

Feasibility of Using Telephone, Association, and Licensure Directories to Examine the Geographic Distribution of Naturopathic Physicians in Oregon, Arizona, and Connecticut

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Address information from the Yellow Pages and the American Association of Naturopathic Physicians (AANP) is too incomplete to map distributions of naturopathic physicians (N.D.'s). Although these sources are incomplete, their address fields contain business addresses which can be used to confirm or augment uncertain address fields in state licensure databases. The researchers compiled lists of N.D.'s from the Yellow Pages and the AANP. Names and names and addresses from these sources were matched to state licensure databases for Oregon, Arizona, and Connecticut. Next they used the Yellow Pages and AANP to confirm business addresses or replace suspected residential addresses in state licensure databases. Because of the availability of phone numbers contained within the licensure database for Arizona, a telephone survey of N.D.'s was conducted to estimate the remaining number of unconfirmed addresses for this state. Finally, the researchers combined address information from state licensure databases, Yellow Pages, and AANP directories to develop enhanced geographic databases that were used to produce proportional symbol maps of N.D. locations in Oregon, Arizona, and Connecticut. The largest number of matches occurred using a combination of AANP and Yellow Pages directories. Oregon had the best percent of business addresses (93%) without having to use outside address sources. Using AANP, the Yellow Pages, and survey estimates, 89% of Arizona's state licensure address records were confirmed as business locations. Sixty-eight percent of Connecticut's licensure address records were confirmed as business locations using the AANP and Yellow Pages directories. The Yellow Pages and AANP directories are not appropriate separately or in combination to produce a geographic database. These sources were incomplete; nevertheless, such directories were useful in confirming state licensure addresses when it is unknown whether the addresses listed by the licensing authorities represent residential or business locations. **Key Words: naturopathic physicians, geographic distribution**

Introduction

Using telephone directories to compile work locations of complementary and alternative practitioners have been advocated on the basis of their availability and reliability; whereas, data from such sources as state licensing boards and professional associations directories have been criticized for incompleteness and outdated information (Osborne 1998). While telephone and other directories are excellent sources of location data for various health professionals, and have been used in some studies on physician locations (Mattingly 1991; Albert 1994), data from state licensing boards and professional associations have also proved useful in other studies (Kindig and Movassaghi 1989; Fruen and Cantwell 1982; Albert and Gesler 1997a, 1997b; Albert and Butar, forthcoming). Therefore, Osborn's (1998) wholesale acceptance of telephone directories and rejection of association and licensure directories to examine patterns of alternative and complementary providers is unwarranted on two points, at least with respect to naturopathic physicians. First, some naturopathic physicians (N.D.'s) as well as other complementary and alternative providers are not listed individually in telephone directories. In some instances, contact information is given for the health clinic or office providing the various services. So serious undercounts of N.D.'s would result if one used telephone directories exclusively to develop a database of N.D. locations. Second, it should be recognized that some state licensing boards (i.e., boards of medical examiners) can produce databases that are of sufficient geographic detail and excellent quality. For example, the North Carolina Board of Medical Examiners provides the city, state, county, ZIP Code, hours per week, employment setting for physicians' primary and in some instances for their secondary and tertiary locations as well (Albert and Gesler 1997a, 1997b). The authors, therefore, recommend that the selection and development of geographic databases of complementary and alternative practitioners should be made in a deliberate fashion and consider multiple sources of information. Current researchers examining the distribution of complementary and alternative practitioners should consult physician location studies produced by geographers. For example, Dutt et al. (1986) used information from a state

licensing board, a professional society, local phone directories, and local hospital physician lists to develop a database on medical doctors (M.D.'s) and osteopathic doctors (D.O.'s) used to assess the adequacy of physicians in a two county region of Ohio. Dutt and colleagues (1986) demonstrated that a proactive and vigilant approach is required to pull all the disparate data sources together. Such tenacity is to be applauded and emulated, however, too many studies are based on a convenient database where issues of data quality are simply not addressed (Hicks and Glenn 1991; Burkett, Baxley, and Theisen 1988; Diggs 1983). Assuming that a data source is of sufficient quality to perform mapping is unacceptable. Unless the data limitations are explicitly identified within the study, this approach should be avoided. Those examining geographic patterns of complementary and alternative health care providers must be as thorough and ingenious as some of the researchers involved in previous studies on physician locations and to incorporate two or more data sources (Dutt et al. 1986; Mattingly 1991).

This paper examines the feasibility of using telephone, professional association, and state licensure data on naturopathic physicians (N.D.'s) to develop databases of sufficient detail and completeness necessary to produce proportional symbol maps that accurately reflect the distribution of naturopathic physicians at the ZIP Code level. Without attempting to improve on existing sources of N.D. location data, maps produced would be less than representative of the underlying data. This study uses multiple data sources on N.D. locations to produce statewide databases of N.D. locations suitable for mapping purposes.

States were selected for inclusion in this study based on the following two criteria. First, just states that licensed N.D.'s were considered. This narrowed the study to eleven states. Second, to insure sufficiently large numbers of N.D.'s, just states with a naturopathic medical college or university within its borders were considered for selection. There are just four accredited naturopathic colleges or universities throughout the entire United States. Therefore, the list of potential candidates included Oregon, Arizona, Connecticut, and Washington, and because of data limitations the latter state was not included in this study. These states represent three out of the four states that met both the licensure and naturopathic medical school criteria. Developing an up-to-date, accurate, and complete database, or as complete as possible, is critical before other more complex cartographic and statistical analyses can be performed.

The numerous forms of medicines and practices geared toward improving health can be thought of as occurring within one of four quadrants. One quadrant includes naturopathy and other *body healing* alternatives (i.e., colonic therapists, massage therapists, nutrition counselors, chiropractors, homeopaths, medical herbalist, aromatherapists, reflexologists, and iridologists). A second and third quadrant, respectively, include those medicines and practices offering *mind/spirit* (faith healers, hypnotherapists, visualization) and *cross-cultural* alternatives (yoga, shamans, ayurvedic, folk medicine) toward improving health. Together these three quadrants (body healing, mind/spirit, and cross-cultural) present alternatives to or complement the *biomedical* quadrant. This last quadrant consists of medical doctors, osteopathic physicians, nurses, dentists, optometrists, podiatrists, pharmacists, and other practitioners typically considered to be part of the established medical community (Nienstedt 1998)

Six pillars form the philosophical basis for naturopathic medicine. These include the healing power of nature, treating the whole person, first doing no harm, identifying and treating the cause (i.e., not just masking the symptoms with prescription drugs), prevention is the best cure, and doctor as teacher. According to the American Association of Naturopathic Physicians (AANP), this form of medicine "attempts to find the underlying cause of the patient's condition rather than focusing solely on symptomatic treatment" (American Association of Naturopathic Physicians, n.d.).

Currently, there are three groups of practitioners operating under the naturopathic rubric. Group one, and the focus of this research, consists of *naturopathic physicians* (N.D.'s). Naturopathic physicians receive rigorous instruction through one of four naturopathic medical schools located in Seattle (Washington) Tempe (Arizona), Portland (Oregon) and Bridgeport (Connecticut). The Council for Naturopathic Education (CNME) has accredited three of the existing schools and a fourth school has applied for accreditation with the CNME. N.D.'s must also pass the Naturopathic Physicians Licensing Examination (NPLEX) as one requirement before being granted a state license. Currently, eleven states (Alaska, Arizona, Connecticut, Hawaii, Maine, Montana, New Hampshire, Oregon, Utah, Vermont, and Washington) permit N.D.'s to practice with a state license (Hough, Dower, & O'Neil 2001). What an N.D. can legally

perform varies from state to state, however, all can practice or order hydrotherapy, colonic irrigation, physiotherapy, naturopathic manipulation, electrotherapy, X-ray, gynecology, botanical medicine, nutrition, and homeopathy. Some states allow N.D.'s to prescribe drugs (i.e., as in Arizona, Oregon, and Washington), perform minor surgery, practice obstetrics and acupuncture (Hough, Dower, & O'Neil 2001).

Data Sources

Three readily available sources exist for developing geographic databases on N.D. locations. Data were obtained from the respective state authorities (Arizona Naturopathic Physicians Board of Medical Examiners 2001; Oregon Board of Naturopathic Examiners 2002; Connecticut Department of Health 2002), telephone directories (MSN Yellow Pages 2002) and a professional association (American Association of Naturopathic Physicians, n.d.). For the most part, these databases were free, or in some instances, as in the case of state authorities, required a modest fee to process the request. From a usage standpoint, therefore, geographic data on naturopathic physicians were accessible and involved minimal direct and indirect costs (Aronoff 1989). For example, lists of N.D. work addresses from the AANP and Yellow Pages were compiled directly from the Internet. Arizona's state licensure data was available on the Internet, whereas state licensure data from Oregon and Connecticut required a modest fee and was received on 3 ½ inch diskettes.

State Licensing Authorities

State authorities overseeing N.D. licensure credentials maintain databases that include such information as name, license number, expiration date, address (street, city, state, ZIP Code) and perhaps phone number. Problematic are the address fields. Some state authorities report addresses without indicating whether the address is a residential (i.e., a convenient mailing address) or a business location; whereas other states might maintain business addresses. Therefore, it is important to evaluate licensure databases on a state-by-state case and to recognize or even compensate for address limitations noted.

American Association of Naturopathic Physicians

The American Association of Naturopathic Physicians (AANP) is the premier professional association with 1,800 members in the United States and Canada. The AANP supports a "Find an N.D." searchable database developed from its membership list. Searches by last name, city, ZIP Code (first 3 digits), area code, or state/province are permissible. Search results produce lists containing such information as name, business name, street address, city, state, ZIP Code, phone number, email address, and "info" noting naturopathic specialties; some entries include website addresses. Since membership is optional, not all N.D.'s join the AANP; perhaps N.D.'s join other professional associations more aligned with their practice specialties (i.e., acupuncture, homeopathy, hydrotherapy).

Yellow Pages

Still another source of names and addresses for naturopathic physicians can be found in telephone directories. Access to the Yellow Pages is available via the Internet. Simple queries can be limited to a category (business), city, and state, whereas more detailed queries provide street address and ZIP Code options. The Yellow Pages lists N.D.'s under the categories "physician and surgeons naturopathic" and "physician naturopathic." Output from these searches for Oregon, Arizona, and Connecticut provided lists containing the names (individual and/or business), street addresses, cities, states, ZIP Codes, and phone numbers of N.D.'s. Yellow Pages list business addresses, which is an advantage. However, often listings are in the form of a business name and not an individual. Aside from calling each business or making assumptions about the number of

N.D.'s affiliated with a particular address, it is difficult to determine how many N.D.'s are affiliated with each business name. One or several N.D.'s might exist at a particular business address, or perhaps one N.D. might be associated with more than one business location. Further degrading the Yellow Pages as a standalone source is that other health care professions (medical doctors, osteopathic doctors, chiropractors) sometimes appear under "physicians and surgeons naturopathic" and "physician naturopathic." It is also possible that N.D.'s could list their other credentials (M.D., D.O., and D.C.) in lieu of their N.D. credential. Notwithstanding the limitations associated with each source described above, these are accessible and inexpensive data.

Methodology

The objective of this research is to evaluate various sources useful in developing statewide databases on naturopathic physicians' locations. To accomplish this objective the following steps are involved. Step one, the extent to which entries listed in the AANP, Yellow Pages, or a combination of the two can be found in state licensure data is determined. This is accomplished by matching name alone and then name and address from these sources to those same fields contained within state licensure databases. Hypothesis I, therefore, states that "the proportions of names (alone) and names and addresses (together) from the AANP, Yellow Pages, or combination of the two, respectively, matching state licensure data are the same." Matching proportions of AZ, OR, and CT within respective data sources (i.e., within Yellow Pages) are apt to be similar because these states were all among the first to license naturopathic physicians. For example, Oregon, Arizona, and Connecticut have licensed N.D.'s respectively since 1927, 1935, and 1949, and can be considered early adopters among states in the diffusion of naturopathic physicians. Similar proportion will also be expected within data sources for these states because each also has a naturopathic medical school. In step two, address records within the state licensure databases are evaluated as to whether an address is a business or residential location. The assumption was that addresses containing a business name or a suite letter/number in the mailing address were employment locations. Since the Yellow Pages and AANP represent employment locations these can be used to confirm or replace suspected residential addresses identified in the state licensure database. Hypothesis II reads then, "the percent of business addresses confirmed or with address replacement is equal to or greater than 80 percent." If less than 80 percent, and if phone numbers are available, a telephone survey of N.D.'s will be conducted to estimate how many of the unconfirmed addresses from the state licensure database are business locations. Therefore, out of the remaining uncertain addresses, a systematic random sampling of 20% was chosen. N.D.'s were asked whether the address listed with their respective licensing authority is a business or residential location. Hypotheses I and II were tested using chi-square statistics ($P < .05$) (Conover 1999). The goal of this all is to be able to use state licensure databases, supplemented and enhanced with address information from the Yellow Pages, AANP, and telephone surveys, to construct proportional symbol maps showing the distribution of naturopathic physicians in Oregon, Arizona, and Connecticut.

Results

Count

Using the American Association of Naturopathic Physicians' "Find an N.D." 174 (Oregon), 126 (Arizona), and 68 (Connecticut) records were retrieved. The AANP provides business addresses useful for geographic analyses; however, it is incomplete as not all naturopathic physicians licensed with the state are AANP members. Yellow Pages searches, using the categories "naturopathic physician" and "physicians and surgeons naturopathic," produced 165 (Oregon), 71 (Arizona), and 58 (Connecticut) records. These counts are less than the AANP because a large percentage of the search results include non-N.D.'s or non-N.D. affiliated businesses entries. Using the AANP or Yellow Pages produced "names" lists containing 290 (Oregon), 174

(Arizona) and 111 (Connecticut) records and "names and addresses" lists of 308 (Oregon), 182 (Arizona) and 119 (Connecticut) records (Table 1).

Percent Matching State

What number and percent of records in the Yellow Pages, AANP, or combination of the two matched the state licensure databases? For names only, matched percentages ranged from 85% (Oregon-AANP) to 41% (Connecticut-Yellow Pages). Seven of the nine name match columns were 60% or greater (Table 1). The AANP had a better match percentage than the Yellow Pages or the AANP/Yellow Pages combination. Importantly though, the AANP and Yellow Pages combination had the largest number of name matches with the state database. The number and percentage of matches drop off using name and address, for example the match percentages ranged from 53% (Oregon and Connecticut-AANP) to 24% (Connecticut-Yellow Pages). Again, the AANP had a higher match percentage than either the Yellow Pages or combination of the two. As noted with name only, the name and address match number was the highest, and therefore, the most useful for the combined AANP/Yellow Pages database. Still, only 50 to 60% of all licensed N.D.'s contained in the respective state databases could be accounted for using the combined records from the AANP/Yellow Pages.

Table 1. AANP, Yellow Pages, or Combination Matching State Licenses

	AANP			Yellow Pages			AANP or Yellow Pages		
	OR	AZ	CT	OR	AZ	CT	OR	AZ	CT
Count									
Names	174	126	68	65	71	58	290	74	111
Names & Address							308	182	119
State Matches									
Names	148 (85)	87 (69)	55 (81)	103 (62)	49 (69)	24 (41)	199 (69)	111 (64)	65 (59)
Names & Address	98 (53)	54 (43)	36 (53)	68 (41)	29 (41)	14 (24)	136 (44)	65 (35)	41 (34)

Numbers within parentheses are percentages.

In summary, the combination of AANP or Yellow Pages produced the largest number of matches with the respective state licensure database. Neither is there a significant difference ($P < .05$) in match percentages for each state across the respective databases. There is no statistical evidence, therefore, to warrant the rejection of the claim that the proportions are the same for each state within respective data sources (Table 1). In other words, there are no differences in the match percentages for the Yellow Pages, AANP directories, or combination of the two for Oregon, Arizona, and Connecticut. Although the AANP and Yellow Pages are incomplete and not useful, alone or in combination, to produce a database suitable for geographic analyses, addresses in these databases can augment suspected residential addresses contained in state licensure data.

Business Addresses

Oregon Board of Naturopathic Examiners provides upon request work and mailing addresses, so except for cases of missing values, the benefit of substituting with Yellow Pages or AANP addresses is marginal and probably not worth the effort. For example, 93% of the addresses in the state licensure database were business addresses (Table 2). Wholesale replacement of Yellow Pages and AANP address fields with those in the state database would be risky because there is a problem of replacing one business address with another. Differences in mailing address might be explained by multiple practice locations, changing place of employment or for other unknown reasons. Given these uncertainties, going with the state address is the most conservative choice.

Table 2. Business Addresses With and Without Replacement

State Licenses	OR N=381 (%)	AZ N=209 (%)	CT N=95 (%)
Business Addresses Without Replacement	356 (93)	124 (59)	4 (4)
Business Addresses With Replacement from Yellow Pages	NA	166 (79)	65 (68)
Business Addresses With Estimates Replacement from Telephone Survey	NA	186 (89)	NA

Inspection of the Arizona database indicates that about 59% of the addresses were business addresses (i.e., name of business given or address suggests office location, for example Suite C). For those addresses which are difficult to discern as a business or residential location, the AANP and Yellow Pages data can be used to either confirm addresses as a business location, and if not, addresses from the Yellow Pages (first choice) or AANP (second choice) can be substituted in the address attribute fields in the state databases. In this manner, either by confirmation or replacement of addresses, 79 percent of the addresses were found to represent business locations (Table 2).

The address data for Connecticut is the most dubious; only 4% appear to be business addresses. Because these are mailing addresses, it is difficult to determine whether the address is business or residential. Therefore, Connecticut is the best candidate of the three state databases to benefit from address confirmation or replacement using the AANP and Yellow Pages. In this manner, 68 percent of the addresses in the state databases were confirmed as business locations or replaced with business addresses from the Yellow Pages or AANP (Table 2). Because neither Arizona nor Connecticut reached the hypothesized level of 80 percent, a sample telephone survey of the remaining N.D.'s with unconfirmed addresses was considered. For Arizona, there were 45 uncertain addresses, 9 of them were sampled. From the telephone survey four of nine (44.44%) of the N.D.'s confirmed their addresses listed with the state as a business location. With extrapolation, 20 out of 45 remaining addresses can be considered business locations. Thus for Arizona, 166 + 20 = 186 out of 209 or 89% of addresses contained within the state licensure database can be considered business locations (Table 2). For Connecticut, 30 out of 95 addresses in the state licensure records remained unconfirmed. A telephone survey could not be conducted because telephone numbers were not available with these records.

Figure 1. Active, Licensed Naturopathic Physicians, Oregon

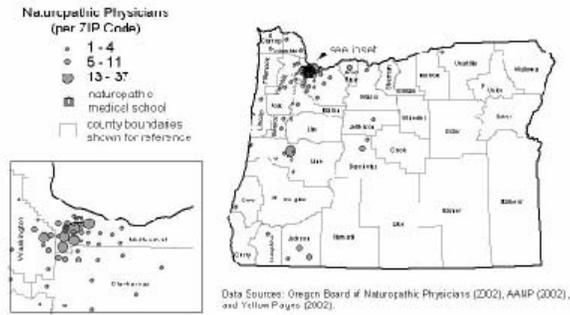


Figure 2. Active, Licensed Naturopathic Physicians, Arizona

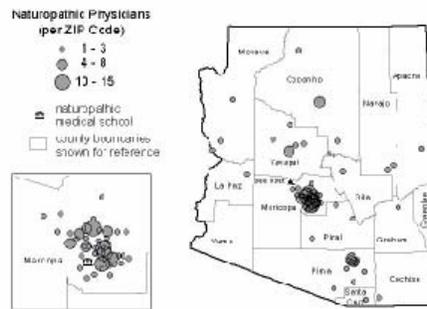
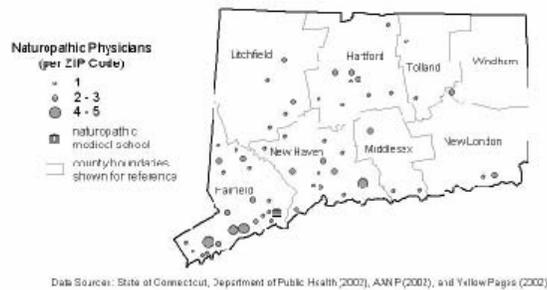


Figure 3. Active, Licensed Naturopathic Physicians, Connecticut



Enhance Database and Mapping

Because of issues related to data completeness, use of AANP and Yellow Pages separately or in combination are unacceptable data sources to examine statewide patterns of naturopathic physicians. Nevertheless, enhanced state databases containing the confirmed or replaced addresses from the AANP and Yellow Pages were used to produce maps showing the distribution of N.D.'s in Oregon, Arizona, and Connecticut (Figures 1, 2, 3). cursory review indicates that for Oregon and Arizona, N.D. locations, similar to M.D.'s, are highly clustered in urbanized areas with strong distance decay apparent with increasing distance from naturopathic medical schools (Figures 1 and 2). Although N.D.'s appear less concentrated in Connecticut, the eastern half of the state is underrepresented (Figure 3). Therefore, N.D.'s are not substantially improving overall patient access to primary health care services.

Conclusions

Developing geographic databases of alternative and complementary practitioners requires an approach unique to each field of medicine and practice. Practitioner name and address information from the Yellow Pages, professional association membership databases, or state licensure data may or may not provide an adequate database for conducting geographic analyses. For N.D.'s, it was found the Yellow Pages and AANP were not appropriate sources alone or in combination. The utility of the Yellow Pages and AANP comes from their ability to improve upon address fields contained within some state licensure databases. Perhaps as the N.D. profession continues to mature and become more accepted by the public and insurance providers, both the Yellow Pages and especially the AANP might be more suitable databases for N.D. geographic research.

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