

A National Survey of U.S. Pharmacists in 2000: Assessing Nonresponse Bias of a Survey Methodology

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ABSTRACT The first objective of this study was to assess the existence of nonresponse bias to a national survey of licensed pharmacists conducted in 2000. Three methods were used to assess nonresponse bias. The second objective of the study was to examine reasons why sampled licensed pharmacists did not respond to the national survey of licensed pharmacists. We used data from 2204 respondents to a national survey of pharmacists and from 521 respondents to a survey of nonrespondents to the national survey. We made comparisons between respondents for 5 variables: employment status, gender, age, highest academic degree, and year of initial licensure. Chi-square tests were used to examine differences in the 5 variables between respondents to the first mailing and second mailing of the survey, early and late respondents to the survey, and respondents to the survey and respondents to the nonrespondent survey. There were no significant differences between first mailing and second mailing respondents, but there were differences in each variable except year of licensure between early and late respondents. These differences likely were due to regional bias possibly related to differences in mailing times. There were differences between respondents and nonrespondents in terms of employment status and year of licensure. The main reasons for not responding to the survey were that it was too long or that it was too intrusive. Overall, the survey methodology resulted in a valid sample of licensed pharmacists. Nonresponse bias should be assessed by surveying nonrespondents. Future surveys of pharmacists should consider the length of the survey and the address where it is sent.

Keywords: Pharmacy Workforce, Survey Methods, Nonresponse Bias.

INTRODUCTION

Pharmaceutical scientists researching social and administrative aspects of pharmacy often use primary and/or secondary data to answer research questions. Primary data typically are collected via a survey of sampled research subjects. One concern when using survey methodology is that a low response rate may jeopardize the generalizability of the data collected from subjects¹. Thus, assessing nonresponse bias (the bias in the data caused by a lack of response to surveys) is an important component of survey methodology.

One topic of research within social and administrative pharmacy that uses survey methodology is the pharmacist workforce. This is an important area of research as evidenced by the recent focus on whether the supply of pharmacists is adequate to meet the demand². Examining the characteristics of licensed pharmacists, such as whether they are working, the amount they are working, and their age and gender provide a more complete assessment of how the number of pharmacists is meeting the demand for pharmacist-provided services. Given the need for information about pharmacists, there is surprisingly little information available about the pharmacist workforce. The most recent assessment of a limited set of characteristics of all licensed pharmacists in the United States was performed in 1991³.

A problem for researchers attempting to survey licensed pharmacists to obtain personal variables and

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work-related variables is that some licensed pharmacists may not respond to surveys because they believe the surveys do not apply to them based on their current employment status. For example, licensed pharmacists may not be working as pharmacists (eg, change of careers), may be retired from practice, or may not be working at all (eg, staying home with children). Also, certain pharmacists may be busier than others and not have the time to respond. For example, pharmacists between the ages of 30 and 40 may be in a management position with many additional responsibilities for the first time or may be balancing work and family issues. If a researcher is interested in documenting the work status of licensed pharmacists to determine, for example, the proportion of all licensed pharmacists that are working as pharmacists, the possibility of disproportionately more nonresponse from certain types of pharmacists is a concern. Thus, response to surveys may be based on a nonrandom event (employment status) that would bias the representativeness of results obtained from a sample of survey respondents¹. The purpose of this study is to examine nonresponse bias in a national mailed survey of licensed pharmacists.

Assessing Nonresponse Bias

One approach to measuring the degree of bias in a sample of survey respondents is to compare their characteristics with known population parameters⁴. Sampling weights can then be calculated to adjust for disproportionate responses. A concern with this approach, however, is at what time period the population parameters were collected. Changes in the characteristics of a population over time may render useless population parameters collected in a different time period. Another concern is how the population parameters were collected⁵. Known values may come from a different source instrument, resulting in different definitions of variables or different values being reported. Regardless, this approach is not possible when conducting a national survey of pharmacists. No data source exists that contains work status or demographic variables for licensed pharmacists in the United States.

A second approach is to compare the characteristics of respondents to a survey with those of nonrespondents to the survey⁶. Using this method, nonrespondents to a survey are identified, and a sample of those nonrespondents receives a survey asking questions

about their characteristics. Comparisons between respondents to the survey and respondents to the nonrespondent survey can then be made to determine the similarities and differences between respondents and nonrespondents.

An additional benefit of a survey of nonrespondents is that it provides an opportunity to inquire why the nonrespondents did not respond to the main survey. Researchers can determine, for example, if surveys ever arrived to sampled persons, whether responses were lost in the mail, the interest level of sampled persons, and whether the survey form was too intrusive or required too much time to complete. Assessing reasons for nonresponse may be particularly useful when a survey is long and covers myriad issues.

Another approach to assessing nonresponse bias involves extrapolating the characteristics of nonrespondents based on characteristics of respondents to the original survey^{7,8}. Extrapolation is useful when a survey of nonrespondents cannot be conducted and is based on the assumption that subjects who respond less readily are more like nonrespondents. The phrase "less readily" has been defined as answering after more prodding to answer or as answering later.

A common method of extrapolation is comparing characteristics of respondents who answer successive waves of a survey⁸. A wave refers to the response following a stimulus and could refer to a second mailing of the survey. Subjects who respond in later waves are assumed to have responded because of the additional stimulus and are expected to be similar to nonrespondents. An additional method of extrapolation is time trends⁷. Persons responding later are assumed to be more similar to nonrespondents. This method has advantages over the use of waves because the bias caused by a stimulus itself can be eliminated. Both methods may be disadvantageous if the passage of time is not associated with characteristics of the population.

The first objective of this study was to assess the existence of nonresponse bias to a national survey of licensed pharmacists conducted in 2000. Three methods were used to assess nonresponse bias. The first method compared characteristics of respondents who answered successive waves of the survey. The second method employed the time trend technique

and compared characteristics of early and late respondents. The third method compared characteristics of respondents to the national survey with respondents to a follow-up survey of nonrespondents to the national survey. We also compared late respondents and respondents to the second mailing with respondents to the follow-up survey of nonrespondents to the national survey to examine the validity of the assumptions surrounding extrapolation techniques. The second objective of the study was to examine reasons why sampled licensed pharmacists did not respond to the national survey of licensed pharmacists.

MATERIALS AND METHODS

Methods

In this section we describe the sources of data used for assessing nonresponse bias to the national survey. Because we obtained information about pharmacists from 2 different surveys, we describe the sampling employed, the instruments used, the timing of survey mailings, and the response rates to each survey. Next, we discuss the characteristics of pharmacists and the data analysis procedures used to assess nonresponse bias to the national survey.

Data

2000 National Survey

A cross-sectional descriptive survey design was used to collect and analyze data. A systematic sample of 5000 pharmacists was obtained from a list of 216 982 pharmacists in the contiguous 48 states maintained by KM Lists, Inc, a national medical marketing data warehouse. The file maintained by KM Lists consists of unduplicated names of licensed individuals and is updated whenever a state board of pharmacy provides an updated file. No states refuse to provide KM Lists information. The file contains only names and addresses of the pharmacists.

An 11-page questionnaire was developed and consisted of 8 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 background⁹. Questions that made up each section were taken from previously conducted workforce surveys¹⁰⁻¹⁸.

Each sampled licensed pharmacist was sent an announcement letter in April 2000 and 1 week later was sent a survey packet containing a cover letter describing the survey and asking for participation, the survey instrument, and a postage-paid return envelope. A follow-up reminder postcard was sent 1 week after the survey packet was sent. Three weeks after the first packet mailing, a second survey packet was sent to nonresponding individuals, followed by a reminder postcard 1 week later.

Of the 5000 mailed surveys, 105 were returned as undeliverable. The overall response rate was 46.0% (2250/4895). Forty-six respondents (2.0%) were deleted due to deceased subjects (n = 14), refusal to participate (n = 12), nonpharmacist respondent (n = 3), or failure to report general employment status (n = 17). The net usable response rate was 45.0% (2204/4895).

2000 National Survey Nonrespondent Follow-Up

To survey the nonrespondents to the national survey, we developed a 1-page questionnaire consisting of 7 questions: primary reason for not responding to main survey, age, gender, degrees earned, year of first licensure, current employment status, and primary employment setting. Each sampled pharmacist in the national mailing was assigned a unique identification number that was inscribed on the survey form. We identified nonrespondents to the national survey using this identification number. Each nonrespondent to the main survey was mailed a survey packet containing a cover letter describing the survey and asking for participation, the survey instrument, and a postage-paid return envelope. No follow-up postcard was sent, and no additional contacts with the nonrespondents were attempted. Of the 2633 nonrespondent surveys mailed in September 2000, 537 were returned for a response rate of 20.4%. A total of 16 respondents to the nonrespondent survey did not provide any information concerning their general employment status. Thus, the usable response rate was 19.8% (521/2633).

Variables

A group of 5 variables, collected consistently in each of the surveys, was used for analysis. Demographic characteristics of pharmacists included gender, age, highest degree earned, and year first licensed as a pharmacist. The surveys also contained a question asking licensed pharmacists to report their general

employment status as working as a pharmacist; not working as a pharmacist but working in a pharmacy-related field or position; working in a non-pharmacy-related career; semiretired; retired; not employed, seeking employment; or not employed, not seeking employment.

Data Analysis

We assessed nonresponse bias using 3 methods. With the first method, we compared characteristics of respondents to the first mailing of the 2000 National Survey with characteristics of respondents to the second mailing of the 2000 National Survey. Responses received at least 3 days after mailing the second survey packet were classified as responding to the second mailing. We determined the number and proportion of respondents for each level of the demographic and work variables collected and tested for independence of the distributions of each variable between the first and second mailings.

With the second method, we compared early respondents to the 2000 National Survey with late respondents to the 2000 National Survey. Early and late respondents came from the group of subjects responding on or before May 5, 2000 (the date the second wave of surveys was mailed). We defined early respondents as subjects who were among the first quintile of these respondents. We defined late respondents as subjects who were among the last quintile of these respondents. We determined the number and proportion of respondents for each level of the demographic and work variables collected and tested for independence of the distributions of each variable between the early and late respondents.

With the third method to assess nonresponse bias, we compared characteristics of respondents to the 2000 National Survey with respondents to the 2000 National Survey Nonrespondent Follow-Up. We determined the number and proportion of respondents for each level of the demographic and work variables collected and tested for independence of the distributions of each variable between the 2000 National Survey and the 2000 National Survey Nonrespondent Follow-Up.

To examine the assumptions surrounding the extrapolation techniques, we compared characteristics of late respondents to the 2000 National Survey and characteristics of respondents to the second mailing of the 2000 National Survey with characteristics of

respondents to the 2000 National Survey Nonrespondent Follow-Up. We followed the same procedures outlined for the other comparisons. The chi-square test was used for all statistical tests, and significance was assessed at the 0.05 level.

The 2000 National Survey Nonrespondent Follow-Up contained questions pertaining to why subjects did not respond to the 2000 National Survey. We determined the number and proportion of pharmacists reporting each of 6 reasons: do not recall ever receiving such a survey, I believe I have returned it to you, did not have enough time to participate in this survey, was not interested in the topic, survey was too intrusive, and survey not applicable to me.

RESULTS

Table 1 shows the characteristics of respondents to the first and second mailings of the 2000 National Survey. Of all respondents to the survey, 73.7% responded to the first mailing. Overall, there were no statistically significant differences in the characteristics of respondents to the first mailing and respondents to the second mailing of the survey. Taken together, the respondents to the first and second mailings represent characteristics of the total sample of respondents to the main survey. Over three fourths of the respondents to the main survey reported working as a pharmacist. Exactly 12% of respondents were not working in pharmacy (6.4% were retired, 2.9% were working in a non-pharmacy-related career, and 2.7% were not employed). The largest proportion of respondents was between the ages of 41 and 50 (27.0%).

Table 2 presents a summary of the characteristics of respondents to the 2000 National Survey categorized as early and late respondents to the first mailing. A total of 1093 subjects (48.6% of all respondents) responded to the 2000 National Survey on or before the date of the second mailing (May 5, 2000) and were classified as early respondents. There were significant differences between early and late respondents for each variable except year of licensure. Early respondents were more likely to be semiretired and younger than 30 years of age. Conversely, late respondents were more likely to be retired, between 31 and 40 years of age, and to have earned a PharmD degree as their highest degree relative to early respondents.

Table 1. Summary and Comparison of Characteristics of Respondents to the First Mailing and Respondents to the Second Mailing of the National Survey

	First Mailing n (%)		Second Mailing n (%)
Employment Status			
Working as a pharmacist	1251 (77.0)		441 (76.0)
Not working as a pharmacist; working in a pharmacy-related field or position	96 (5.9)		31 (5.3)
Working in a non-pharmacy-related career	43 (2.6)		22 (3.8)
Semiretired	96 (5.9)		24 (4.1)
Retired, do not practice pharmacy at all	97 (6.0)		44 (7.6)
Not employed, seeking employment	9 (0.6)		6 (1.0)
Not employed, not seeking employment	32 (2.0)	<i>P</i> > 0.05	12 (2.1)
Gender			
Male	905 (56.0)		340 (59.7)
Female	711 (44.0)	<i>P</i> > 0.05	230 (40.3)
Age Category			
23-30	223 (13.9)		68 (12.0)
31-40	437 (27.1)		153 (27.0)
41-50	438 (27.2)		157 (27.7)
51-60	264 (16.4)		111 (19.6)
61-70	165 (10.2)		49 (8.6)
>70	83 (5.2)	<i>P</i> > 0.05	29 (5.1)
Highest Degree			
BS Pharm	1276 (78.9)		452 (79.2)
PharmD	221 (13.7)		76 (13.3)
MS, MBA, PhD	120 (7.4)	<i>P</i> > 0.05	45 (7.5)
Year Licensed			
<1960	176 (11.5)		56 (10.4)
1960-1969	184 (12.0)		71 (13.2)
1970-1979	356 (23.2)		133 (24.7)
1980-1989	388 (25.3)		133 (24.7)
1990-1999	428 (28.0)	<i>P</i> > 0.05	145 (27.0)

Note: The p-values reflect significance of chi-square tests of independence between levels of each variable and the respondent category. A total of 8 and 10 respondents to the first and second mailings, respectively, did not report gender. A total of 14 and 13 respondents to the first and second mailings, respectively, did not report age. A total of 7 and 13 respondents to the first and second mailings, respectively, did not report highest degree. A total of 92 and 42 respondents to the first and second mailings, respectively, did not report year of licensure.

Table 2. Summary and Comparison of Characteristics of Early and Late Respondents to the National Survey

	Early Respondents n (%)		Late Respondents n (%)
Employment Status			
Working as a pharmacist	183 (83.9)		163(74.8)
Not working as a pharmacist; working in a pharmacy-related field or position	9 (4.1)		9(4.1)
Working in a non-pharmacy-related career	--		4(1.8)
Semiretired	26 (11.9)		15(6.9)
Retired, do not practice pharmacy at all	--		20(9.2)
Not employed, seeking employment	--		1(0.5)
Not employed, not seeking employment	--	$P < 0.05$	6(2.8)
Gender			
Male	130 (59.9)		114(52.1)
Female	87 (40.1)	$P < 0.05$	104(47.9)
Mean Age			
Age Category			
23-30	37 (17.1)		6 (2.8)
31-40	46 (21.2)		73 (33.5)
41-50	60 (27.6)		59 (27.1)
51-60	35 (16.1)		36 (16.5)
61-70	28 (12.9)		31 (14.2)
>70	11 (5.1)	$P < 0.05$	13 (6.0)
Highest Degree			
BS Pharm	174 (79.8)		164 (75.2)
PharmD	22 (10.1)		34 (15.6)
MS, MBA, PhD	22 (10.1)	$P < 0.05$	20 (9.2)
Year Licensed			
<1960	27 (13.2)		34 (16.0)
1960-1969	29 (14.2)		29 (13.7)
1970-1979	47 (23.0)		42 (19.8)
1980-1989	45 (22.1)		50 (23.6)
1990-1999	56 (27.5)	$P > 0.05$	57 (26.9)

Note: The P -values reflect significance of chi-square tests of independence between levels of each variable and the respondent category. One early respondent did not report gender, and 1 early respondent did not report age. A total of 14 early respondents and 6 late respondents did not report year of licensure.

Table 3. Summary of Variables for Respondents to the 2000 National Survey and the 2000 National Survey Nonrespondent Follow-Up

	2000 National Survey n (%)		2000 National Survey Nonrespondent Follow-Up n (%)
Employment Status			
Working as a pharmacist	1692 (76.8)		385 (73.9)
Not working as a pharmacist; working in a pharmacy-related field or position	127 (5.8)		49 (9.4)
Working in a non-pharmacy-related career	65 (2.9)		8 (1.5)
Semiretired	120 (5.4)		27 (5.2)
Retired, do not practice pharmacy at all	141 (6.4)		30 (5.8)
Not employed, seeking employment	15 (0.7)		2 (0.4)
Not employed, not seeking employment	44 (2.0)	$P < 0.05$	20 (3.8)
Gender			
Male	1245 (57.0)		286 (55.1)
Female	941 (43.0)	$P > 0.05$	233 (44.9)
Age Category			
23-30	291 (13.4)		67 (13.1)
31-40	590 (27.1)		155 (30.4)
41-50	595 (27.3)		135 (26.5)
51-60	375 (17.2)		91 (17.8)
61-70	214 (9.8)		40 (7.8)
>70	112 (5.1)	$P > 0.05$	22 (4.3)
Highest Degree			
BS Pharm	1713 (78.4)		403 (77.8)
PharmD	320 (14.7)		85 (16.4)
MS, MBA, PhD	151 (6.9)	$P > 0.05$	30 (5.8)
Year Licensed			
<1960	232 (11.2)		49 (9.7)
1960-1969	255 (12.3)		49 (9.7)
1970-1979	489 (23.6)		103 (20.4)
1980-1989	521 (25.2)		156 (31.0)
1990-1999	573 (27.7)	$P < 0.05$	147 (29.2)

Note: The P -values reflect significance of chi-square tests of independence between levels of each variable and the survey type. A total of 18 and 2 respondents to the main survey and the nonrespondent survey, respectively, did not report gender. A total of 27 and 11 respondents to the main survey and the nonrespondent survey, respectively, did not report age. A total of 20 and 3 respondents to the main survey and the nonrespondent survey, respectively, did not report highest degree. A total of 134 and 17 respondents to the main survey and the nonrespondent survey, respectively, did not report year of licensure.

Table 4. Results of Chi-Square Tests of Comparisons of Characteristics of Late Respondents to the 2000 National Survey and Respondents to the Second Mailing of the 2000 National Survey with Respondents to the 2000 National Survey Nonrespondent Follow-Up

Variable	Late Respondents vs. Respondents to Nonrespondent Follow-Up	Respondents to Second Mailing vs. Respondents to Nonrespondent Follow-Up
Employment status	$P < 0.05$	$P < 0.05$
Gender	$P > 0.05$	$P < 0.05$
Age category	$P < 0.05$	$P > 0.05$
Highest degree	$P < 0.05$	$P < 0.05$
Year licensed	$P < 0.05$	$P < 0.05$

Table 5. Primary Reasons for Not Responding to Main Survey

Reason	Number	Percent
Did not have enough time to participate in this survey	206	38.4
Do not recall ever receiving such a survey	131	24.4
Survey was too intrusive	64	11.9
I believe I have returned it to you	55	10.2
Was not interested in the topic	44	8.2
Felt the survey did not apply to me	30	5.6
Missing	7	1.3

Note: Seven respondents did not provide a reason for not responding.

Table 3 shows a summary of characteristics of respondents to the 2000 National Survey and the 2000 National Survey Nonrespondent Follow-Up. There were significant differences between the respondents to these 2 surveys in terms of employment status and year of first licensure. There was a significantly lower proportion of respondents to the 2000 National Survey (5.8%) who were not working as pharmacists but were working in a pharmacy-related field relative to the 2000 National Survey Nonrespondent Follow-Up (9.4%). Additionally, a significantly lower proportion of respondents to the 2000 National Survey were not employed and not seeking employment (2.0%) relative to the 2000 National Survey Nonrespondent Follow-Up (3.8%). In terms of year of first licensure, a significantly smaller proportion of respondents to the 2000 National Survey were first licensed between 1980 and 1989 (25.2%) relative to the 2000 National Survey Nonrespondent Follow-Up (31.0%).

Table 4 is a summary of comparisons of characteristics of late respondents to the 2000 National Survey and respondents to the second mailing of the 2000 National Survey with respondents to the 2000 National Survey Nonrespondent Follow-Up. Results showed that late respondents to the 2000 National Survey and respondents to the second mailing of the 2000 National Survey were significantly different from respondents to the 2000 National Survey Nonrespondent Follow-Up for a majority of characteristics.

Table 5 shows a summary of the primary reasons respondents to the nonrespondent survey reported for not responding to the main survey. The primary reason provided by more than half (50.3%) of respondents was that the survey was either too long or too intrusive. Others reasons given suggested problems with the addresses used for pharmacists (24.4%) or problems with mail service (10.2%).

DISCUSSION

Nonresponse bias is a concern for pharmaceutical scientists collecting primary data via survey methods. The goal of this study was to assess the existence of nonresponse bias in a sample of respondents to a national survey of licensed pharmacists. A straightforward method of assessing nonresponse bias is to compare characteristics of a sample with known population parameters. This method is not possible for pharmacists, as there are no data available that describe the national population of licensed pharmacists. In 1991, using names and addresses of licensed pharmacists obtained from each state, a survey was used to determine the age, gender, race, degree earned, and hours worked per week for each licensed pharmacist³. However, a major change in the population of licensed pharmacists has been the growth in the proportion of female pharmacists. Since 1985, most graduates from pharmacy schools have been females, and currently pharmacy school classes are between 60% and 70% female¹⁹. This change in gender composition of the licensed pharmacist workforce has made information collected in 1991 obsolete for assessing nonresponse bias.

The lack of information about the pharmacist workforce guided our decisionmaking concerning the survey methods used in the 2000 National Survey. We used identification numbers for each sampled subject to better target the second survey mailing and then to survey the nonrespondents to assess nonresponse bias and determine why they did not respond. We found differences between respondents and nonrespondents in terms of work status and year of licensure. The bias due to work status confirmed our speculation that licensed pharmacists may not respond to surveys because of their work situation. Despite a specific appeal in the cover letter to pharmacists who were not working, work status still affected response. This is an important result because many pharmacist supply projections are based on the number of licensed pharmacists who are working in a pharmacy. Future research could continue to make special appeals to sampled pharmacists in cover letters to encourage response regardless of work status. Additionally, future work could attempt to validate our work status results.

We used 2 extrapolation techniques to assess nonresponse bias. Comparisons between early and late respondents showed significant differences in terms of work status, age, and highest degree earned. One

explanation for the differences is regional variation between the early and late respondents. More early respondents were from the Midwest, South, or Northeast, and more late respondents were from the West. Subsequent analyses showed that respondents from the West were older and more likely to have earned a PharmD degree as their highest degree. The regional variation likely occurred due to longer mail delivery times both to and from the West from the survey origination point (Columbus, OH). There were no regional differences between respondents to the first and second mailings of the survey form.

Extrapolation techniques commonly are used in place of a survey of nonrespondents as a means of assessing nonresponse bias. Because we collected information from nonrespondents, we were able to compare the characteristics of nonrespondents with characteristics of respondents to the second mailing and of late respondents. According to the assumptions of the extrapolation techniques, the later 2 groups should reflect nonrespondents. Our analyses showed that second mailing respondents and late respondents differed significantly from respondents to the nonrespondent follow-up survey in several characteristics. One implication of our results is that researchers using survey techniques should attempt to contact nonrespondents to assess nonresponse bias. As our results show, the assumptions surrounding the use of extrapolation techniques to assess nonresponse bias may not hold. Future research could continue to document whether extrapolation techniques to assess nonresponse bias result in consistent findings relative to methods using characteristics of nonrespondents.

The 2000 National Survey Nonrespondent Follow-Up also allowed us to determine why pharmacists did not respond to the 2000 National Survey. The 2000 National Survey was long and asked very detailed questions. The impact of the length and intrusiveness of the survey was evident in the reasons for not responding to the main survey reported by respondents. The time requirement necessary to complete the survey may have prevented the busiest pharmacists from responding - perhaps those pharmacists aged 31 to 40. Our survey was lengthy because it addressed multiple research questions. Perhaps future survey research directed at pharmacists should address research questions with more than 1 survey form rather than with a single lengthy, time-consuming questionnaire.

The finding that almost one quarter of respondents to the nonrespondent survey reported they did not remember receiving the survey raises issues about the address to which surveys were sent and treatment of surveys sent to that address. Pharmacists may provide their place of employment as the address for relicensure information. It likely is easier for a survey to be lost at work than at home. Regardless, reasons for not responding coupled with a paucity of information about pharmacists and the potential need to collect information about pharmacists raises questions about data collection methods for future surveys of pharmacists. Pharmacy researchers and organizations could begin discussions on the use of telephone survey techniques similar to data collection techniques used for the American Medical Association master file of physician characteristics²⁰.

Overall, our survey methodology appeared to result in a valid sample of licensed pharmacists. However, the lack of population-level information about licensed pharmacists will continue to prevent validation of characteristics of pharmacists gathered through sample surveys. One approach to gathering population-level data for pharmacists is a national census of licensed pharmacists that gathers work status and limited demographic variables (eg, age, gender, work setting). In addition to validating work status, a census could provide better basic information about the demographic characteristics of the pharmacist workforce. Additionally, census results could be matched to respondent name and address and serve as a more detailed sampling frame of licensed pharmacists. This improved sampling frame could be used, for example, to sample female pharmacists between the ages of 25 and 45 who are working as pharmacists to examine how they handle child-related issues and work.

An important issue related to a pharmacist census is which methods to use to obtain information from pharmacists. One approach could be a coordinated effort between state licensing boards and pharmacy researchers using standardized data collection instruments and appropriate survey methodology to gather basic pharmacist information upon license renewal. Another approach could be to use the same techniques and instruments but conduct the research independently of state pharmacy boards to ease the burden on state government. We believe further discussion concerning a pharmacist census is

warranted considering recent federal reports discussing concern about the adequacy of the pharmacy workforce and the adoption of the idea of a pharmacist census by pharmacy organizations²¹.

Limitations

The response rate to the 2000 National Survey Nonrespondent Follow-Up was only 20.4%, limiting the generalizability of the results. Thus, it is possible that nonresponse bias to the 2000 National Survey Nonrespondent Follow-Up exists. However, surveying nonrespondents and expecting a response is difficult because they are predisposed to nonresponse. We did not attempt multiple contacts in the nonrespondent survey as we did for the main survey because of resource constraints and a desire to not upset nonrespondents.

Although we detected nonresponse bias, it is unknown how the differences in work status and year of licensure between the respondents to the 2 surveys affect other characteristics of pharmacists (eg, hours worked, compensation, work attitudes). We collected limited information from nonrespondents because we hypothesized that fewer questions would elicit a better response rate. Future studies could explore the use of telephone follow-ups to obtain more and/or better information from nonrespondents.

CONCLUSION

Industry, government policy agencies, and pharmacy profession organizations are likely to require data directly from pharmacists. The goal of this study was to examine the existence of nonresponse bias to a national survey of licensed pharmacists. Our results provide support that a mailed survey methodology is a valid approach for obtaining information from pharmacists.

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