2). It is evident that frontier populations, in general, and populations in the isolated frontier counties specifically within Montana and Kansas, would benefit from the full- or part-time presence of MDs or NDs.

What would happen, then, if NDs were counted along with general and family practitioners, internists, obstetricians and gynecologists, and pediatricians in the calculation of population-to-primary care physician ratios used to determine HPSA designation? Answering this question requires a two-step process.

Table 2
Shortage counties, metropolitan status, and number of primary care physicians short for states licensing naturopathic physicians

State	Shortage counties			Number of primary care physicians short
	Frontier	Nonmetropolitan	Total	
AK	0	14	14	13.6
AZ	0	2	2	1.6
KS	14	12	26	20.3
MT	30	1	31	15.5
OR	2	0	2	0.9
UT	10	3	13	10.3
WA	4	1	5	8
Total	60	33	93	70.2

First, shortage counties will be de-designated if the number of NDs is greater than or equal to the number of physicians short (for example, see # short column in Table 1). Searches of 'Find An ND' and the Yellow Pages turned up just four NDs practicing in three shortage counties of the study area. Two NDs were found to be practicing in Park County, MT, and one each in Phillips County, KS, and Cache County, UT. The two NDs in Park County, MT compensated for the 1.5 primary care physicians short (Shortage Designation Branch, 2003); the one ND in Phillips County, KS, and the one ND in Cache County, UT, covered less than one MD that each of these counties were lacking (Tables 3 and 4). Overall, the effect of counting NDs as MDs reduced, by three, the number of shortage counties and reduced, by two, the number of primary care physicians short. While this reduction appears rather minimal, if one were to have access to a more complete database on ND locations, perhaps the effect of NDs on de-designating HPSAs would be more dramatic.

The second step involves making allowances for an incomplete database of ND locations. Since previous research has indicated that the combined AANP and Yellow Pages directories account for approximately one-third of NDs, one might estimate a more reasonable effect of NDs on HPSAs. If three shortage counties were eliminated using

Table 3
Shortage counties under scenario that includes naturopathic physicians

State	Shortage counties			Number of primary care physicians short
	Frontier	Nonmetropolitan	Total	
AK	0	14	14	13.6
AZ	0	2	2	1.6
KS	14	11	25	19.8
MT	29	1	30	14.0
OR	2	0	2	0.9
UT	10	2	12	10.3
WA	4	1	5	8.0
Total	59	31	90	68.2

Table 4
NDs and shortage counties

State	County	NDs
KS	Phillips	1
MT	Park	2
UT	Cache	1
Total	3	4

the AANP and Yellow Pages, which have been shown to be about one-third complete (Albert & Butar, 2003), then up to nine of 93 (9.7%) shortage counties might lose designation if one had access to a complete database. For purposes of illustration only, if this percentage (9.7) $\pm$ a 95% confidence interval were applied to all 902 HPSA counties designated by the Bureau of Health Professions (2003), how many less counties might be expected to lose shortage status? Since $n=93$ and $x=9$, then the sample proportion is 0.097; using a 95% confidence the margin of error is 0.0602, thus a 95% confidence interval would produce a range between 3.68 and 15.72%. Therefore, between 33 and 142 of 902 counties might fail to maintain shortage designation if NDs were counted as primary care physicians. Obviously there are numerous problems in accepting these estimates including: (1) the supply of NDs (i.e. number of NDs, rate of NDs per population) varies between the licensed states themselves and especially between the licensed and nonlicensed states, and therefore the confidence interval could reflect an overestimation; and (2) more likely though, as the ND profession continues to expand, the 33–142 confidence interval here is apt to be underestimated considerably. After all this profession is experiencing phenomenal growth, and one might expect that at some point in the future when the supply of NDs stabilizes in respective states and in the aggregate for the United States, counting NDs as primary care physicians might be expected to reduce the number of shortage counties substantially and dramatically.

Conclusion

Counting NDs as primary care physicians would only have a modest impact in reducing the number of shortage counties in the seven state study area in 2003. Estimates indicate that the greatest possible reduction in shortage counties would be nine, dropping from 93 to 84. The actual reduction would be somewhere between three, the number of shortage counties losing designation based on the AANP and MSN Yellow Pages directories, and nine, which is based on the assumption that these databases are only one-third complete. The bottom line is that NDs have not substantially improved availability and accessibility to primary health care services in HPSAs. Nevertheless, a potential 9.7% reduction would translate into nine less shortage counties within the study area and, based on a 95% confidence interval, 33–142 less HPSAs across the United States and territories.

This paper argued that NDs should be considered primary care physicians and be included in physician counts used to determine health professional shortage areas. Counting NDs as primary care physicians would reduce the number of shortage counties

by about 10% in the study area. Expected growth in the profession would further improve availability to care in nonmetropolitan and frontier counties. Since numerous federal programs allocate funding based on HPSA designation (GAO, 1995), lowering the number of shortage counties would reduce federal expenditures, while improving access to care. Further, this study illustrates a simple methodology to enhance the determination of HPSA status without requiring large amounts of data, greater geographic resolution, intimidating spatial analytic techniques, and sophisticated geographic software.

So while it is difficult to assess a phenomenon moving so quickly, our results should be viewed as a snapshot in a rapidly evolving process, providing a mere inkling or glimpse of the situation. It is our opinion, however, that the results presented in this paper would certainly be an underestimation of a fully diffused (saturated) ND workforce and a more diffused state licensing. Even at this incipient stage, the results from this case study provide some gauge to assess the potential impact of naturopathic medicine in underserved areas.

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