

# A Ten-Year Trend Analysis of Pharmacist Participation in the Workforce<sup>1</sup>

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The purpose of this study was to examine trends in work variables (work status, part-time work, secondary employment, full-time equivalents) and characteristics of actively practicing pharmacists between 1990 and 2000. Data from two national surveys of licensed pharmacists in the United States were used for analyses. Between 1990 and 2000 there was an increase in the proportion of licensed pharmacists that were female (31 percent in 1990 versus 43 percent in 2000). For males there was a decrease in the proportion practicing full-time (78.6 percent in 1990 versus 75.9 percent in 2000) and an increase in the proportion that were retired (7.0 percent in 1990 versus 9.4 percent in 2000). For females there was an increase in the proportion practicing full-time (61.7 percent in 1990 versus 69.9 percent in 2000) and a decrease in the proportion working outside of pharmacy and not working (9.1 percent in 1990 versus 6.6 percent in 2000). Given the excess demand for pharmacists, our results suggest the current pharmacist workforce has responded by increasing the amount of work supplied to the pharmacist labor market.

## INTRODUCTION

The demand for health care has increased and likely will continue to increase due to the aging of the population, improved access to health care and technological advances in treating diseases. One implication of the increase in demand for health care is an increase in the demand for health care professionals (*i.e.*, physicians, nurses, pharmacists). This results because the demand for labor, generally, is derived from the demand for goods and services that labor produces(1). A shortage (heretofore called excess demand) of health professionals is significant since the quality of care provided to patients and patient access to needed care may be impacted by an inadequate supply of health professionals(2). Given these implications, it is important to examine trends in workforce data to understand the status of health professions.

The pharmacy profession is an example of a health care profession experiencing increased demand for the goods and services pharmacists produce(3). The demand for pharmacists is increasing likely due to the demand for prescription drugs. Between 1992 and 1998 the number of prescriptions dispensed increased from 1.9 billion to 2.6 billion(4). It is estimated that four billion prescriptions will be dispensed by the year 2005(5). A primary role of pharmacists is dispensing the increasing numbers of prescriptions. An additional role of pharmacists, however, is preventing misuse of prescription

drugs and the costs associated with misuse. In 2000 it was estimated that drug misuse in ambulatory care settings cost \$177.4 billion, an increase from a 1995 estimate of \$76.6 billion(6,7). Alleviating the excess demand for pharmacists has important public health consequences.

Facing excess demand for pharmacists, recent pharmacy workforce policy discussions have focused mainly on methods to expand the numbers (supply) of pharmacists to meet the excess demand(8). Since 1980 the number of graduates from U.S. pharmacy schools has remained fairly stable. First professional degree graduates numbered 7,432 in 1980 and this number grew to 8,003 in 1996, but decreased to 7,141 in 1999(9). However, expanding the supply of pharmacists likely is a slow process due to the length of training required for pharmacists and the years it takes to establish and build new pharmacy schools. Given the modest increases in supply of pharmacists since 1980 and the delay in expanding supply, our approach is to examine trends in work variables among the current supply of pharmacists.

Examining work variables provides insights into whether licensed pharmacists are participating in the workforce as pharmacists

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or not working at all (work status), and how much pharmacists work (full-time versus part-time, secondary pharmacy employment, full-time equivalent). Labor economic theory suggests that characteristics of workers, economic factors, and characteristics of employers influence whether a person works and the amount of labor each person provides to a market (*i.e.*, how many hours a person works)(10,11). Age, gender, health status and education are examples of characteristics of workers hypothesized to account for differences in how much people work. Life-cycle factors derived from human capital theory such as experience, number of children, and marital status help determine the value of a worker in a market and the amount of time that can be devoted to work. Characteristics of employing firms such as work setting, work conditions and setting location influence hours worked as workers try to match preferences for work with available conditions. Examining trends in work variables and characteristics of pharmacists may better inform us of whether and how the current workforce has responded to increased demand and provide possible policy directions for increasing supply.

Examining trends in characteristics of the pharmacist workforce would be incomplete without considering gender composition. Since 1985 the majority of pharmacy school graduates has been women and the proportion of graduates that are women has increased steadily since 1985(9). It has been estimated that by the year 2003 a majority of practicing pharmacists will be women(12). Gender composition of the pharmacy workforce has important implications for the pharmacy workforce since research has shown that women pharmacists are more likely to leave the workforce, work part-time and work less than males(13-17).

The trends in work variables and how gender has impacted trends in work variables among licensed pharmacists in the U.S. are unknown because the last national summary of the pharmacist workforce occurred in 1990(14). The purpose of this study was to examine trends in work variables for all licensed pharmacists and separately for male and female pharmacists between 1990 and 2000. To investigate trends in workforce participation we examined the work status of licensed pharmacists, and demographic characteristics, work setting and work position of pharmacists actively practicing pharmacy. In terms of how much pharmacists are working we examine trends in the prevalence of part-time work, and rates of part-time work by demographic characteristics, work setting and work position of pharmacists. We also examine trends in the prevalence of secondary pharmacy employment and rates of secondary pharmacy employment by demographic characteristics, work setting and work position of pharmacists. Lastly, we examine trends in full-time equivalents of pharmacists. FTEs are useful to workforce policy because they combine work status and how much people work to provide a composite measure of work contribution.

## METHODS

### Data

Data for this study were obtained from two national studies of the pharmacist workforce conducted in 1990 and 2000(14,18). Data describing the licensed pharmacist population in 1990 were obtained from the final report of the National Pharmacists' Compensation Survey 1990-91. A sample of 3,005 licensed pharmacists was surveyed via mailed questionnaire. The survey form was six pages and consisted of four sections: personal profile, current employment profile, compensation

profile, and fringe benefits and other compensation. Of the 1,718 total responses, 1,623 were complete and used in the analysis. Since raw data from this survey were not available, we used information from tables in the final written report(14). Data describing the pharmacist workforce in 2000 were collected via mailed survey from a sample of 5,000 licensed pharmacists in the 48 contiguous United States. A description of the procedures used for data collection is described elsewhere(18). An 11-page questionnaire was developed and consisted of eight sections: general employment status, primary employment, compensation and work schedules (primary employment), compensation and work schedules (secondary employment), work environment, labor market information, work-related attitudes, and individual background. Questions that comprised each section of the survey form were developed based on survey questions used in the 1990 survey of pharmacists and taken from regional pharmacist workforce survey s(14,19,20).

Of the 5,000 mailed surveys, 105 were returned as undeliverable. The overall response rate was 46.0 percent (2,250/4,895). A total of 158 responses (7.0 percent) were deleted due to deceased subjects (n=14), refusal to participate (n=12), non-pharmacist respondent (n = 3), failure to report employment status (n - 78) and failure to report all information for a minimum set of demographic variables (n= 51). The net useable response rate was 42.9 percent (2,092/4,895). The validity of the survey methodology was assessed(21).

### Variables

We compared the samples of pharmacists from 1990 and 2000 on several variables. To promote appropriate comparisons, definitions of variables used for the data from 2000 were based on definitions used in 1990. The first variable examined was work status and was categorized into four levels, actively practicing pharmacy, retired, working but not in pharmacy, and not working. Pharmacists that were categorized as not working reported that they were either temporarily or permanently out of the workforce.

We categorized pharmacists who were actively practicing pharmacy as working full-time or part-time. Full-time work was defined as working greater than 30 hours per week in primary pharmacy employment and part-time work was defined as working less than or equal to 30 hours per week in primary pharmacy employment. The number of hours pharmacists worked in their primary pharmacy employment was based on self-report by pharmacists. Using self-reported weekly hours worked in pharmacists' primary place of employment we calculated full-time equivalents (FTEs) for all pharmacists. A full-time equivalent pharmacist was defined as working 40 hours per week.

The selection of characteristics of pharmacists to examine was guided by labor economic theory and the availability of variables in the 1990 and 2000 data. In terms of demographic variables we examined marital status, highest degree earned, age category, region of the country employed, number of children, and the presence of any children at home in three age groups, 0-6 years, 7-12 years and 13-17 years. Region of the country was one of the four census regions (West, Northeast, Midwest, South).

A work setting variable represented pharmacists' primary place of employment. In 1990 this variable was categorized into five levels (independent, all chain, hospital, other practice and other). For the 2000 data we classified work setting into seven categories: independent, chain (small and large), mass

**Table I. Work status of licensed pharmacists**

Work status	All pharmacists			Males			Females		
	1990 n = 1,623	2000 n = 2,092	1990 to 2000 % change	1990 n = 1,116	2000 n = 1,187	1990 to 2000 % change	1990 n = 507	2000 n = 905	1990 to 2000 % change
Full-time (>30 hours/week)	1,190 (73.3%)	1,534 (73.3%)	0.0 <sup>a</sup>	877 (78.6%)	901 (75.9%)	-2.7 <sup>a</sup>	313 (61.7%)	633 (69.9%)	+8.2 <sup>a</sup>
Part-time (<=30 hours) per week	227 (14.0%)	311 (14.9%)	+0.9	97 (8.7%)	118 (9.9%)	+1.2	130 (25.6%)	193 (21.3%)	-4.3
Total actively practicing	1,417 (87.3%)	1,845 (88.2%)	+0.9	974 (87.3%)	1,019 (85.8%)	-1.5	443 (87.3%)	826 (91.3%)	+4.0
Retired	96 (5.9%)	130 (6.2%)	+0.3	78 (7.0%)	111 (9.4%)	+2.4	18 (3.6%)	19 (2.1%)	-1.5
Non-pharmacy work	71 (4.4%)	62 (3.0%)	-1.4	55 (4.9%)	44 (3.7%)	-1.2	16 (3.2%)	18 (2.0%)	-1.2
Not working	39 (2.4%)	55 (2.6%)	+0.2	9 (0.8%)	13 (1.1%)	+0.3	30 (5.9%)	42 (4.6%)	-1.3

Note: Percent change is percentage point change. Respondents who reported non-pharmacy work included persons working in other health care fields such as dentistry and medicine and working in other occupations such as teaching. Persons reporting not working included persons temporarily out of the labor market (*i.e.* looking for a new job) or permanently out of the labor market.

<sup>a</sup>Chi-squared test between data from 1990 and 2000,  $P < 0.05$ , 4 d.f.

merchandise, supermarket, hospital, other practice and other. In both 1990 and 2000 other practice settings represented settings such as health maintenance organizations, nursing homes, and home health care. The other category represented pharmacists working in settings such as academia, government and industry.

Work position represented the position pharmacists held at their primary practice setting and was categorized as owner/partner, manager, staff/other. Pharmacists classified as managers included those reporting their position as director, supervisor or assistant manager. In addition to work setting and position, pharmacists reported whether they held an additional job as a pharmacist. Using this information, rates of secondary employment were calculated. We could not calculate the number of hours pharmacists worked in secondary employment since the report from 1990 did not contain this information.

### Data Analysis

Data analysis proceeded in six steps. The first step was determining the frequency and proportion of all licensed pharmacists in each work status category for the survey samples from 1990 and 2000. The number and proportion of pharmacists in each work status category also was determined separately for males and females in 1990 and 2000. We calculated changes in the proportion of pharmacists in each category by subtracting the proportion in 1990 from the proportion in 2000. Chi-square tests were used to examine changes in the distribution of pharmacists in work status categories across time.

The second step of data analysis examined the comparability of data for actively practicing pharmacists from the 1990 and 2000 samples with national estimates and examined changes between 1990 and 2000 in sample and national estimates. The analysis examined the proportion of actively practicing pharmacists categorized by gender, race, marital status, age group, and region for the survey samples from 1990 and 2000 and for data obtained from the Current Population Survey's (CPS) Outgoing Rotation Group (ORG)(22). The CPS is a monthly survey of 50,000 households nationwide conducted by the Bureau of Labor Statistics. The ORG data contain detailed information about current occupation, earnings and general demographic information such as age, gender,

marital status and race for approximately 300,000 individuals each year. Pharmacists were identified using criteria developed in a previous study(23). We assessed the comparability of the sample survey data with national estimates by calculating 95 percent confidence intervals for sample proportions and comparing them with national estimates. We examined changes in the proportion of pharmacists in each category between 1990 and 2000 using both the sample survey data and national data. The significance of changes in proportions between 1990 and 2000 for the sample estimates was tested with the chi-squared statistic. We repeated these analyses separately for male and female actively practicing pharmacists.

The third step of data analysis examined the frequency and proportion of pharmacists by pharmacy education, family, and work characteristics for all actively practicing pharmacists and for males and females separately. The difference in proportions between 1990 and 2000 was calculated and chi-square tests were used to test for association between 1990 data and 2000 data.

The fourth step of data analysis examined the rate of part-time work by levels of variables in 1990 and 2000 for all actively practicing pharmacists and separately for male and female pharmacists. The difference in rates of part-time work between 1990 and 2000 was determined and chi-square tests were used to test for association between 1990 data and 2000 data. The next step in data analysis examined trends in FTE data. We determined the percentage change from 1990 by dividing the difference in mean FTE values between 1990 and 2000 by the FTE value for 1990. One-sample t-tests were used to determine whether the mean FTE in 2000 differed from the mean FTE in 1990.

The last step of data analysis examined the rate of secondary employment across levels of variables in 1990 and 2000 for all pharmacists and separately for male and female pharmacists. The rate of secondary employment was examined only for pharmacists who reported working full-time in their primary place of employment and by a limited number of variables (marital status, highest degree earned, years of experience, region, work setting and work position) since the 1990 final report only reported these variables. Years of experience was defined as the survey year minus the year a respondent

**Table II. Sample and National estimates of actively practicing pharmacists: 1990 and 2000**

Characteristics	1990 Sample n = 1,417	1990 National n = 179,409 <sup>a</sup>	2000 Sample n = 1,845	2000 National n = 201,247 <sup>a</sup>	1990 to 2000 % change in sample estimates	1990 to 2000 % change in National estimate
Gender						
Male	68.7 (66.2–71.1)	64.4	<b>55.2 (52.9–57.4)</b>	54.6	-9.2 <sup>b</sup>	-9.8
Female	31.3 (28.9–33.8)	35.6	<b>44.8 (42.6–47.1)</b>	45.4	13.5	9.8
Race						
White	93.4 (92.1–94.7)	89.6	87.3 (85.8–88.8)	83.5	-6.1 <sup>c</sup>	-6.1
Asian	2.8 (2.0–3.7)	6.5	7.5 (6.3–8.7)	13.0	4.7	6.5
Other	<b>3.8 (2.8–4.8)</b>	3.9	5.2 (4.2–6.2)	3.6	1.4	-0.3
Marital Status						
Not married	18.2 (16.2–20.2)	25.3	25.0 (23.0–27.0)	31.0	5.7 <sup>b</sup>	5.7
Married	81.8 (79.8–83.8)	74.7	76.0 (74.0–77.9)	69.0	-5.8	-5.7
Age Group						
21–30	15.0 (13.2–16.9)	23.4	15.1 (13.5–16.8)	18.3	0.1 <sup>d</sup>	-5.1
31–40	37.2 (34.7–39.7)	34.2	<b>29.0 (27.0–31.1)</b>	29.3	-8.2	-4.9
41–50	23.4 (21.2–25.6)	18.6	29.5 (27.4–31.6)	26.8	6.1	8.2
51–60	<b>14.0 (12.2–15.8)</b>	13.9	<b>17.1 (15.4–18.8)</b>	16.0	3.1	2.1
>60	<b>10.4 (8.8–12.0)</b>	9.9	<b>9.2 (7.9–10.5)</b>	9.5	-1.2	-0.4
Region						
West	14.7 (12.8–16.5)	18.3	18.6 (16.8–20.4)	21.1	3.9 <sup>c</sup>	2.8
South	<b>33.6 (31.1–36.1)</b>	35.3	<b>34.6 (32.4–36.8)</b>	33.3	1.0	-2.0
East	<b>19.4 (17.3–21.5)</b>	19.8	<b>19.3 (17.5–21.1)</b>	20.7	-0.1	0.9
Midwest	32.3 (29.9–34.8)	26.6	27.5 (25.5–29.5)	24.9	-4.8	-1.7

Note: Numbers are percentages. Numbers in parentheses are 95% confidence intervals for the sample percentages. The 1990 to 2000 changes are percentage point changes. The numbers in bold represent levels of variables where the sample confidence interval contains the national estimate.

<sup>a</sup>These are weighted numbers. The sample sizes used for the 1990 and 2000 national estimates were 321 and 285 pharmacists, respectively. The national estimate for 1990 and 2000 are derived from pharmacists in the Current Population Survey's Outgoing Rotation Group for 1990 and 2000.

<sup>b</sup>Chi-squared test between data for 1990 sample and 2000 sample,  $P < 0.05$ , 1 d.f.

<sup>c</sup>Chi-squared test between data for 1990 sample and 2000 sample,  $P < 0.05$ , 2 d.f.

<sup>d</sup>Chi-squared test between data for 1990 sample and 2000 sample,  $P < 0.05$ , 4 d.f.

<sup>e</sup>Chi-squared test between data for 1990 sample and 2000 sample,  $P < 0.05$ , 3 d.f.

was first licensed as a pharmacist. The difference in rates between 1990 and 2000 was determined and chi-square tests were used to test for association between 1990 data and 2000 data. All statistical tests were evaluated at the 0.05 level of significance.

## RESULTS

Table 1 contains a summary of the work status of all licensed pharmacists and by gender for 1990 and 2000. Between 1990 and 2000 there was an increase (0.9 percentage points) in the proportion of licensed pharmacists that were actively practicing pharmacy and a decrease (1.4 percentage points) in the proportion of licensed pharmacists working outside of the pharmacy profession. In terms of gender, there was an increase in the proportion of pharmacists that was female (31 percent in 1990 versus 43 percent in 2000). For males there was a decrease between 1990 and 2000 in the proportion actively practicing full-time (2.7 percentage points) and an increase (2.4 percentage points) in the proportion retired. For females there was an increase (four percentage points) in the proportion actively practicing pharmacy. The proportion of females working full-time increased 8.2 percentage points between 1990 and 2000. There also was a four-percentage point decrease between 1990 and 2000 in the proportion of females out of the pharmacy profession (retired (1.5 percentage points), working outside of pharmacy (1.2 percentage points) and not working (1.3 percentage points)).

Tables II and III contain a summary of demographic variables for actively practicing pharmacists and male and female actively practicing pharmacists, respectively, in the 1990 and 2000 survey samples and for national estimates from 1990 and 2000. The tables contain the proportion of pharmacists in each level of the variables in each year, 95 percent confidence intervals for estimates based on the survey samples, and changes in the proportion of pharmacists between 1990 and 2000. Overall there was an increase in the ethnic diversity of pharmacists and an increase in the proportion of pharmacists between 41 and 60 years of age. For females, there was an increase in the proportion of pharmacists between 41 and 50 years of age and for males there was an increase in the proportion of pharmacists between 41 and 60 years of age. In 2000, according to sample estimates, about 40 percent of males were older than age 50 compared to nine percent of females.

The most noticeable differences between the survey and national samples were that the survey samples underrepresented Asian pharmacists, non-married pharmacists and pharmacists between the ages of 21 and 30. There were a greater number of differences between sample and national estimates for female pharmacists. Despite these differences, the direction of 10-year trends in the percentage of pharmacists in each level of the characteristics using sample estimates was fairly consistent with the direction of trends using the national estimates.

**Table III. Sample and National estimates of actively practicing pharmacists by gender: 1990 and 2000**

Characteristics	1990 Sample	1990 National	2000 Sample	2000 National	1990 to 2000 % change in sample estimates	1990 to 2000 % change in National estimates
Males	n = 974	n = 115,627 <sup>a</sup>	n = 1,019	n = 109,785 <sup>a</sup>		
Race						
White	<b>94.3 (92.9-95.8)</b>	92.9	89.7 (87.8-91.6)	91.7	-4.6 <sup>b</sup>	-1.2
Asian	2.2 (1.2-3.1)	3.8	6.0 (4.5-7.4)	6.7	3.8	2.9
Other	<b>3.5 (2.3-4.7)</b>	3.3	4.3 (3.1-5.6)	1.7	0.8	-1.6
Marital Status						
Not married	14.7 (12.5-16.9)	25.3	19.8 (17.4-22.3)	25.9	5.1 <sup>c</sup>	0.6
Married	85.3 (83.1-87.5)	74.7	80.2 (77.7-82.6)	74.1	-5.1	-0.6
Age Group						
21-30	9.2 (7.4-11.1)	11.9	8.2 (6.5-9.9)	10.5	-1.0 <sup>d</sup>	-1.4
31-40	<b>32.0 (29.1-34.9)</b>	33.6	<b>20.6 (18.1-23.1)</b>	20.0	-11.4	-13.6
41-50	27.4 (24.6-30.2)	24.1	<b>31.1 (28.2-33.9)</b>	33.4	3.7	9.3
51-60	<b>16.9 (14.6-19.3)</b>	16.5	25.1 (22.4-27.8)	20.4	8.2	3.9
>60	<b>14.5 (12.2-16.7)</b>	13.9	<b>15.0 (12.8-17.2)</b>	15.8	0.5	1.9
Region						
West	14.2 (12.0-16.4)	19.9	<b>20.1 (17.7-22.6)</b>	22.1	5.9 <sup>e</sup>	2.2
South	<b>33.9 (30.9-36.9)</b>	36.9	33.3 (30.4-36.2)	28.4	-0.6	8.5
East	19.1 (16.6-21.6)	22.8	19.0 (16.6-21.5)	23.9	-0.1	1.1
Midwest	32.9 (29.9-35.8)	20.4	27.6 (24.8-30.3)	25.5	-5.3	5.1
Females	n = 443	n = 63,782 <sup>f</sup>	n = 826	n = 91,462 <sup>f</sup>		
Race						
White	91.4 (88.8-94.0)	83.7	84.4 (81.9-86.9)	73.6	-7.0 <sup>b</sup>	-10.1
Asian	4.3 (2.4-6.2)	11.5	9.3 (7.3-11.3)	20.5	5.0	9.0
Other	<b>4.3 (2.4-6.2)</b>	4.8	<b>6.3 (4.6-8.0)</b>	5.9	2.0	1.1
Marital Status						
Not married	25.7 (21.6-29.8)	33.9	29.2 (26.1-32.3)	35.9	3.5	2.0
Married	74.3 (70.2-78.4)	66.1	70.8 (67.7-73.9)	64.1	-3.5	-2.0
Age Group						
21-30	27.8 (23.8-32.2)	44.3	23.6 (20.7-26.5)	27.8	-4.2 <sup>d</sup>	-16.5
31-40	48.8 (44.5-53.9)	35.2	<b>39.4 (36.1-42.7)</b>	40.5	-9.4	5.3
41-50	14.4 (11.2-17.9)	8.7	27.6 (24.6-30.7)	18.8	13.2	10.1
51-60	<b>7.4 (5.0-10.0)</b>	9.2	7.3 (5.5-9.0)	10.8	-0.1	1.6
>60	0.6 (0.01-1.5)	2.7	<b>2.0 (1.1-3.0)</b>	2.1	1.4	-0.6
Region						
West	20.1 (16.3-23.8)	15.5	<b>19.7 (17.0-22.5)</b>	19.9	-0.4	4.4
South	33.0 (28.6-37.4)	32.4	<b>36.2 (32.9-39.5)</b>	39.3	3.2	6.9
East	<b>15.8 (12.4-19.2)</b>	14.2	<b>16.7 (14.2-19.3)</b>	16.8	0.9	2.6
Midwest	31.2 (26.8-35.5)	37.8	27.4 (24.3-30.4)	24.1	-3.8	-13.7

Note: Numbers are percentages. Numbers in parentheses are 95% confidence intervals for the sample percentages. The 1990 to 2000 changes are percentage point changes. The numbers in bold represent levels of variables where the sample confidence interval contains the national estimate.

<sup>a</sup>These are weighted numbers. The sample sizes used for the 1990 and 2000 national estimates were 209 and 154 male pharmacists, respectively. The national estimates for 1990 and 2000 are derived from pharmacists in the Current Population Survey's Outgoing Rotation Group for 1990 and 2000.

<sup>b</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 2 d.f.

<sup>c</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 1 d.f.

<sup>d</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 4 d.f.

<sup>e</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 3 d.f.

<sup>f</sup>These are weighted numbers. The sample sizes used for the 1990 and 2000 national estimates were 112 and 131 female pharmacists, respectively. The national estimates for 1990 and 2000 are derived from pharmacists in the Current Population Survey's Outgoing Rotation Group for 1990 and 2000.

Table IV contains a summary of education, family and work variables for all actively practicing pharmacists and for male and female pharmacists separately. Overall there was an increase in the proportion of pharmacists with a PharmD degree. There were increases in the proportion of females with

at least one child at home between the ages of 7 and 12 years and between the ages of 13 and 17 years. Additionally, there were increases in the proportion of female pharmacists actively practicing who had two and three or more children. In terms of position, 74 percent of females were in staff positions in

**Table IV. Education, family and work characteristics of actively practicing pharmacists**

	Percent all active pharmacists			Percent male			Percent female		
	1990 n = 1,417	2000 n = 1,845	1990 to 2000 % change	1990 n = 974	2000 n = 1,019	1990 to 2000 % change	1990 n = 443	2000 n = 826	1990 to 2000 % change
Highest Degree									
BS	85.9	73.8	-12.1 <sup>a</sup>	85.6	75.6	-10.0 <sup>a</sup>	86.5	71.5	-15.0 <sup>a</sup>
PharmD	3.7	14.8	+11.1	2.7	11.7	+9.0	4.1	18.6	+14.5
Other	10.4	11.4	+1.0	11.7	12.7	+1.0	9.4	9.9	+0.5
At Least One Child in Age Group									
0-6 yrs	24.1	21.9	-2.2	21.3	16.4	-4.9 <sup>b</sup>	30.2	28.7	-1.5
7-12 yrs	20.5	21.0	+0.5	21.8	20.2	-1.6	17.6	21.9	+4.3 <sup>b</sup>
13-17 yrs	14.4	16.8	+2.4 <sup>b</sup>	16.8	19.1	+2.3	9.0	13.9	+4.9 <sup>b</sup>
Number of Children									
0	25.7	28.7	+3.0 <sup>c</sup>	18.1	20.3	+2.2	42.0	39.1	-2.9 <sup>c</sup>
1	13.9	13.6	-0.3	12.1	12.0	-0.1	17.6	15.5	-1.9
2	33.7	34.6	+0.9	36.2	37.9	+1.7	27.5	30.6	+3.1
3 or more	26.7	23.1	-3.6	32.8	30.8	-2.0	12.6	14.8	+2.2
Setting									
Indep.	25.1	16.3	-8.84	28.5	20.4	-8.1 <sup>d</sup>	17.6	11.1	-6.5 <sup>d</sup>
Chain		23.5			24.5			22.3	
Mass. Merch.		6.6			6.3			7.0	
Super-market		9.0			8.8			9.2	
All Chain	33.0	39.1	+6.1	34.0	39.6	+5.6	30.9	38.5	+7.6
Hospital	24.6	24.1	-0.5	20.9	21.4	+0.5	32.5	27.4	-5.1
Other	10.7	13.9	+3.2	9.4	13.0	+3.6	14.0	15.1	+1.1
Practice									
Other	6.6	6.6	0.0	7.2	5.6	-1.6	5.0	7.9	+2.9
Position									
Owner or partner	12.7	7.0	-5.7 <sup>a</sup>	16.8	10.9	-5.91	3.6	2.3	-1.3
Manager or director	34.1	28.6	-5.5	37.6	33.1	-4.5	26.4	23.0	-3.4
Staff/Other	53.2	64.4	+11.2	45.6	56.0	+10.4	70.0	74.7	+4.7

Note: The 1990 to 2000 changes are percentage point changes. Independent settings represented pharmacies with fewer than four stores under common ownership. Chain represented both small (4-10 stores under common ownership) and large chain pharmacies (>10 stores under common ownership). Mass Merchandise included stores such as Target and Wal-Mart. Supermarkets included stores such as Kroger. Hospital pharmacies included both inpatient and outpatient pharmacy settings. Other Practice included clinic, HMO operated, mail service, nursing home/long term care, and home health/infusion. The category Other represents industry, academia and government.

Owners/partners were defined as pharmacists reporting any ownership of a site. Managers/Directors were pharmacists reporting being in a management position (manager/director, assistant manager/assistant director, supervisor). Staff/Other pharmacists included employee pharmacists, residents and pharmacists in oil other practice settings who listed various positions.

<sup>a</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 2 d.f.

<sup>b</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 1 d.f.

<sup>c</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 3 d.f.

<sup>d</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 4 d.f.

2000 compared to 56 percent of males. Between 1990 and 2000 the proportion of pharmacists in management positions who were females increased from 24.2 to 36.2 percent.

Table V contains the proportion of active pharmacists who work part-time. The table shows the likelihood of working part-time at each level of the independent variables. For all pharmacists the likelihood of part-time work was greatest for pharmacists who were married and the likelihood of part-time work for pharmacists who were not married decreased between 1990 and 2000. In terms of age, the likelihood of part-time work in both 1990 and 2000 was greatest for pharmacists greater than age 60. Between 1990 and 2000 the likelihood of working part-time among pharmacists between the ages of 31 and 50 increased significantly. The presence of a child less than age seven at home resulted in the greatest likelihood to work part-time both in 1990 and 2000. Also the likelihood of a pharmacist working part-time increased significantly between 1990 and 2000 when a child was present at home in any of the three age groups in Table III. The likelihood of a pharmacist working

part-time increased between 1990 and 2000 when pharmacists had three or more children.

For males, part-time work was most likely after age 60 both in 1990 and 2000. However, the likelihood of working part-time increased significantly between 1990 and 2000 for males between the ages of 31 to 40 and 51 to 60. The likelihood of part-time work for males increased between 1990 and 2000 for each age group of children at home and increased when males had three or more children. The rate of part-time work increased for pharmacists in independent settings and owners/partners.

For females, the likelihood of part-time work was greatest for married pharmacists in both 1990 and 2000 but the likelihood of part-time work decreased between 1990 and 2000 for both married and non-married females. The likelihood that female between age 21 to 60 works part-time is greater compared to males. However, the likelihood of working part-time decreased significantly between 1990 and 2000 for females between the ages of 21 to 30, 41 to 50, and 51 to 60. Also, the

**Table. V. Percent of active pharmacists working part-time**

	All pharmacists			Males			Females		
	1990 n = 1,417	2000 n = 2,092	1990 to 2000 % change	1990 n = 974	2000 n = 1,019	1990 to 2000 % change	1990 n = 443	2000 n = 826	1990 to 2000 % change
Total	16.0	16.9	+0.9	10.0	11.6	+1.6	29.3	23.3	-6.0a <sup>a</sup>
Marital Status									
Not married	10.5	9.0	-1.5	9.1	10.4	+1.3	12.3	7.9	-4.4 <sup>a</sup>
Married	17.2	19.3	+2.9 <sup>a</sup>	0.1	11.9	+1.8	35.2	29.7	-5.5 <sup>a</sup>
Highest Degree									
BS	17.0	18.9	+ 1.9	10.2	12.7	+2.5 <sup>a</sup>	31.9	26.9	-5.0 <sup>a</sup>
PharmD	15.4	11.0	-4.4 <sup>a</sup>	10.3	5.9	-4.4	21.7	14.9	-6.8 <sup>a</sup>
Other	11.5	11.3	-0.2	8.2	11.5	+3.3	14.6	13.4	-1.2
Age Range									
21-30	12.2	5.7	-6.5 <sup>a</sup>	2.2	3.6	+0.4	19.5	6.7	-12.8 <sup>a</sup>
31-40	14.4	19.8	+5.4 <sup>a</sup>	1.6	5.2	+3.6 <sup>a</sup>	32.9	30.2	-2.7
41-50	8.8	12.9	+4.1 <sup>a</sup>	3.4	4.1	+0.7	31.3	25.0	-6.3 <sup>a</sup>
51-60	10.1	11.7	+ 1.6	5.5	8.2	+2.7 <sup>a</sup>	33.3	26.2	-7.1
>60	51.4	48.2	-3.2	48.2	47.1	-1.1	57.1	52.9	-4.2
At Least One Child in Age Group									
0-6 yrs	20.8	25.7	+4.9 <sup>a</sup>	1.0	4.8	+3.8 <sup>a</sup>	51.5	40.5	-11.0 <sup>''</sup>
7-12 yrs	14.1	19.1	+5.0 <sup>a</sup>	1.0	2.9	+ 1.9 <sup>a</sup>	50.0	37.6	-12.4 <sup>a</sup>
13-17 yrs	9.3	14.5	+5.2 <sup>a</sup>	1.2	3.6	+2.4 <sup>a</sup>	42.5	33.0	-9.5 <sup>''</sup>
Number of Children									
0	9.4	6.1	-3.3 <sup>a</sup>	8.5	7.4	-1.1	10.2	5.3	-4.9 <sup>a</sup>
1	18.4	21.4	+3.0	7.6	10.7	+3.1	34.6	31.3	-3.3
2	18.9	18.4	-0.5	8.2	9.2	+ 1.0	50.0	32.1	-17.9 <sup>a</sup>
3 or more	17.4	25.4	+8.0 <sup>a</sup>	13.4	17.1	+3.7 <sup>a</sup>	41.1	44.3	+3.2
Region									
West	20.2	19.0	-1.2	11.6	17.1	+5.5 <sup>*</sup>	37.1	21.7	-15.4 <sup>a</sup>
Midwest	13.8	17.8	+4.0 <sup>a</sup>	8.4	8.9	+0.5	26.1	28.8	+2.7
South	14.5	14.3	-0.2	10.3	11.5	+ 1.2	24.0	17.4	-6.6 <sup>a</sup>
Northeast	19.3	18.2	-1.1	10.8	9.8	-1.0	37.1	28.2	-8.9 <sup>a</sup>
Setting									
Indep.	28.1	32.0	+3.9	20.5	27.4	+6.9 <sup>a</sup>	55.0	42.4	-12.6
Chain		11.5			8.4			15.8	
Mass. Merch.		13.1			6.3			20.7	
Super-market		13.9			8.9			19.7	
All Chain	12.4	12.3	-0.1	6.3	8.2	+ 1.9	27.0	17.6	-9.4 <sup>a</sup>
Hospital	13.5	14.2	+0.7	5.4	7.8	+2.4	25.0	20.4	-4.6 <sup>a</sup>
Other Practice	11.3	19.1	+7.8 <sup>a</sup>	5.6	6.8	+ 1.2	19.4	32.0	+ 12.6 <sup>a</sup>
Other	5.3	15.4	+ 10.1 <sup>a</sup>	4.3	3.6	-0.7	10.0	23.8	+ 13.8 <sup>a</sup>
Position									
Owner or partner	4.4	10.8	+6.4 <sup>a</sup>	3.0	9.9	+6.9 <sup>a</sup>	18.8	15.8	-3.0
Manager or director	6.8	3.0	-3.8 <sup>a</sup>	6.3	2.7	-3.6 <sup>a</sup>	8.5	3.7	-4.8 <sup>a</sup>
Staff/Other	24.7	23.7	-1.0	15.5	17.2	+ 1.7	37.7	29.7	-8.0 <sup>a</sup>

Note: The 1990 to 2000 changes are percentage point changes. The numbers represent the percent of pharmacists in each level of the variables that work part-time. For example, in 1990 10.5% of all non-married actively practicing pharmacists worked part-time.

Independent settings represented pharmacies with fewer than four stores under common ownership. Chain represented both small (4-10 stores under common ownership) and large chain pharmacies (>10 stores under common ownership). Mass Merchandisers included stores such as Target and Wal-Mart. Supermarkets included stores such as Kroger. Hospital pharmacies included both inpatient and outpatient pharmacy settings. Other Practice included clinic, HMO operated, mail service, nursing home/long term care, and home health/infusion. The category Other represents industry, academia and government.

Owners/partners were defined as pharmacists reporting any ownership of a site. Managers/Directors were pharmacists reporting being in a management position (manager/director, assistant manager/assistant director, supervisor). Staff/Other pharmacists included employee pharmacists, residents and pharmacists in other practice settings who listed various positions.

<sup>a</sup>Chi-squared test between data for 1990 and 2000,  $P < 0.05$ , 1 d.f.

**Table VI. Full-time equivalent of active pharmacists by gender and years experience**

	All pharmacists			Males			Females		
	1990 n = 1,417	n = 1,845	Percent change from 1990	1990 n = 974	2000 n = 1,019	Percent change from 1990	1990 n = 443	2000 n = 826	Percent change from 1990
Total	0.99	1.00	+1.0	1.04	1.05	+1.0	0.89	0.94	+5.6
Years of Experience									
0-5	1.02	1.04	+2.0	1.07	1.08	+0.9	0.99	1.03	+4.0 <sup>a</sup>
6-10	1.01	1.00	-1.0	1.12	1.13	+0.9	0.89	0.94	+5.6 <sup>a</sup>
11-15	1.03	0.96	-6.8 <sup>a</sup>	1.11	1.09	-1.8	0.88	0.86	-2.3
16-20	1.03	1.03	-1.9	1.10	1.11	+0.9	0.80	0.91	+13.8 <sup>a</sup>
21-25	1.04	1.04	0.0	1.07	1.09	+1.9	0.85	0.93	+9.4 <sup>a</sup>
26-30	0.98	1.09	+11.2 <sup>a</sup>	1.03	1.11	+7.8 <sup>a</sup>	0.75	0.99	+32.0 <sup>a</sup>
31-35	0.97	1.05	+8.2 <sup>a</sup>	0.99	1.08	+9.1 <sup>a</sup>	0.82	0.90	+14.6
>35	0.75	0.81	+8.0	0.76	0.82	+7.9	0.60	0.71	+18.3

Note: Full-time Equivalent (FTE) is defined as a pharmacist working 40 hours per week. The figures in the table represent FTE values based on primary pharmacy employment only. Percent change from 1990 was defined as the difference in FTE values between 1990 and 2000 divided by the 1990 FTE amount.

<sup>a</sup>One-sample *t*-test, mean FTE in 2000 equal to mean FTE in 1990, *P* < 0.05.

likelihood of working part-time decreased significantly between 1990 and 2000 when at least one child in any of the age groups was present at home. Also, the likelihood of working part-time decreased significantly when no children or two children were present. There was a significant decrease in the likelihood of part-time work in all chain and hospital settings and a significant increase in the likelihood of part-time work in other practice and other settings between 1990 and 2000.

Table VI contains the full-time equivalent (FTE) for all actively practicing pharmacists and by gender and years of experience. The figures in the table are based on self-reported weekly hours worked at primary pharmacy settings with a full-time person working 40 hours per week. Overall between 1990 and 2000 there was a one percent increase in pharmacist FTEs. The male FTE increased by *one* percent and the female FTE increased by 5.6 percent. By years of experience, the largest increase in FTE between 1990 and 2000 occurred for pharmacists with 26 to 30 years of experience (+11.8 percent) and the largest decrease in FTE occurred for pharmacists with 11 to 15 years of experience (-6.8 percent). For both males and females, FTEs increased between 1990 and 2000 for each year of experience category except 11 to 15 years.

A total of 12.3 percent of all actively practicing pharmacists working full-time in 2000 had secondary employment as a pharmacist (Table VII). This proportion was significantly lower than in 1990 (23.5 percent). The difference between 1990 and 2000 for all pharmacists was significant for almost every variable contained in Table VII. The proportion of males and females having secondary employment decreased 10.8 and 10.3 percentage points, respectively, between 1990 and 2000.

## DISCUSSION

Overall, the proportion of licensed pharmacists actively practicing pharmacy increased between 1990 and 2000. Although there was no change in the proportion working full-time, the proportion working part-time increased. Thus, the increase in the rate of part-time work did not appear to result from a reduction in the rate of pharmacists working full-time. Additionally, the proportion of pharmacists leaving the pharmacy profession and working elsewhere decreased between 1990 and 2000. Despite reports of job stress and job dissatisfaction, it appears the proportion of pharmacists working in the pharmacy profession has increased(24).

One explanation for the increase in pharmacists actively practicing pharmacy is the excess demand for pharmacists. When demand for pharmacists is high, employers search for scarce labor resources (pharmacists) and attempt to attract pharmacists to work settings by increasing wage rates(1). Hourly wage rates for pharmacists increased 59.4 percent between 1990 and 2000(25,26). Our results suggest pharmacists have responded to the excess demand for their services.

The growth in the proportion of females actively practicing pharmacy has contributed to the growth in the proportion of licensed pharmacists actively practicing pharmacy between 1990 and 2000. Our results show there was an increase in the proportion of females working full-time and a decrease in the proportion working part-time between 1990 and 2000. This is an important finding in light of the 12.1 percentage point growth in the proportion of licensed pharmacists that are female and projections that a majority of licensed pharmacists will be female by 2003(12). It appears the influx of women into pharmacy has not reduced the proportion of pharmacists actively practicing.

Our results also suggest that the rate of females working part-time in certain age groups decreased between 1990 and 2000. One implication of this finding is that females may be re-entering the workforce in a full-time capacity after childbirth and child rearing responsibilities. This is consistent with our finding that the FTE value for females with more years of experience increased between 1990 and 2000. An increase in the amount of work supplied (*i.e.*, more hours) by part-time workers (*i.e.*, switching from part-time to full-time work) is significant for the pharmacist workforce. Given the large proportion of females that work part-time, the finding that females may be returning to full-time work suggests a significant source of additional hours that can be supplied to the workforce.

Our results provide some insight as to why females were actively practicing at a higher rate in 2000 relative to 1990. Labor economic theory hypothesizes that the rate of part-time work is positively associated with life-cycle events such as childbirth and child rearing(1). Our results suggest that the rate of part-time work decreased between 1990 and 2000 when at least one child was present at home for each age group of children at home. Also, the rate of part-time work decreased for females who had one or two children. One explanation for this



**Table VII. Percent of pharmacists working full-time and having secondary employment**

	All pharmacists			Male			Female		
	1990 n = 1,190	2000 n = 1,534	1990 to 2000 % change	1990 n = 877	2000 n = 401	1990 to 2000 % change	1990 n = 313	2000 n = 633	1990 to 2000 % change
Total	23.5	12.3	-11.2 <sup>a</sup>	24.6	13.8	-10.8 <sup>a</sup>	20.4	10.1	-10.3 <sup>a</sup>
Marital Status									
Not married	25.1	13.4	-11.7 <sup>a</sup>	21.5	11.6	-9.9 <sup>a</sup>	24.5	14.9	-9.6 <sup>a</sup>
Married	23.1	11.8	-11.3 <sup>a</sup>	24.5	14.3	-10.2 <sup>a</sup>	18.3	7.5	-10.8 <sup>a</sup>
Highest Degree									
BS	22.7	11.0	-11.7 <sup>a</sup>	23.1	12.6	-10.5 <sup>a</sup>	21.5	8.3	-13.2 <sup>a</sup>
PharmD	20.5	17.3	-3.2	26.9	19.6	-7.3	11.1	15.3	+4.2
Other	32.1	13.3	-18.8 <sup>a</sup>	36.6	14.8	-21.8 <sup>a</sup>	2.9	11.8	+8.9 <sup>a</sup>
Years of Experience									
0-5	25.3	12.3	-13.0 <sup>a</sup>	35.2	14.1	-21.1 <sup>a</sup>	16.0	11.6	-4.4
6-15	25.8	12.7	-13.1 <sup>a</sup>	28.3	14.7	-13.6 <sup>a</sup>	20.8	11.1	-9.7 <sup>a</sup>
16-25	25.8	13.4	-12.4 <sup>a</sup>	25.3	17.0	-8.3 <sup>a</sup>	29.4	6.7	-22.7 <sup>a</sup>
26-35	17.1	11.3	-5.8	16.0	10.1	-5.9	26.3	17.1	-9.2
>35	13.6	12.8	-0.8	13.2	14.1	+0.9	20.0	0.0	-20.0
Region									
West	27.7	16.9	-10.8 <sup>a</sup>	27.9	20.0	-7.9 <sup>a</sup>	27.3	12.0	-15.4 <sup>a</sup>
Midwest	23.0	12.7	-10.3 <sup>a</sup>	23.9	13.7	-10.2 <sup>a</sup>	20.6	11.2	-9.4 <sup>a</sup>
South	24.8	11.3	-13.5 <sup>a</sup>	28.4	12.7	-15.7 <sup>a</sup>	15.3	9.7	-6.6 <sup>a</sup>
Northeast	18.9	8.9	-10.0 <sup>a</sup>	16.9	9.7	-7.2 <sup>a</sup>	25.0	7.7	-17.3 <sup>a</sup>
Setting									
Indep.	16.8	8.3	-8.5 <sup>a</sup>	17.2	6.0	-11.2 <sup>a</sup>	14.3	15.1	+0.8
Chain		4.7			4.8			4.5	
Mass. Merch.		9.4			15.0			2.2	
Super-market		8.4			8.5			8.2	
All Chain	19.0	6.3	-12.7 <sup>a</sup>	20.0	7.3	-12.7 <sup>a</sup>	16.0	5.0	-11.0 <sup>a</sup>
Hospita	33.2	20.5	-12.7 <sup>a</sup>	37.8	26.4	-11.4 <sup>a</sup>	25.0	13.9	-11.1
Other practice	25.4	18.8	-6.6 <sup>a</sup>	26.2	22.0	-4.2	24.0	14.1	-9.9 <sup>a</sup>
Other	28.2	13.0	-15.2 <sup>a</sup>	30.4	14.5	-15.9 <sup>a</sup>	20.0	11.3	-8.7 <sup>a</sup>
Position									
Owner or partner	14.0	6.9	-7.1 <sup>a</sup>	13.8	5.0	-8.8 <sup>a</sup>	15.4	18.8	+3.4
Manager or director	19.3	12.3	-7.0 <sup>a</sup>	21.3	14.6	-6.7 <sup>a</sup>	13.1	8.2	-4.9
Staff/Other	29.8	12.9	-16.9 <sup>a</sup>	32.3	15.0	-17.3 <sup>a</sup>	24.9	10.6	-14.3 <sup>a</sup>

Note: The numbers represent the percent of pharmacists in each level of the variables that had secondary pharmacy employment. For example, in 1990 22.9% of all single full-time practicing pharmacists had secondary pharmacy employment.

Independent settings represented pharmacies with fewer than four stores under common ownership. Chain represented both small (4-10 stores under common ownership) and large chain pharmacies (>10 stores under common ownership). Mass Merchandisers included stores such as Target and Wal-Mart. Supermarkets included stores such as Kroger. Hospital pharmacies included both inpatient and outpatient pharmacy settings. Other Practice included clinic, HMO operated, mail service, nursing home/long term care, and home health/infusion. The category Other represents industry, academia and government.

Owners/partners were defined as pharmacists reporting any ownership of a site. Managers/Directors were pharmacists reporting being in a management position (manager/director, assistant manager/assistant director, supervisor). Staff/Other pharmacists included employee pharmacists, residents and pharmacists in other practice settings who listed various positions.

<sup>a</sup>Chi-squared test between data for 1990 and 2000, P < 0.05, 1 d.f.

result is that the net monetary benefit of working and placing children in day care may have changed. The growth in pharmacist pay may have resulted in a wage rate that produces a net benefit, at least monetarily, for females to work and pay for day care services. Another explanation is that wage rates for female pharmacists have grown to a point where it is more beneficial, from a financial standpoint, for a family to have the female work full-time and the male work part-time. Gender role reversal may be more common in families where one spouse is a pharmacist. Other issues such as the increased divorce rate and the increase in single parent families nationally also may

account for the increase in females actively practicing pharmacy. These are important issues that future research could address.

In addition to economic reasons, another explanation for this effect may be the increased prevalence of females in the pharmacist workforce. It may be more appealing for females to enter the workforce in a full-time capacity when they are working in a setting where females constitute a majority of practicing pharmacists(24). An additional explanation may be related to the increased proportion of management positions that were occupied by women between 1990 and 2000. Does the opportunity

for a management position influence whether women pharmacists return to the workforce? Have opportunities for management positions for women increased between 1990 and 2000? Are the management styles of females more attractive to female pharmacists, increasing the hours worked by females? Future research is needed to examine factors that influence females' decisions to re-enter the workforce and/or change from part-time to full-time capacity.

Although our results show a decrease in the rate of part-time work for female pharmacists between 1990 and 2000 it is important to note the size of the rates of part-time work for females for certain variables in 2000. For example, over one-quarter of females in the age groups 31 to 40, 41 to 50, and 51 to 60 worked part-time in 2000. The highest rate for males across these age groups was 8.2 percent. Rates of part-time work also were large for the age of children at home and number of children variables. As the rates of part-time work demonstrate, each one of the age groups of children at home impact the amount of work female pharmacists provide to the workforce. It is important to consider the size of these rates as new pharmacy schools graduate pharmacists and new schools are built. A majority of the new, additional supply of pharmacists will be young females who likely will have families during their pharmacy careers. Since we do not have a clear idea of how long the excess demand for pharmacists will continue, it is important that workforce planners account for reductions in the effective supply of pharmacists due to life-cycle events and begin to research why pharmacists either do or do not reduce work while experiencing these events.

Workforce trends for male pharmacists are different from female pharmacists. Between 1990 and 2000 the proportion of male pharmacists working part-time increased as did the proportion retiring. These trends are consistent with the aging of the male pharmacist population. Since a majority of pharmacy graduates have been female since 1985, a relatively smaller number of young males have entered the pharmacy workforce. Our results show an increasing trend of part-time work for males between the ages of 51 to 60. This is significant due to the large proportion of males actively practicing who are approaching this age range. Also, if part-time work is a precursor to retirement, this trend may signal a trend toward early retirement and exit from the workforce for male pharmacists.

An additional source of work provided to the labor market is secondary employment. The rate of pharmacists working full-time and having secondary employment decreased even though the rate of licensed pharmacists actively practicing increased between 1990 and 2000. Past research reported the number of additional hours supplied by pharmacists in secondary employment was 9.5 hours per week in 1995 and 8 hours per week in 1999(19,27). Pharmacists worked an average of 35.1 weeks per year in secondary employment in 1999(19). One explanation for the reduction in the rate of secondary employment by pharmacists is that opportunities for secondary employment have decreased. In 1990, the most common practice setting for secondary employment was independent pharmacies(14). Between 1990 and 1998 the number of independent pharmacies in the United States decreased from 31,879 to 20,641(4). Another explanation is that the increased wages and increased stress in primary employment have reduced the need and desire to work in a secondary setting. More research, however, is needed regarding this topic.

## Limitations

Data from 1990 and 2000 are sample data. Thus, the generalizability of the results is limited. We compared the sample estimates from 1990 and 2000 with population estimates for several characteristics of all actively practicing pharmacists and for male and female actively practicing pharmacists. Although there were differences between the sample and population estimates, it is important to consider whether the differences biased the conclusions of this study. For example, the samples from 1990 and 2000 appeared to under-represent pharmacists under the age of 30. The likelihood of part-time work for pharmacists under age 30 is much less than that for older pharmacists. Thus, our results likely underestimate the proportion of pharmacists working full-time and overestimate the proportion of pharmacists working part-time.

## CONCLUSION

The purpose of this study was to examine trends in work variables for licensed pharmacists in the United States between 1990 and 2000. The most significant finding was an increase in the proportion of female pharmacists who were actively practicing pharmacy. Coupled with this trend is an increase in the proportion of females working full-time. Examination of pharmacist characteristics suggests an increase in the proportion of females switching from part-time to full-time work. These are significant findings due to the growth in the proportion of licensed pharmacists that are females. Our results are useful for workforce planners in estimating how pharmacist characteristics influence the amount of work supplied by pharmacists. Future research could examine how characteristics of pharmacists and work environments are associated with decisions to work and the number of hours worked using a multivariate approach(17).

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