

# Mixed-mode survey of female veterinarians yields high response rate

J. R. Wilkins III,\* W. D. Hueston,<sup>†\*\*</sup> J. Mac Crawford,\*  
L. L. Steele<sup>†\*\*\*</sup> and D. F. Gerken<sup>§</sup>

*\*Division of Epidemiology and Biometrics, School of Public Health, B-150 Starling-Loving Hall, The Ohio State University, 320 West Tenth Avenue, Columbus, OH 43210, USA; †Department of Veterinary Preventive Medicine, College of Veterinary Medicine, The Ohio State University; ‡Division of Epidemiology and Biometrics, School of Public Health, The Ohio State University; §Department of Veterinary Biosciences, College of Veterinary Medicine, The Ohio State University*

In a recent study of female veterinarians, a subgroup of health professionals growing rapidly in number, the authors employed a mixed-mode survey design in targeting the cohort of women graduating from all US veterinary colleges during the 11-year period 1970–80 ( $n = 2,997$ ). The questionnaire elicited information on a variety of health and occupational factors and required 35 minutes on average to complete. In the first stage, a modified version of Dillman's Total Design Method for mailed, self-administered questionnaires was employed, yielding a response rate of 82.9%. In the second stage, a telephone interview of all mail non-respondents was attempted, yielding a response rate here of only 30.1%, but increasing the overall response rate among those contacted to 90.2%. Non-respondents differed little from mail (early) or telephone (late) respondents with respect to year of graduation and geographic region of veterinary college attendance. Gentle probing of telephone non-respondents suggested the personal nature of some questions and the amount of time required to answer all questions were the main reasons they chose not to participate. It therefore appears that conventional survey techniques may be successfully employed in health studies of health professionals, particularly if issues of great concern to the target population are addressed.

*Key words:* Cohort studies; public health; survey methods; veterinary medicine.

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## INTRODUCTION

Growing numbers of women entering the labour force have increased public awareness and simultaneously raised concern about on-the-job reproductive health hazards.<sup>1–5</sup> Increasing numbers of women have also entered the health professions, similarly raising health concerns since there exists the potential for exposure to a wide array of reproductive health hazards in such occupations.<sup>6–9</sup>

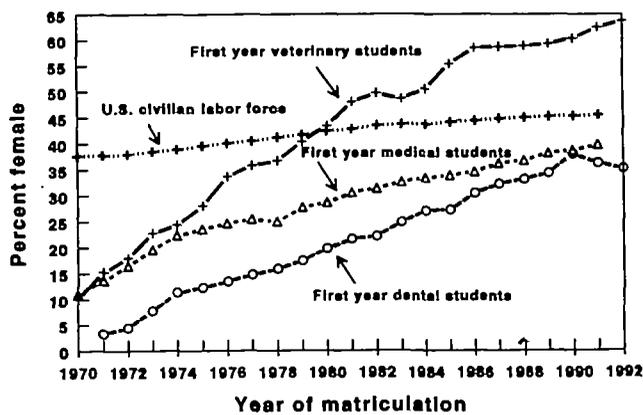
In no profession have demographic changes been more dramatic than in veterinary medicine. As shown in Figure 1, the percentage of first-year USA veterinary students who were women has risen from 10.1% in 1970 to nearly 65% in 1992, an average annual increase of 2.4%. On the other hand, the percentage of first-year

Correspondence and reprint requests to: J. R. Wilkins III, Division of Epidemiology and Biometrics, School of Public Health, B-150 Starling-Loving Hall, The Ohio State University, 320 West Tenth Avenue, Columbus, OH 43210, USA. Tel: (+1) 614 293 3897; Fax: (+1) 614 293 3937; e-mail: jrww@osu.edu

\*\* Current address: Department of Veterinary Medicine, Virginia–Maryland Regional College of Veterinary Medicine, University of Maryland at College Park, College Park, MD, USA.

\*\*\* Current address: Disability Prevention Unit, Division of Family Health, State of New York Department of Health, Albany, NY 12237, USA.

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**Figure 1.** Student enrolment trends in the health professions, 1970–92, USA

medical students who were women rose from 11.0% in 1970 to approximately 40% in 1991, an average annual increase of only 1.2%. The trend in first-year enrolments of women in dental schools closely parallels that of the medical school entrants, at least up to 1990. Although veterinarians have been previously identified as an occupational group at high risk of exposure to a broad spectrum of chemical, physical and biological agents known or strongly suspected to be reproductive hazards, epidemiologic studies of the profession are limited principally to investigations of trauma, zoonotic disease and mortality patterns among male veterinarians.<sup>10-17</sup> Primarily because of this, female veterinarians were targeted for a national study.

It is our purpose here to detail the methods used in surveying this particular group of health professionals and demonstrate the effectiveness of a mixed-mode survey design. In part, we describe our experience to suggest that extraordinary efforts are not always required to achieve acceptably high response rates among health professionals, especially when issues of current concern are addressed.

## METHODS

### The target population

All women graduating from US veterinary colleges during the 11-year period 1970–80 were targeted for study. Cohort ascertainment/identification relied predominantly on the membership roster of the American Veterinary Medical Association (AVMA) and on the annual graduation rosters of each US veterinary college. Various alumni associations and state veterinary societies were also contacted and solicited for assistance. As a result of the combined efforts, the total number of women graduates of US veterinary colleges for the 11-year period was estimated to be 2,997 (see Table 1). Twenty-one universities graduated veterinarians during 1970–80, with the cumulative number of graduates by college ranging from 13–341.

**Table 1.** A cohort of female veterinarians: Number of US graduates by year of graduation

Year of graduation	No.	%
1970	93	3.1
1971	97	3.2
1972	116	3.9
1973	133	4.4
1974	164	5.5
1975	204	6.8
1976	303	10.1
1977	355	11.8
1978	413	13.8
1979	497	16.6
1980	622	20.8
Totals	2,997	100.0

### Questionnaire administration/survey protocol

In the first stage of the survey, Dillman's Total Design Method for mailed, self-administered questionnaires was employed.<sup>18</sup> All cohort members were initially sent a personalized package by first-class mail that included a one-page cover letter, the 20-page questionnaire (17.8 cm × 21.6 cm), and a postage-paid return envelope. The first mailing was 20 January 1987, the postcard reminder was mailed one week later on schedule (27 January 1987), the second mailing was conducted on 10 February 1987 and the third on 10 March 1987. The cover letter in the third mailing specifically addressed the following issues: confidentiality of the responses, purpose of the study and communication of results to respondents. Certified mail was not used for the third and last mailing.

In the survey's second stage, a telephone follow-up of the mail non-respondents was conducted during the months February through May 1988, approximately one year after the postal survey. Cohort members for whom no telephone number could be obtained, as well as the 50 mail untraceables, were traced through AVMA representatives and veterinary licensing boards. The questionnaire was appropriately modified and pretested for telephone administration and female graduate students were hired to conduct the interviews. Telephone respondents could respond over the telephone, complete and return a mail questionnaire already in their possession or request another mail questionnaire. Individuals refusing to participate were encouraged to respond to an abbreviated version of the questionnaire. Those contacted by telephone refusing to participate at any level were asked to offer a reason why.

### Questionnaire development, design and content

Questionnaire development involved personal interviews (and pretesting) with practising veterinarians, 'focus groups' to discuss pertinent issues, and consult-

**Table 2.** Response of 2,997 female veterinarians to a mixed-mode survey

Outcome	Mail phase		Telephone follow-up		Combined	
	No.	%	No.	% of 520	No.	% of 2,978
Contacted						
Responded	2,427	81.0	105	20.2	2,532	85.0
Refused	501	16.7	244	46.9	275	9.2
Passive <sup>a</sup>	470 <sup>b</sup>	(15.7)	158	(30.4)	158	(5.3)
Active <sup>c</sup>	31	(1.0)	86	(16.5)	117	(3.9)
Not contacted						
Deaths	19	0.6				
Untraceable	50	1.7	171	32.9	171	5.7
Totals	2,997	100.0	520	100.0	2,978	99.9

<sup>a</sup> For mail, subjects with valid mailing addresses who did not return their questionnaire; for telephone, subjects who failed to return questionnaires after requesting one.

<sup>b</sup> Targeted/selected for telephone follow-up along with the 50 mail untraceables.

<sup>c</sup> For mail, subjects who returned partially complete, blank or otherwise unusable questionnaires; for telephone, subjects who agreed to the abbreviated interview, or answered the non-response probe questions or gave no information/explanation over the telephone for their refusal.

ations with survey methodologists. Questionnaire content is summarized as follows: history of chronic illness; previous hospitalizations; job-related injuries; reproductive history; zoonoses; pre-exposure rabies prophylaxis; rabies exposure; employment history; tobacco, alcohol and illicit drug use; and radiation film badge use, along with basic demographic information. The average time required to complete the mailed self-administered questionnaire was 35 minutes.

## RESULTS

### Response to survey

**Mail phase.** As indicated in Table 2, 19 (0.6%) potential respondents had died since their graduation from veterinary school. Other non-contacts in this phase of the survey include the 50 (1.7%) individuals classified as untraceable by mail.

Among those contacted initially, 2,427 (81.0%) returned a completed questionnaire; 501 (16.7%) refused participation, with 470 (15.7%) considered 'passive' refusals and only 31 (1.0%) considered 'active' refusals (see Table 2 footnotes). Of the 2,427 individuals responding during this phase, nearly 80% had returned their questionnaires by the end of the fifth week after the first mailing.

Using a version of the questionnaire adapted for the telephone, attempts were made to contact the 470 passive refusals and the 50 mail untraceables.

**Telephone follow-up.** Among the 520 cohort members targeted for telephone follow-up, 105 (20.2%) responded by either completing a telephone interview ( $n = 42$ ) or by completing and returning a question-

naire through the mail ( $n = 63$ ); 244 (46.9%) refused to participate in this phase and 171 (32.9%) were classified as untraceable by mail or phone. Passive refusals outnumbered active refusals by nearly a factor of 2 (158 *vs.* 86), but overall accounted for a small percentage of all eligible cohort members.

**Overall response rate.** As shown in Table 2, a total of 2,532 cohort members responded to the mixed-mode survey and 275 did not. Thus, among contacted eligible persons ( $n = 2,807$ ), the response rate was 90.2% (2,532/2,807). Note that the non-contact rate (excluding the 19 deaths) was 5.7% (171/2,978).

### Assessing non-response bias

In an attempt to assess non-response bias, sample-based comparisons were made with respect to known characteristics of the target population: the veterinary college of attendance, the year of graduation from veterinary college and the geographic region of the US where veterinary school was attended. Respondents, non-respondents and the untraceables were found to be generally similar to the target population with respect to graduation year and region. Slightly disproportionate numbers of non-respondents graduated in the 1970-74 quinquennium, indicating the non-respondents were probably somewhat older. Time elapsed since graduation from veterinary school did not in any consistent (or predictable) way affect our ability to trace eligible cohort members.

Non-respondents were somewhat more likely to have attended veterinary college in the North and the West, although these differences are relatively small (as were differences seen when comparisons were made on a school-by-school basis). Non-respondents also differed little from mail (early) or telephone (late)

respondents. On the other hand, about one-third of all untraceables attended veterinary college in the South, compared to about one-quarter of the target population. The number of women responding to the abbreviated questionnaire was too small to be particularly informative ( $n = 18$ ).

## DISCUSSION

Surveys of physicians and other health professionals have not always achieved acceptably high response rates, prompting attempts over the years to develop better techniques for such populations.<sup>19-23</sup> An important aspect of this is that many factors have the potential to influence the survey response.<sup>18,24-28</sup> Response rates of 75% are often considered acceptable, although there are circumstances where higher response is required or lower response is acceptable. In the mixed-mode health survey of female veterinarians described here, the response rate achieved among those contacted was high — greater than 90%. Surely this success is attributable, at least in part, to the methods employed since such techniques have a long history of effectiveness, even for relatively diverse populations.<sup>18</sup>

In addition to the effect of the survey mode, the influence of the questionnaire content, timing of the survey and the characteristics of the potential respondents must also be considered, although it is generally not possible to separate out individual effects. It is likely that the rapid growth in the number of women in the veterinary profession and society's heightened interest in occupational health concerns combined to sensitize the target population to the issues addressed in the study. Furthermore, sensitization of the target population to the issues addressed in our survey may have also occurred as a result of a health survey of the same cohort of veterinarians conducted approximately 2.5 years previously<sup>9</sup> and publication of a document in 1985 entitled 'Health Hazards in Veterinary Practice' which was made widely available to veterinarians through the AVMA.<sup>10</sup> With respect to demographic characteristics of the target population that contributed to the survey's high response rate, it might be speculated that gender and level of education played some influential role. Although the results of previous studies have not always been consistent, there is nevertheless persuasive evidence that women are more likely than men to agree to participate in a survey.<sup>25,29,30</sup> In a recent study we conducted to evaluate the feasibility and effectiveness of different data collection techniques, self-administered questionnaires were mailed to a random sample of 443 1981-90 US veterinary college graduates.<sup>31</sup> Not only was the response rate better among the sample females (75.9% vs. 68.4% among the sample males), the women were 3.5 times more likely to respond affirmatively to a proposed injury follow-up scheme, 1.8 times more likely to indicate they would allow blood to be drawn

and 1.8 times more likely to indicate they would allow urine collection and analysis for putative occupational exposures.<sup>31</sup>

Finally, since one co-author and the spouse of a second were cohort members, the study was more likely to be perceived by many as derived from within the affected cohort rather than being superimposed from the outside by unaffiliated and removed researchers or public health officials.

In conclusion, our experience suggests that extraordinary means are not always required to achieve acceptably high response rates when surveys of health professionals are conducted. High response rates can apparently be elicited from health professionals when careful attention is given to the timeliness of the issues addressed and when sound survey techniques are employed by credible surveyors.

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