

Review of Occupational Health Nurse Data From Recent National Sample Surveys of Registered Nurses—*Part I*

by Margaret C. Thompson, PhD, RN, COHN-S, FAAOHN

The U.S. Department of Health and Human Services obtains information about U.S. registered nurses through the periodic National Sample Survey of Registered Nurses (NSSRN). Occupational health nurses comprise less than 1% of the U.S. nursing population and published NSSRN reports usually include only estimates of the total occupational health nurse population and minimal information about occupational health nurses' characteristics. The objectives of this study were to develop a knowledge base of occupational health nurses' characteristics; examine characteristics that may influence entry and retention in occupational health nursing practice; and explore indications of demand for occupational health nurses. Descriptive and inferential statistics were used in a secondary analysis of data from recent (1992 to 2004) NSSRN. The findings are reported in two parts. This article, Part I, provides descriptive data about occupational health nurses based on responses to the 1992 through 2004 NSSRN questionnaires. Part II will provide findings from analysis of 2004 responses indicative of occupational health nurses' entry, retention, and demand characteristics.

Occupational health nurses are “the largest group of health care providers serving the worksite” (American Association of Occupational Health Nurses, Inc.

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[AAOHN], 2008), yet published information about the occupational health nurse population is scarce. Published occupational health nurse data are most often based on surveys of AAOHN members, occupational health nurses certified by the American Board for Occupational Health Nurses (ABOHN), or occupational health nurse students and alumni of the National Institute for Occupational Safety and Health (NIOSH) Education and Research Centers (ERC) and other academic programs. These studies have provided valuable information about occupational health nurses and occupational health

nurse practice. AAOHN, ABOHN, and academic program data provide information about demographics, educational preparation, academic degrees, and specialty certification of their occupational health nurse communities. However, membership populations may vary and member or cohort characteristics may not represent the occupational health nurse population.

Information about the U.S. occupational health nurse population is obtained by the U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), Bureau of Health Professions, through the National Sample Survey of Registered Nurses (NSSRN). The NSSRN is a periodic survey of registered nurses that provides information about the U.S. registered nurse population. According to HRSA, “(t)he NSSRN is the Nation’s most extensive and comprehensive source of statistics on all individuals with active registered nurse licenses to practice nursing in the United States whether or not they are employed in nursing. It provides information on the number of registered nurses, their educational background and practice specialty areas, their employment settings, position levels, job satisfaction and salaries. It also provides information on their geographic distribution and personal characteristics includ-

ing gender, racial/ethnic background, age, and family status” (HRSA, Bureau of Health Professions, 2006b, p. i). Occupational health nurses are a relatively small portion of the overall nursing population (generally < 1%), and published NSSRN reports usually include only estimates of the total occupational health nurse population and minimal information about their specific characteristics.

The researcher identified a need to study characteristics of the entire occupational health nurse population. The effect, if any, of the current nursing shortage on occupational health nursing is not known. The supply estimates for occupational health nurses used by the Institute of Medicine’s Committee to Assess Training Needs for Occupational Safety and Health Personnel in the United States (2000) were based primarily on membership data provided by AAOHN. Palmer (2003) has suggested that a severe shortage of occupational health nurses could affect both worker health and the economy. Consistent with strategies recommended to combat the overall nursing shortage, the profession must develop and implement strategies for the education and training of future occupational health nurses and recruitment and retention of nurses in the specialty practice. Beyond the need to know who occupational health nurses are, current information about occupational health nurses could be used to support occupational health nurse workforce analysis and inform strategies for both the education and training of current and future occupational health nurses. Knowledge of occupational health nurses’ demographics can also be used to develop sampling strategies for future research.

STUDY PURPOSE AND METHOD

This study employed descriptive and inferential statistics in a secondary analysis of data from recent NSSRN questionnaires (1992 through 2004). The purposes of the study were to develop a knowledge base of characteristics of the U.S. occupational health nurse population;

examine characteristics that may influence entry into and retention in the specialty practice through comparisons with other community-based clinical nursing groups; and explore indications of demand for occupational health nurses. The underlying research questions asked were:

- What are the demographic and employment characteristics of U.S. occupational health nurses?
- Were there significant changes in those characteristics during the period from 1992 to 2004?
- Do characteristics related to entry and retention differ between occupational health nurses and nurses in other community-based clinical employment settings?
- Are indications of demand for occupational health nurses evident in changes in occupational health nurse positions or employment locations?

The NSSRN targeted population is the current U.S. registered nurse population as of March of each study year. Registered nurses in the study sample “answer questions on their education and training in nursing, professional nursing certifications, education and workforce participation prior to becoming a registered nurse, current and recent workforce participation, income, demographic characteristics, and States in which they hold current licenses” (HRSA, Office of Information Technology, 2005, p. 1).

The sample design used for each of the surveys since 1977 has consisted of “a complex, nested sample frame, with equal probabilities of selection of nurses sampled in each State” (HRSA, Office of Information Technology, 2005, p. 1). Lists of current registered nurse licenses in each state were used to develop the sampling frame. Although it is possible that individual nurses may be sampled sequentially, the survey does not attempt to track nurses over time (HRSA, Office of Information Technology, 2005).

The sample survey instrument used in the NSSRN “was designed to ensure that the data collected from study to study provides sufficient continuity so that an evaluation can

be made of trends in nursing,” although new areas may be covered in specific surveys (HRSA, Bureau of Health Professions 2006b, p. 3). The questionnaires used for the 1992, 1996, 2000, and 2004 NSSRN can be found in published survey reports (HRSA, Bureau of Health Professions, 2006b; Moses, 1993, 1997; Spratley, Johnson, Sochalski, Fritz, & Spencer, 2001) and in NSSRN documentation files on the HRSA data warehouse website (HRSA, Office of Information Technology, 2005).

For each survey year, the questionnaire was mailed to each nurse selected for the sample at the address provided on the state license list. The cover letter requested voluntary participation and detailed the purposes of the study, the agency conducting the study, how confidentiality is maintained, value and use of study results, and instructions on completing the questionnaire. Until 2004, questionnaires were returned solely by postal mail; a web version of the questionnaire was made available to respondents in 2004. Return of the completed survey was evidence of the participant’s consent to participate. Various strategies, including multiple mailings and follow-up telephone interviews of nonrespondents, to clarify ambiguous responses or obtain missing information were employed to ensure adequate response. Survey response rates of 70% or higher were reported for 1992 through 2004, providing data from 30,000 to 35,000 respondents in each survey year. Additional details regarding the survey methodology, survey instruments, sample sizes, and response rates can be found in published survey reports and in NSSRN documentation files cited above.

Public use files for each survey year are made available to researchers by HRSA. Public use files contain collected response data, including assigned sampling weights (calculated to reflect the complex survey design and the individual’s selection probability, adjusted for multiple licenses, and to lessen nonresponse bias), and provide documentation such as survey background, technical

or programmer information, variable naming conventions and definitions, sample variance estimation, design notes, and the Codebook (HRSA, Office of Information Technology, 2005). These data files were downloaded into SAS statistical software for analysis.

The target population for this study was nurses who reported employment in an occupational health setting at the time of each survey, resulting in sample sizes of 306 for 1992, 280 for 1996, 459 for 2000, and 277 for 2004.

The primary comparison groups, nurses employed in community-public health and ambulatory care settings, were selected because both populations, similar to occupational health nurses, provide adult clinical care in diverse non-hospital settings. Similar to occupational health nursing, community-public health nursing has been described as both a practice setting and a specialty nursing practice (Kovner & Harrington, 2001). The nursing groups used in the comparative analyses were similarly identified by the responding nurses' indicated employment setting in the 2004 NSSRN: community-public health (3,292) and ambulatory care (3,569).

Variables used for analysis in this study were based on responses to the NSSRN questionnaires. For certain measures (e.g., nursing group, advanced practice, position and position level, highest education level, or age), the study included variables constructed by NSSRN researchers from response variables. The characteristics examined relevant to entry and retention included autonomy, salary, job satisfaction, and position change. As there is no direct indicator of autonomy in the NSSRN response data, the study used position title, master's or doctoral education, advanced practice education and preparation, and professional certificates as indicators of autonomy. The NSSRN data files do not provide separate response data for master's and doctoral education. "All responses to either master's or doctorate education are regrouped in the public use

files into one combined level that covers both degrees" (HRSA, Bureau of Health Professions, 2006a, p. C-9). The characteristics examined relevant to occupational health nurse demand were position change, geographic location (state and U.S. Census Bureau region; U.S. Census Bureau, 2001), and type of employment setting (industry, government, or other). The subgroup, nurses new to occupational health, included all nurses who reported employment in an occupational health setting at the time of the survey (2004), who also reported not being employed in nursing in the year prior to the survey (2003) or who reported employment in a setting other than occupational health in the year prior to the survey. Nurses with continuing employment in occupational health included all nurses who reported employment in occupational health in the year prior to the survey (2003) who also reported employment in an occupational health setting in the survey year (2004). A detailed description of measures used in the study and information about the sociological theory and concepts on which the indicators of autonomy are based are available from the author.

Data Analysis

A preliminary review of the unweighted response data provided in the NSSRN public use data files was completed prior to data analysis. SAS survey analysis procedures assume missing values are missing at random and are excluded or deleted prior to analysis. As generally only a small proportion (< 10%) of cases were missing, no additional adjustments were made. Distributions of variables were generally adequate for analysis. Where the number of responses for a particular response category was less than 10, population estimates were not calculated and comparisons were not made. Where necessary and feasible, categories were collapsed to provide adequate cell sizes.

The complex nature of the survey design was taken into account by the use of SAS survey analysis procedures for descriptive and inferen-

tial analysis. Descriptive statistics for characteristics of nurses employed in occupational health settings and in the comparison settings were estimated. Relationships between variables of interest, changes over time, and group comparisons were analyzed using chi-square and ordinary least squares and logistic regression analysis. Data analyses and population estimates used the final sampling weights provided for each respondent in the NSSRN public use data files. Analysis of changes in salaries over time included an adjustment for inflation based on the Bureau of Labor Statistics' Consumer Price Index to determine real increases in occupational health nurse salaries. Analyses considered and controlled for the influence of other relevant characteristics, such as education, age, family-work life elements, and geographic location, on the characteristics related to entry, retention, and demand.

Data Limitations

Although use of the NSSRN database allows access to a large amount of information that would not otherwise be available to occupational health nurse researchers, it is not without limitations. Estimates of occupational health nurses and estimates of other nursing groups used for comparisons were based on responses to the NSSRN question regarding employment setting. In each survey year, this question allows the respondent to choose only one employment setting from the listed responses. For example, occupational health nurses working in a hospital or university employee health services must choose either the hospital, the academic, or the occupational health employment setting. Also, only three choices exist within that occupational health setting category: private industry, government, or other. This grouping does not reflect the diversity of occupational health nurses' employment settings.

The wording of the questions asked may change from one survey year to the next and questions may be eliminated or new questions added, limiting analysis of changes over

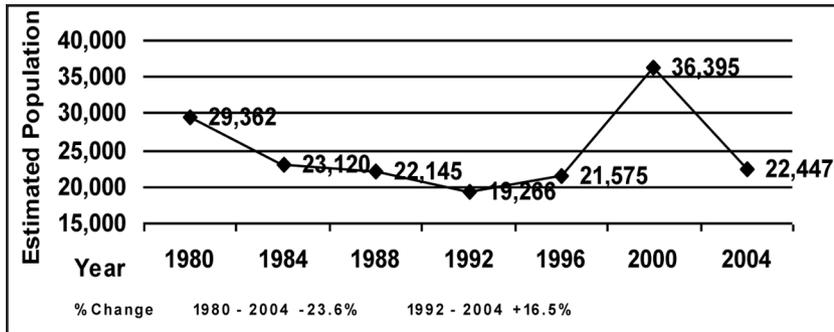


Figure 1. Occupational health nurse population estimates, 1980 to 2004. (Sources: Health Resources and Services Administration, Bureau of Health Professions, 2002a, 2002b, 2002c, 2006b; Moses, 1993, 1997; Spratley, Johnson, Sochalski, Fritz, & Spencer, 2001.)

time. Variables used as indicators of specific concepts (e.g., autonomy, entry, or retention) reflect both theoretical constructs and the limitations imposed by the survey questions and may not accurately represent the characteristic of interest.

The comparatively small number of occupational health nurses in each survey sample also imposes limitations, potentially compromising the unbiased nature of population estimates and making it difficult to reliably analyze responses of particular subsets (i.e., occupational health nurses with specific characteristics or groups of characteristics), reliably analyze group comparisons, or derive useful or reliable conclusions.

STUDY FINDINGS

Study findings are reported in two parts. This part, Part I, provides descriptive data about U.S. nurses employed in occupational health settings. This section describes a representative image of occupational health nurses: their work settings, positions, roles, education, certification, training, salaries, and general demographics both currently and in how these may have changed from 1992 to 2004. In Part II, findings from the analysis of entry, retention, and demand characteristics among occupational health nurses will be reviewed and discussed. Where applicable, findings are discussed in the context of information about the overall registered nurse population reported by NSSRN researchers and of information about nurses employed in community-public health and ambulatory

care settings previously reported or comparatively analyzed in this study.

U.S. Occupational Health Nurses' Descriptive Data

Data from the 2004 NSSRN indicated an estimated 22,447 nurses were employed in occupational health settings (HRSA, Bureau of Health Professions, 2006b). Viewing the occupational health nurse population estimates over time (Fig. 1), it can be seen that the occupational health nurse population increased approximately 17% during the period from 1992 to 2004. However, extending the time period back to 1980, when the occupational health nurse population was estimated at 29,362 (HRSA, Bureau of Health Professions, 2002a), a decline of almost 24% in the number of nurses employed in occupational health settings becomes evident. The extremely large occupational health nurse population estimated in 2000 appears to be an outlier for which a specific explanation has not been determined. As discussed with NSSRN survey researchers, it may be related to specifics of the 2000 sampling strategy. The 2004 occupational health nurse population estimate, although considerably smaller than the estimate reported for 2000, appears more consistent with the pattern of earlier survey estimates. After a 34% decline from 1980 through the lowest estimate in 1992, occupational health nurse population estimates increased 12% from 1992 to 1996 and increased 4% from 1996 to 2004 (excluding the 2000 estimate).

How do these changes compare

with changes in the overall registered nurse population estimates? Despite cyclical nursing shortages (related, in part, to increased and diversified demand), the estimated number of registered nurses employed in nursing in the United States rose almost 31% from 1992 (1,853,024) to 2004 (2,421,351) (HRSA, Bureau of Health Professions, 2006b; Moses, 1993) and increased more than 90% when the time period was extended back to 1980 (1,277,041) (HRSA, Bureau of Health Professions, 2002a). The reasons for changes in occupational health nurse population estimates and differences in those changes from the overall registered nurse population have not been specifically studied, but possible explanations will be presented for discussion and further study in the second part of this report.

What are the characteristics of these occupational health nurses, and how have they changed from 1992 to 2004? Summaries of the employment, education, and demographic characteristics reported by nurses employed in occupational health settings in 2004 and changes over time are provided in Tables 1 through 3 and Figures 2 and 3.

Occupational Health Nurses' Employment Characteristics

In 2004 (Table 1), approximately two thirds of occupational health nurses (66%) reported working in private industry and 23% reported working in government settings; settings were not specified for the remaining 11%. A subsequent survey question asked if the employed nurse provided direct care to patients in a hospital setting; approximately 11% of occupational health nurses reported that they did. More than two thirds of occupational health nurses reported working full-time (68%) and as employees of the facility in which they worked (76%). Occupational health nurses' work-time status was similar to that reported in 2004 for all employed registered nurses (71% worked full-time), for nurses employed in community-public health settings (70%), and for ambulatory

Table 1
**2004 Occupational Health Nurses’
 Employment Characteristics**

	n ^a	% ^b
Employment setting type		
Private industry	175	66.5
Government	70	22.8
Other	32	10.7
Employment status		
Employee of facility	209	76.3
Through employment agency	33	13.5
Self-employed or per diem	29	10.2
Work-time status		
Full-time	188	67.7
Part-time	89	32.3
Employment region (U.S. Census Bureau region)		
Northeast	63	24.0
Midwest	68	26.1
South	91	32.4
West	55	17.5
Staff-level position		
Yes	109	41.9
No	166	58.1
Direct patient care in hospital		
Yes	31	11.0
No	243	89.0
Represented by labor union		
Yes	29	11.5
No	243	88.5
Registered nurse license required for position		
Yes	264	95.4
No	11	4.6
Job satisfaction		
Extremely satisfied	113	40.4
Satisfied	117	42.3
Neither satisfied nor dissatisfied	25	10.8
Dissatisfied	14	3.9
Extremely dissatisfied	6	c
	M	SE/ Median
Job satisfaction		
All	4.1	0.7/4
Full-time only	4.1	0.1/4
Part-time only	4.2	0.1/4

	n ^a	% ^b
Position title (grouped)		
Administrator or assistant administrator	19	5.3
Consultant	12	4.4
Supervisor	10	4.4
Instructor	4	c
Head or assistant head of nursing	27	9.5
Staff or general duty nurse	109	41.9
Nurse practitioner	13	5.1
Nurse midwife	0	
Clinical nurse specialist	3	c
Nurse clinician	5	c
Certified nurse anesthetist	2	c
Researcher	3	c
Private duty nurse	1	c
Informatics nurse	0	
Other	18	7.2
Home health	1	c
Surveyor, auditor, or regulator	2	c
Patient coordinator	46	14.5
Dominant function (> 50% of time)		
Administration	29	10.0
Consult with agency	7	c
Direct patient care	78	28.9
Research	2	c
Supervision	7	c
Teach nursing or health care	3	c
Other	13	4.6
None	133	50.1
	M	SE/ Median
Percentage of time spent in		
Administration	22.6	1.6/18
Consultation	13.9	1.2/10
Direct patient care	38.3	2.3/30
Research	3.3	3.3/0
Supervision or management	8.9	1.2/0
Teaching nursing or other	4.1	4.1/0
Health profession other	9.1	1.5/0

Note. Study sample = 277. Population estimate ~ 22,447. Data adapted from Thompson (2008). ^aSample. ^bEstimated population. Total percentage may not equal 100 due to rounding, not applicable, missing responses, or more than one possible response. ^cPopulation estimates were not calculated where sample sizes were less than 10.

Table 2
2004 Occupational Health Nurses' Average Annual Earnings

	<i>Earnings (Thousands)</i>	
	<i>M (SE)</i>	<i>Median</i>
Overall	\$48.3 (1.8)	\$50.0
Work-time status		
Full-time	\$58.3 (1.5)	\$56.0
Part-time	\$26.7 (2.9)	\$20.0
Work setting type		
Private industry	\$48.6 (2.2)	\$56.0
Government	\$47.9 (3.3)	\$48.0
Other	\$47.2 (5.0)	\$50.0
Employment status		
Employee of facility	\$51.9 (1.8)	\$52.0
Through employment agency	\$34.9 (5.4)	\$28.0
Self-employed or per diem	\$38.5 (7.0)	\$21.9
Employment region (U.S. Census Bureau region)		
Northeast	\$50.2 (3.8)	\$49.0
Midwest	\$48.9 (3.1)	\$47.0
South	\$49.4 (2.7)	\$54.0
West	\$43.2 (5.2)	\$40.0
Staff-level position		
Yes	\$44.5 (2.5)	\$44.1
No	\$50.9 (2.4)	\$54.0
Advanced practice nursing certification		
No	\$46.7 (1.8)	\$50.0
Yes	\$64.4 (6.5)	\$65.0
Professional certificates		
None	\$47.0 (1.6)	\$48.0
1 or more	\$53.3 (4.9)	\$55.0
Highest nursing education		
Diploma	\$43.7 (2.5)	\$46.0
Associate	\$42.0 (2.8)	\$43.0
Baccalaureate	\$50.1 (3.3)	\$54.0
Master's or doctorate	\$64.3 (5.1)	\$68.0

Note. Study sample = 277. Population estimate ~ 22,447. Data adapted from Thompson (2008).

care nurses (65%) (HRSA, Bureau of Health Professions, 2006b). However, the proportion of nurses who were employees of the facility in which they worked was larger for these other groups (90% or more) than for occupational health nurses (HRSA, Bureau of Health Professions, 2006b).

A larger proportion of occupational health nurses worked through temporary employment agencies (14%) or were self-employed or per diem (10%) than nurses in the other groups (≤ 2% agency; 6% to 7% self-employed or per diem) (HRSA, Bureau of Health Professions, 2006b).

Occupational health nurses' employment settings were distributed with some regularity across the country's regions: approximately half were located in the Northeast (24%) and Midwest (26%). Almost one third of the employment settings were located in the South (32%). The fewest settings were located in the West (18%). This distribution is similar to that of the employed registered nurse population (22%, 26%, 34%, and 18%, respectively) (HRSA, Bureau of Health Professions, 2006a). Generally, the sparse distribution of occupational health nurse respondents across the states did not allow for calculation of population estimates for individual states. Occupational health nurses' employment settings located in seven states (California, Maryland, Massachusetts, Michigan, New York, Ohio, and Texas) and in the District of Columbia were estimated to account for just more than two fifths (41%) of the occupational health nurse population.

The NSSRN questionnaire asks respondents employed in nursing to select, from a list of possible titles, the position title that best corresponds to the title of their principal nursing position. The position titles reported by occupational health nurses had considerable variability: occupational health nurse respondents reported having 27 of the 36 possible titles and several other nonspecified titles. The most frequently reported position title was staff nurse (39%). Case manager (14%) was the next most frequently reported. Other frequently reported position titles included consultant (4%), nurse coordinator (5%), nurse practitioner (5%), and supervisor or assistant supervisor (4%). The reported position titles were also collapsed by the NSSRN researchers into 18 grouped position categories; the grouped position titles for the position titles reported by occupational health nurses are shown in Table 1. Within the grouped position titles, the NSSRN researchers constructed a staff-level category that included the charge nurse, float nurse, public health nurse, travel nurse, and team leader position titles, reporting that

Table 3
2004 Occupational Health Nurses'
Education and Certification

	n ^a	% ^b
Initial nursing education		
Diploma	94	35.2
Associate	111	40.8
Baccalaureate	69	23.5
Master's or doctorate	2	c
Received health field degree prior to initial nursing education		
No	242	87.2
Yes	35	12.8
Employed in health care prior to initial nursing education		
No	128	49.4
Yes	149	50.6
If yes, type of employment		
Nursing aid	90	60.4
Licensed practical-vocational nurse	39	26.2
Other	9	c
Allied health	32	21.5
Manager in health care	6	c
Initial nursing education received outside the United States		
No	265	97.1
Yes	8	c
Emergency response training (since January 2000)		
No	162	59.3
Yes	115	40.7

more than 59% of employed nurses held staff-level positions in 2004 (HRSA, Bureau of Health Professions, 2006b). Less than half of the occupational health nurses (42%) reported having position titles in the staff-level category.

Analysis of two related measures, percentage of time spent in an activity and dominant function, provided a high-level view of the activities of occupational health nurses. The 2004 NSSRN questionnaire asked employed nurses to estimate the percentage of their time spent in each of six listed activities (administration, consultation with agencies or professionals, direct patient care, research, supervision or management, plus an other category) during a usual work week (HRSA, Bureau of Health

Professions, 2006b). Reflecting the diversity of roles and responsibilities inherent in the occupational health nurse position, the estimated averages for occupational health nurses as a group indicated that their time was divided among several activities (Table 1): direct patient care (38%), administration (23%), consultation with agencies or professionals (14%), supervision or management (9%), teaching (4%), research (3%), and other unspecified activities (9%). Dominant function, a variable constructed by the NSSRN researchers, identifies the activity that occupies more than 50% of the nurse's time; if no function occupies more than 50% of the nurse's time, then the nurse is reported as having no dominant function (HRSA, Bureau of Health

Professions, 2006b). Also reflecting the diversity of occupational health nurses' roles, more than 50% of occupational health nurses were estimated to have no dominant function. Less than 30% of occupational health nurses were estimated to have direct patient care as their dominant function; for 10% of occupational health nurses, administration was the estimated dominant function.

The extent and nature of changes over time differed across these characteristics. Proportionately fewer occupational health nurses reported working full-time in 2004 (68%) than in 1992 (76%). Occupational health nurses responding to the 1992 NSSRN reported working in only two of the three possible settings (government and private industry);

Years since graduation from initial nursing program

0-5	11	3.4
6-10	37	12.0
11-15	32	10.1
16-25	73	28.3
26+	123	46.2

Highest nursing education

Diploma	58	21.4
Associate	73	27.0
Baccalaureate	109	38.1
Master's or doctorate	37	13.5

Advanced practice nursing certification

No	24	8.6
Yes	253	91.4

Professional certificates

None	223	78.8
1 or more	54	21.2

Current degree program

No	256	92.3
Yes	21	7.7

	M (SE)	Median
Number of emergency response training hours	33 (7.9)	10

Note. Study sample = 277. Population estimate ~ 22,447. Data adapted from Thompson (2008). ^aSample. ^bEstimated population. Total percentage may not equal 100 due to rounding, not applicable, missing responses, or more than one possible response. ^cPopulation estimates were not calculated where sample sizes were less than 10.

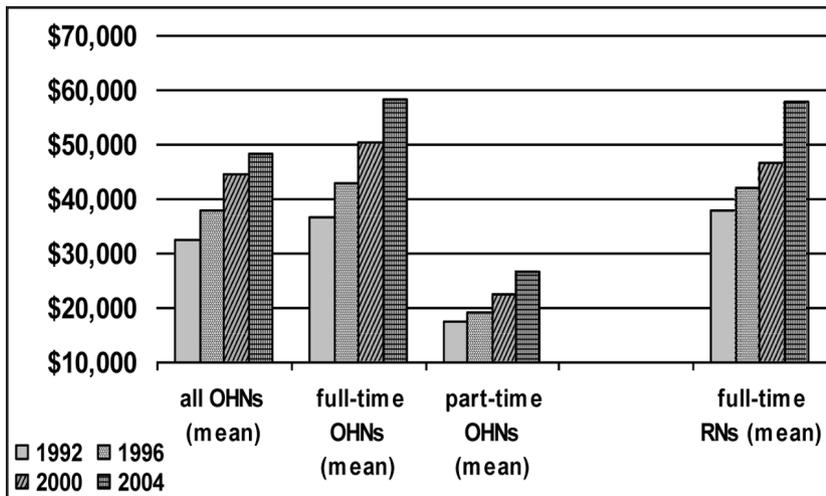


Figure 2. Changes in occupational health nurses' reported earnings, 1992 to 2004. OHNs = occupational health nurses; RNs = registered nurses.

no occupational health nurses reported working in the other response category. In 2004, 11% of occupational health nurses reported working in a setting in the other response category, which may explain the decrease in reported employment in private industry from 1992 (81%) to 2004 (67%). A smaller proportion of occupational health nurses reported working as an employee of the facility (77%) in 2004 than did in 1992 (85%), and a larger proportion reported working through a temporary employment agency in 2004 (14%) than did in 1992 (6%). The proportion reporting self-employment or working per diem remained about the same (10%). Reflecting the increased diversity of functions within the occupational health nurse role, in 2004 a larger proportion of occupational health nurses were estimated to have no dominant function (50%) than were estimated in 1992 (37%), and proportionately fewer occupational health nurses were estimated to have either administration (10%) or direct patient care (29%) as their dominant function than in 1992 (39% and 20%, respectively).

In 2004, occupational health nurses reported annual earnings ranging from \$3,000 to \$130,000; average annual earnings were estimated at \$48,303 for all occupational health nurses (Table 2). Annual earnings reported by occupational health nurses working full-time ranged

from \$18,000 to \$130,000; average annual earnings for full-time occupational health nurses were \$58,343, an average similar to that of the full-time registered nurse population (\$57,785) but slightly more than that of the average annual earnings reported for full-time community-public health nurses (\$52,347) and for full-time ambulatory care nurses (\$56,265) (HRSA, Bureau of Health Professions, 2006b). For part-time occupational health nurses, reported annual earnings ranged from \$3,000 to \$93,600; average annual earnings were \$26,736. Average annual earnings for occupational health nurses who reported being employed by the facility in which they worked were considerably higher (\$51,930) than the earnings reported by occupational health nurses who were employed through a temporary agency (\$34,857) and by occupational health nurses who reported self-employment or working per diem (\$38,485). The major portion of these differences can be explained by the larger proportions of part-time occupational health nurses in each of the latter two categories (26% and 25%) than of full-time occupational health nurses (8% and 2%). For all occupational health nurses, average annual earnings were similar across work setting type: \$48,615 in private industry, \$47,862 in government, and \$47,222 in the other nonspecified settings. Except for the West, where average annual

earnings were reported as \$43,158, average earnings were similar across the regions: \$50,221 in the Northeast, \$48,888 in the Midwest, and \$49,393 in the South. As would be expected, average annual earnings were higher for occupational health nurses in non-staff positions (\$50,876) than for occupational health nurses in staff-level positions (\$44,445); higher for occupational health nurses who reported advanced practice certification (\$64,411) than for those who did not (\$46,709); higher for occupational health nurses who reported having professional certificates (\$53,281) than for occupational health nurses who did not (\$47,701); and generally higher as education level rose. Average annual earnings for occupational health nurses who reported master's or doctoral degrees were \$64,300; for occupational health nurses with baccalaureate degrees, they were \$50,093; and for occupational health nurses with associate degrees, they were \$42,010. The average annual earnings for occupational health nurses with a diploma as their highest nursing-related education were \$43,652, slightly higher than those reporting an associate degree. As noted by the NSSRN researchers, occupational health nurses have complex patterns of earnings and education; these may be influenced, in part, by a larger proportion of diploma-prepared nurses with more years of experience (HRSA, Bureau of Health Professions, 2006b).

Figure 2 illustrates changes in occupational health nurses' average earnings over time, based on survey reported earnings ("actual" earnings). Actual average annual earnings for full-time occupational health nurses increased 58.3% from 1992, when full-time occupational health nurses' average annual earnings were estimated at \$36,847, to 2004, when they were estimated at \$58,343. This increase is slightly higher than the 53.1% increase in actual average earnings reported for all full-time registered nurses (\$37,738 in 1992; \$57,785 in 2004) (HRSA, Bureau of Health Professions, 2006b; Moses, 1993). Earnings for occupational

health nurses who worked part-time increased 51.2%, from \$17,577 in 1992 to \$26,581 in 2004. However, during this same time period, the purchasing power of earnings declined as the cost of living increased, lessening the real value of the additional earnings. From 1992 to 2004, the Consumer Price Index rose an average of 2.5% annually, increasing overall by 30.1% (Bureau of Labor Statistics, 2009). When adjusted for these changes, the real increase in full-time occupational health nurse earnings between 1992 and 2004 is 28.2% (58.3% minus the 30.1% Consumer Price Index increase).

In 2004, most occupational health nurses (83%) described themselves as feeling moderately (4) or extremely satisfied (5) about their positions (Table 1). This rate was among the highest in job satisfaction reported by nurses in various settings: 76% for all employed nurses; 84% for ambulatory care nurses; and 81% for public-community health nurses (HRSA, Bureau of Health Professions, 2006b). Comparisons of job satisfaction rates over time are not feasible because the 1992 and 1996 surveys did not include a question on job satisfaction and the 2000 survey asked a somewhat different question. In 2000, the question asked was “Compared to a year ago, how would you best describe your feelings about your nursing job?” (Spratley et al., 2001). In 2004, the question was “How would you best describe your feelings about your principal nursing position?” (HRSA, Bureau of Health Professions, 2006b).

Occupational health nurses’ responses to two questions new to the NSSRN questionnaire in 2004 provide additional information not previously available. Slightly less than 5% of occupational health nurse respondents indicated that a registered nurse license was not required for their position, and approximately 12% indicated that they were represented by a labor union (Table 1). Responses for all employed registered nurses indicated an estimated 1% held positions that did not require a registered nurse license, and an estimated 17%

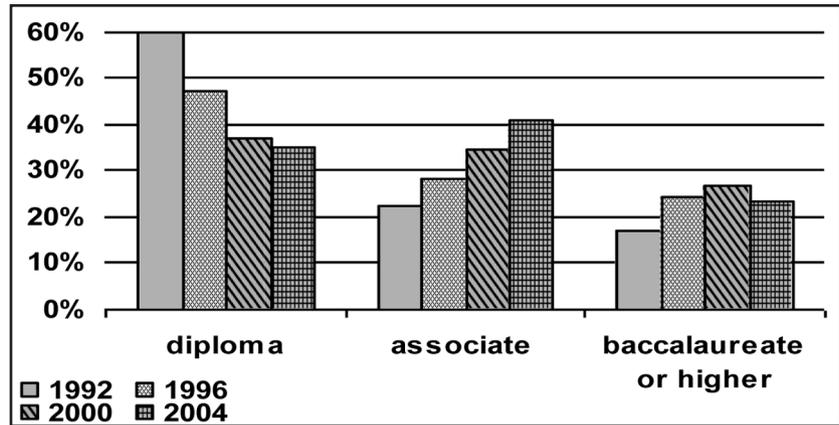


Figure 3. Occupational health nurses' initial nursing education, 1992 to 2004.

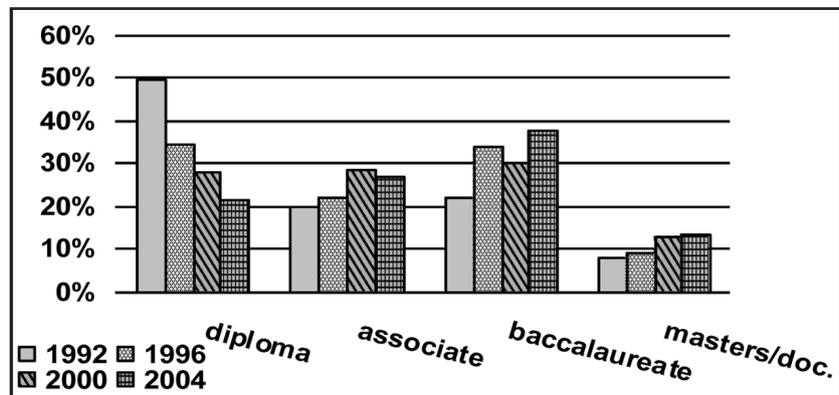


Figure 4. Occupational health nurses' highest educational preparation, 1992 to 2004.

were represented by a labor union. For community-public health nurses, estimates were just under 2% for license not required and 14% for union representation; for ambulatory care nurses, the estimates were 2% and 7%, respectively (HRSA, Bureau of Health Professions, 2006b).

Education and Certification

In 2004, more than half of the occupational health nurses responding (51%) reported employment in a health care setting prior to the start of their initial nursing education program, and a smaller proportion (13%) reported receiving a degree in health care prior to their initial nursing program (Table 3). Associate degree programs were the initial nursing education program for the largest proportion (41%) of occupational health nurses responding to the 2004 NSSRN. Initial nursing education through diploma programs was reported by 35% of occupational health

nurses, and baccalaureate or higher degree programs were the initial programs for 24% of occupational health nurses. These proportions represent a considerable change from 1992 (Fig. 3), when diploma programs were the initial nursing education for 60% of occupational health nurses, associate degree programs for 22%, and baccalaureate and higher degree programs for 17%. Although similar to trends seen in the registered nurse population, the movement away from diploma programs as initial nursing education is not as pronounced for occupational health nurses as for the registered nurse population. The proportion of occupational health nurses who attended diploma programs as their initial nursing education (35%) remained larger in 2004 than for the registered nurse population (25%) (HRSA, Bureau of Health Professions, 2006a). The primary factor influencing this appears to be the larger proportion of occupational health

nurses (75%) for whom graduation from initial nursing education was 16 or more years ago, when diploma programs were more frequently attended, than the proportion of registered nurses (60%) who graduated 16 or more years ago (HRSA, Bureau of Health Professions, 2006a). Only a few occupational health nurses (< 10) who graduated less than 16 years prior to the survey reported completing a diploma program as their initial nursing education program. Approximately two thirds of occupational health nurses (65%) with between 11 and 15 years since graduation completed associate degree programs as their initial nursing program and 26% completed baccalaureate programs. For occupational health nurses with between 6 and 10 years since graduation, 54% completed associate degree programs and 32% completed baccalaureate degree programs. Sample numbers were too small to allow estimations of other combinations of years since graduation and type of initial nursing education reported by occupational health nurses. Almost all occupational health nurses (97%) reported receiving their initial nursing education in the United States.

Following the trend for nurses to complete additional education, more than 27% of occupational health nurses were estimated to have associate degrees as their highest educational preparation; 38% to have baccalaureate degrees; and 14% to have master's or doctoral degrees (Table 3). Less than one fourth of occupational health nurses (21%) were estimated to have a diploma as their highest educational preparation. These findings represent considerable change from 1992 (Fig. 4), when the diploma was the highest educational preparation, estimated for half of occupational health nurses; less than one tenth had master's or doctoral degrees (8%) and less than one fourth had either associate (20%) or baccalaureate (22%) degrees. An estimated 8% of occupational health nurses in 2004 reported current enrollment in a formal education program leading to an academic degree or certificate degree program;

almost half of those occupational health nurses (48%) were enrolled in master's degree programs. In 1992, an estimated 10% of occupational health nurses reported current enrollment in degree programs; more than half (56%) of those occupational health nurses were enrolled in baccalaureate degree programs.

Following a general nursing trend, occupational health nurses have increasingly reported advanced practice education and certification. In 2004, 9% of occupational health nurses were estimated to have advanced practice status, a number comparable to the number of advanced practice nurses estimated in the overall registered nurse population (8%) (HRSA, Bureau of Health Professions, 2006b) but considerably larger than the proportion of occupational health nurses (5%) estimated in 1992.

Two questions regarding education and certification were asked for the first time in 2004; one concerned professional certificates and the other emergency response training. Respondents were asked to identify up to three national professional nursing certificates received in their career, excluding those reported in earlier responses to advance practice questions. Because of the volume, diversity, and variation in professional practice certificates reported by respondents, NSSRN researchers developed an aggregated list "which summarized the focus of the enumerated certifications into 26 new categories of national professional nursing certifications" (HRSA, Bureau of Health Professions, 2006a, p. C-25). A derived variable that summarized the count "of the number of national professional certifications in nursing which the nurse reported . . ." (HRSA, Bureau of Health Professions, 2006a, p. C-25) was constructed. Twenty-one percent of occupational health nurses were estimated to have one or more national professional certifications in nursing, a larger proportion than that estimated for all employed registered nurses (14%), for community-public health nurses (12%), or for ambulatory care nurses (11%). The focus of certificates listed by occupa-

tional health nurses varied: the largest group (27%) were summarized in the family practice or ambulatory category; 13% were summarized in the case management category; 8% in acute and critical care; and 15% in the other functional category. The remaining certificates listed were scattered in small numbers through many of the other categories, perhaps reflecting the diverse experience of occupational health nurses. It is not possible to determine from the available data the number of occupational health nurses who reported specific certification in occupational health nursing.

Less than half of the occupational health nurses (41%) reported having received training in recognizing or responding to specific emergencies. This was roughly the same proportion estimated for all employed registered nurses (42%) and for community-public health nurses (43%). However, this proportion was higher than the proportion of ambulatory care nurses (31%) who reported receiving emergency response training. Of the occupational health nurses who reported receiving training, 74% received training in recognizing or responding to a biological attack, 64% for a chemical attack, 40% for a nuclear or radiological attack, 77% for infectious disease epidemics, and 69% for natural disasters or other public health emergencies.

Additional Demographics of Occupational Health Nurses

As in the overall nursing population, males and those of non-White and Hispanic racial or ethnic background continued to make up only a small portion of the estimated occupational health nurse population in 2004 (Table 4). The proportion of males was slightly higher for occupational health nurses (8%) than for all employed registered nurses (6%), for community-public health nurses (5%), and for ambulatory care nurses (5%). The number of occupational health nurses identified as male in the 1992 survey (7 of 306 occupational health nurse re-

Table 4
2004 Occupational Health Nurses'
Demographics

	n ^a	% ^b
Gender		
Female	260	92.4
Male	17	7.6
Race or ethnicity		
White and non-Hispanic	236	89.7
Other	27	10.3
Age in years (grouped)		
< 25	0	
25-29	5	c
30-34	15	5.2
35-39	21	6.7
40-44	39	10.9
45-49	51	19.7
50-54	47	17.2
55-59	45	16.2
60-64	33	12.1
≥ 65	20	9.0
	M (SE)	Median
Age		
All	50.8 (0.7)	51
Full-time only	49.6 (0.8)	51
Part-time only	53.3 (1.5)	52

	n ^a	% ^b
Marital status		
Now married	197	71.6
Widowed, divorced, or separated	61	20.2
Never married	19	8.3
Children or dependents living at home or providing significant care		
None	121	48.1
1 or more	155	51.9
Household income		
≤ \$15,000	3	c
\$15,001 to \$25,000	1	c
\$25,001 to \$35,000	7	c
\$35,001 to \$50,000	24	1.9
\$50,001 to \$75,000	72	26.0
\$75,001 to \$100,000	67	21.0
\$100,001 to \$150,000	61	21.4
≥ \$150,001	30	13.8
Speak other languages fluently		
No	259	94.1
Yes	18	5.9

Note. Study sample = 277. Population estimate ~ 22,447. Data adapted from Thompson (2008). ^aSample. ^bEstimated population. Total percentage may not equal 100 due to rounding, not applicable, missing responses, or more than one possible response. ^cPopulation estimates were not calculated where sample sizes were less than 10.

spondents) was too small to permit analysis of changes over time. The single survey question regarding racial and ethnic background of earlier surveys was expanded in the 2000 and 2004 surveys, providing more specific information on racial or ethnic background for the overall nursing population in recent years but limiting detailed occupational health nurse comparisons over time. Generally, however, the proportion of occupational health nurses reporting their racial or ethnic background as White and non-Hispanic decreased from 94% in 1992 to 90% in 2004, representing a small increase in the diversity of the occupational health nurse population. The proportion of White, non-Hispanic occupational health nurses estimated in 2004 was somewhat higher than the estimated proportion for all employed

registered nurses (81%), slightly lower than that of community-public health nurses (92%), and slightly higher than that of ambulatory care nurses (89%).

With an average age of 50.8 years, nurses employed in occupational health settings had the highest average age among nursing groups from various employment settings. The average age for all employed registered nurses was reported as 45.4, and as 48.4 for community-public health nurses (HRSA, Bureau of Health Professions 2006b). The average age was higher for occupational health nurses working part-time (53.3) than for full-time occupational health nurses (49.6). As in the overall nursing population, the overall occupational health nurse average age was higher in 2004 than in 1992, when it was 47.9. In 2004,

more than half (55%) of occupational health nurses were 50 years or older and approximately two fifths (43%) were between the ages of 30 and 49. Few occupational health nurse respondents were 29 or younger.

Almost three fourths of occupational health nurses (72%) indicated that they were currently married; about 20% indicated being separated, divorced, or widowed; and less than 10% indicated they had never married. More than half (52%) of occupational health nurses reported they either had children younger than 18 at home or had others for whom they provided significant care. Responses regarding marital status, with the exception of the never married category, have changed little over time. In 1992, 75% of occupational health nurses reported being currently married; 20% were widowed, divorced,

IN SUMMARY

Review of Occupational Health Nurse Data From Recent National Sample Surveys of Registered Nurses

Part I

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- 1 Study data provide a knowledge base of occupational health nurses that can be used to support the analysis of the occupational health nurse work force, to inform strategies for the education and training of current and future occupational health nurses, and to inform strategies for the recruitment and retention of occupational health nurses. The occupational health nurse demographic data can be used to develop sampling strategies for future research about occupational health nurses.
- 2 Study data provide practicing occupational health nurses with information about the characteristics of their occupational health nurse colleagues throughout the United States. Occupational health nurses can use elements of this information (e.g., educational status, certification, or participation in emergency response training) as they create and evaluate their individual professional development plans.

or separated; and 5% had never married. Almost half of occupational health nurses (49%) in 1992 reported they had children living at home; the earlier survey did not ask about non-child dependent care. In 2004, more than four fifths of occupational health nurses (83%) reported household income of \$50,000 or more, slightly higher than the proportion of employed registered nurses (79%) who reported that level of household income.

The proportion of occupational health nurses (6%) who reported speaking another language fluently was slightly less than for employed nurses generally (9%) and for community-public health nurses (8%), but similar to ambulatory care nurses (6%). One fourth of occupational health nurses reported residence in one of the 17 states participating in the Nursing Licensure Compact at the time of the survey. This proportion of compact state residence was similar to the proportion for all employed registered nurses (24%), for all community-public health nurses

(23%), and for all ambulatory care nurses (24%). A slightly higher proportion of occupational health nurses (14%) used the Internet to respond to the survey than employed nurses did generally (12%).

DISCUSSION

The findings presented provide a basic description of occupational health nurses employed in the United States in 2004 and of changes occurring in that population during the period from 1992 to 2004. The data indicated that occupational health nurses mirror, in many respects, the characteristics and trends seen in the overall nursing population. Despite cyclical nursing shortages, the occupational health nurse population, similar to registered nurses in general, increased in estimated size during the years 1992 to 2004. Gender and racial or ethnic backgrounds remained non-diverse; occupational health nurses, as in the general nursing population, are predominately female and White, non-Hispanic. Concerns regarding the aging of the

nursing work force are particularly applicable for occupational health nurses, who have the highest average age among the groups of nurses employed in various settings.

Employment settings of occupational health nurses are distributed throughout the United States, although a sizable portion of settings are concentrated in just eight states. Knowledge of this concentration may be useful in developing sampling strategies for future studies of the occupational health nurse population. The diversity of roles and responsibilities described in publications for occupational health nurses is reflected in the data: in the variety of position titles, functions, and time expenditures for particular activities reported by occupational health nurses. The data also verified the claims of increased diversity in occupational health nurses' roles and functions over time.

Reflecting trends in the registered nurse population, occupational health nurses have become increasingly educated and specialized. Far fewer occupational health nurses received their initial nursing education through diploma programs in recent years, and most occupational health nurses, regardless of type of initial nursing education, reported receiving associate or higher degrees during their career. In addition, a larger proportion of occupational health nurses reported having advanced practice education and certification. It is encouraging that a sizable proportion of occupational health nurses reported receiving training in recognizing and responding to various emergencies and natural disasters. However, given the importance of occupational health nurses' role in all hazard planning and response and the seriousness of potential consequences if such emergencies occur, it is critical that the need for such training be more strongly supported so that all occupational health nurses are encouraged to receive training.

This descriptive part of the study provided an initial knowledge base of occupational health nurses. The second part of this study will pro-

vide additional information about occupational health nurses and their employment decisions when findings from the analysis of entry, retention, and demand characteristics of occupational health nurses are reviewed and discussed. The NSSRN data are a valuable resource for researchers who are interested in studying occupational health nurses and the nursing profession and can provide the starting place for a variety of much needed in-depth studies.

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