3. Many of these vaccines will be directed at specific target groups other than children, and there is no existing infrastructure to reach target populations other than children effectively.

4. Other than the perceived health benefits, incentives to become immunized (for example school requirements) do not exist for these vaccines, as they do for the childhood vaccines.

These obstacles are not so easily addressed as are the remaining obstacles to achieving the childhood immunization objectives. Overcoming them may require development of further scientific information and consensus, formulation of new policies, changes in legislation, and commitment of resources.

Reference

1. Department of Health and Human Services, Public Health Service: Promoting health/preventing disease: objectives for the nation. U.S. Government Printing Office, Washington, D.C., fall 1980.

Statewide Survey of Risk Factor Prevalence: the Ohio Experience

MOON S. CHEN, Jr., PhD, MPH
DEBRA BILL, MPH

Dr. Chen, formerly the director of "Health Ohio," is assistant professor in the School of Health, Physical Education, and Recreation, Ohio State University. Miss Bill, formerly a health education consultant with the Ohio Department of Health, is project director, Hartford Community Arthritis Program, Multi-Purpose Arthritis Center, University of Connecticut Health Center, Farmington, Conn. 06032.

This study was supported by grant No. H 11/CCH500262-03 from the Centers for Disease Control, Public Health Service, to the Ohio Department of Health's Health Education-Risk Reduction Project.

Tearsheet requests to Moon S. Chen, Jr., Assistant Professor, Health Education, Ohio State University, 215 Pomerene Hall, 1760 Neil Ave., Columbus, Ohio 43210.

SYNOPSIS

In 1982, a statewide survey was conducted to determine the prevalence of health risk factors among Ohio's population. The survey was mandated by a health education-risk reduction grant to the Ohio Department of Health. The background, development, and validation of the survey instrument are described. The four goals of "Health Ohio"—the collection of descriptive statistics on selected risk factors for adult Ohioans, the compilation of baseline data, the development of a standard methodology for a prevalence survey, and the reporting of these findings for potential users of the data—were achieved.

The population sample consisted of 607 Ohioans aged 18 and older who were polled by telephone. Subjects were selected through a modified random digit dialing technique. As a result of this technique and the designation of a specific household respondent, demographic characteristics of the sample matched those of the State's population in the 1980 census.

Among the implications of the survey findings were the needs to (a) *remove economic barriers that apparently impede the installation of residential smoke detectors,* (b) *initiate health education at an earlier age to counter cigarette smoking trends, and* (c) *encourage adult self-determination in reducing health risks. The February 1982 "Health Ohio" data describing the need for intervention to reduce health risk factors have become the basis for health education-risk reduction efforts of the Ohio Department of Health.*

In addition, "Health Ohio" has spawned two local prevalence surveys in the State; these resulted in more precise local data on the prevalence of health risk factors. Other multiplier effects of health education-risk reduction projects should be documented for future reference.

IN THE LATE 1970s CONGRESSIONAL commitment to health education as a means of protecting the public's health was demonstrated by the health education-risk reduction grants to the States through the Public Health Service's Centers for Disease Control (CDC). Among the activities mandated by CDC's grant to Ohio was a statewide prevalence survey of risk factors. These risk factors were defined by the

CDC to be the "health hazards of smoking, alcohol use, obesity, exercise, stress, hypertension and accident prevention and injury control" (*1*).

As a result of these guidelines and the need for actual rather than the previous synthetic estimates, four goals for a prevalence survey were identified:

1. to collect descriptive statistics on CDC's risk factors among Ohioans aged 18 years and older;
2. to compile baseline data for subsequent comparisons on demographic, epidemiologic, and behavioral variables;
3. to develop a standard prevalence survey methodology for prevalence surveys that could be replicated by others;
4. to report these findings and their implications to potential users of the data.

All of these goals were achieved; however, only highlights of the findings and some implications will be discussed in this paper.

Materials and Methods

The 1982 Ohio health risk factor survey entitled "Health Ohio" (*2*) was modeled after the 1981 Colorado adult health risk prevalence survey in both instrumentation and methodology (*3*). (Consequently, in this article, Health Ohio's survey techniques are compared to survey techniques used by Colorado researchers, although the comparabilities of the adult populations of the States of Ohio and Colorado cannot be assumed.)

Both the Health Ohio and the Colorado instrument consisted of questionnaire items from three sources.

1. CDC's "Common Data Items" from the "Health Education-Risk Reduction Grants Interim Guidelines" of March 18, 1980 (*1*).
2. subject specialists from State agencies or subdivisions of the departments of health of Ohio or Colorado.
3. other statewide health risk surveys, namely those conducted for New York and Utah.

By deriving questionnaire items from these sources, the documentation necessary to assure content validity was addressed. However, in addition to accepting the face validity of the items proposed by subject specialists, rationales and baseline data from the professional literature and similar State or national surveys (if available) were developed for each item. This two-step process of "asking the experts" (step 1) followed by requiring rationales and baseline data for each item (step 2) exemplified the attempts to execute both Health Ohio and the Colorado surveys with attention to validity, scientific rigor, and professionalism.

Versions of Health Ohio and the Colorado instrument were pilot tested before implementation to assure instrumentation validity. The pilot version of Health Ohio consisted of interviewing 31 members of the target population; the Colorado instrument was field tested with 10 Coloradoans.

Items that were considered ambiguous during the pilot testing of Health Ohio were reworded to improve clarity. Items for Health Ohio were also constructed so that nonhealth professionals could understand them. A readability level at the seventh to ninth grades was the standard; a readability level at the eighth grade was actually measured in accordance with the SMOG readability test (*4*).

Instrument reliability was determined by the test-retest method. Specifically, during the 1981 Colorado survey, 10 percent of the persons in the sample were reinterviewed and asked eight factual (rather than attitudinal) questions. The perfect test-retest reliability exhibited by the Colorado instrument, the source for two-thirds of the 78 items for Health Ohio, seemed to be sufficient evidence of comparable reliability of the 1982 survey.

In terms of methodology, both Health Ohio and the Colorado survey used random digit dialing (RDD) of households with telephones followed by a specific designation of an adult respondent within the sampled household. (However, the RDD technique used in Health Ohio was modified, as will be explained subsequently. Random digit dialing as a public health survey technique has been increasingly popular because of its relative efficiency and effectiveness (*5*). As applied to the Ohio population, the modified RDD technique offered the following advantages:

1. statewide representativeness, since Ohio Bell indicated that 95 percent of the population had residential telephones in its service area.
2. the provision of random distribution through a three-step sampling procedure. In accordance with Kish (*6*), the first two sampling stages resulted in a list of telephone households in counties weighted in proportion to the number of telephone households in Ohio at large. In the third stage, a specific adult respondent in a telephoned household was selected (*6*). If the selected respondent was not available, an

appointment for a callback time was made. By specifying a respondent within the sampled household, a sampling reflecting proportionate age and gender distributions was achieved.

Another quality control feature of Health Ohio was contracting for the data collection and data tape preparation by the University of Cincinnati's (UC) Institute for Policy Research, the most experienced public opinion research organization in Ohio. Contracting with the UC resulted in the use of 14 professional (rather than volunteer) interviewers under the supervision of senior personnel. Interviewers received 2 days of training specifically for Health Ohio. Many interviews were also simultaneously monitored by senior personnel to ensure that instructions were followed.

Health Ohio was integrated with the February 13–27, 1982, Ohio Poll, which included questions on a number of topics in addition to health. The Ohio Poll is conducted periodically by the University of Cincinnati. The 14-day period for the survey (Mondays through Fridays, 9 am–10 pm and Saturdays, 9:30 am–10 pm) was designed to minimize the threat that some external event or seasonal variation might affect the responses of those not yet surveyed. By sharing costs with the Ohio Poll, the expenses that would have been associated with single purpose data collection were reduced. Health Ohio constituted approximately 14 minutes of the average 22 minutes required for the Ohio Poll. No complaints about the time required to be interviewed were heard; in fact, UC personnel reported that respondents enjoyed answering questions about their health and could have talked longer.

As a consequence of the attention paid to instrumentation validity and reliability as well as technical aspects of quality control, the authors are confident that Health Ohio was conducted in an exemplary manner. Selected findings follow.

'No complaints about the time required to be interviewed were heard; in fact, UC personnel reported that respondents enjoyed answering questions about their health and could have talked longer.'

Results

Survey effectiveness and efficiency. A total of 607 respondents completed Health Ohio. This number was considered sufficient to make claims about the State's total population (*7,8*) and resulted in an acceptable potential sampling error of ± 4 percent.

The modified random digit dialing (MRDD) techniques used for Health Ohio differed from the pure RDD (PRDD) used for the Colorado survey in that the PRDD technique resulted in a listing of statistically random numbers without regard for the telephone company's tendencies of assigning telephone numbers to residences or businesses (personal communication with David West, former director of research and evaluation, Health Promotion and Education, Colorado Department of Health, on April 19, 1983). On the other hand, the MRDD technique resulted in a listing of statistically random telephone numbers that were preferentially selected for the probability that they would be residential (rather than nonresidential) numbers. Consequently, the MRDD technique appeared to be approximately three times more efficient than the PRDD technique (table 1).

Demographic profiles. Use of the MRDD technique in conjunction with the Kish sampling tables (*6*) yielded a sample that was statistically representative of the State's population aged 18 years and older on

Table 1. Summary of telephone numbers resulting in contacts

Classification	1981 Colorado survey [1]		1982 Health Ohio [2]	
	Number	Percent of contacts	Number	Percent of contacts
Completed interviews	469	17.03	607	51.57
Refusals to be interviewed	121	4.39	111	9.43
Partially completed interviews	5	0.18	4	0.43
Total contacts	595	21.60	722	61.43

[1] Pure random digit dialing technique (random generation of 4-digit numbers to be matched with telephone prefixes to be surveyed).

[2] Random digit dialing technique weighted in favor of residential telephone households.

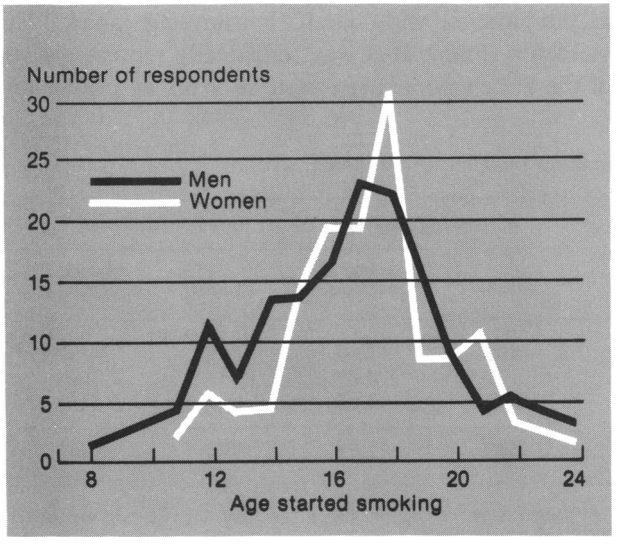
Table 2. Comparisons between the 1982 Health Ohio sample and the 1980 Ohio census data in relation to age, gender, and racial distributions

Demographic characteristic	Health Ohio, 1982		1980 Ohio census	
	Number	Percent	Number	Percent
Total, all ages	617	100.0	7,623,310	100.0
18-21 years	66	10.7	814,848	10.7
22-29 years	121	19.9	1,506,364	19.8
30-34 years	59	9.8	815,697	10.7
35-44 years	135	22.0	1,119,823	14.7
45-54 years	89	14.4	1,126,607	14.8
55-59 years	36	5.8	581,948	7.6
60-61 years	12	2.0	205,715	2.7
62-64 years	26	4.1	282,848	3.7
65-74 years	43	6.8	706,554	9.3
75-84 years	26	4.0	354,480	4.6
85 and older	4	0.5	108,426	1.4
Total, both sexes [1] ..	611	100.0	8,599,110	100.00
Males	269	44.0	4,056,200	47.17
Females	342	56.0	4,542,910	52.83
Total, all races [1, 2] ..	606	100.0	10,797,419	100.0
Whites	559	92.3	9,597,266	88.9
Blacks	42	7.0	1,076,734	10.0
Asian, Pacific Islanders	2	0.3	47,813	0.4
American Indians, Eskimos, Aleuts .	2	0.3	12,240	0.1
Others	1	0.1	63,366	0.6

[1] Health Ohio statistics are for those 18 years and older; 1980 Ohio census data are for all ages.

[2] Classification of race or ethnic group may differ slightly, although not significantly between Health Ohio and the 1980 Ohio census; in the census persons of Spanish origin, for example Hispanics, may be of any race.

Comparison of ages when respondents started smoking, by gender, 1982 "Health Ohio" 1982 survey study of risk factor prevalence



all four available demographic variables that could be used to compare characteristics of the sample with characteristics reported in the 1980 U.S. Census of Ohio's population (table 2).

Chi-square tests detected no statistically significant differences between the 1982 Health Ohio sample and the 1980 Ohio census population with respect to age distribution ($\chi^2 = 5.79$; df = 10), gender ($\chi^2 = 0.29$; df = 1), and racial-ethnic composition ($\chi^2 = 2.20$; df = 9). Further, for Ohio's 10 most populous counties, there were no significant differences with the sample in each county's contribution to the total ($\chi^2 = 2.20$; df = 9). Therefore, considerable confidence was achieved in interpolating Health Ohio data to statewide projections. Selected findings follow.

Cigarette smoking. The prevalence of current cigarette smokers among Ohioans was 31 percent, a proportion that was quite similar to data reported from Massachusetts (*9*) and to national statistics (*10*). For the adult Ohio sample, cigarette smoking was most likely to have begun between the ages of 14 and 18 years. In fact, 50 percent of all current smokers began smoking between these ages (see chart).

Alcohol. The reported prevalence of "ever drinkers" among Ohioans was 70.3 percent. (Ever drinkers were those who affirmed that they ever drank alcoholic beverages; that is beer, wine, or liquor.) Men more frequently reported themselves as "ever drinkers" (75.1 percent) than women (66.5 percent). The observation that drinking was more prevalent among men than women was not surprising, but the phenomenon that men were reportedly more successful in reducing their drinking was. "Health concerns" and "just wanted to" were the reasons most frequently cited (together, 61.5 percent) for reduced drinking.

Hypertension. The prevalence of diagnosed hypertensives among Ohioans (22.6 percent) exhibited the expected positive correlation with increasing age, particularly after age 50. Among diagnosed hypertensives, the self-reported control of high blood pressure, an indicator of compliance, was 76.7 percent.

Accident prevention and injury control. Among the items asked in this section of the survey were the frequency of wearing a safety belt when in a motor vehicle and the possession of a functional smoke

detector in the respondent's residence. Overall, never or almost never wearing a seat belt was reported by 58 percent of the respondents. There were no major differences between men and women among the 489 respondents, as the following percentages indicate.

Frequencies	*Males*	*Females*
Always or almost always	14.87	16.84
More than half the time	7.57	4.89
Less than half the time	15.33	17.81
Never or almost never	62.23	60.47

Risk of fire-related morbidity and mortality was assessed by inquiring "Do you have a working smoke detector in your home?" Although the majority of respondents had one, a correlation with income level was noticeable. Those who reported an annual household income (all sources of income reported by respondents) of $15,000 or more were approximately 1.8 times more likely to have a functional smoke detector than not to have one. Those with annual household incomes less than $15,000 were approximately 1.6 times less likely to have a functional smoke detector.

Discussion

The presence of a functioning smoke detector in the home may be the only tangible evidence that income level is positively correlated with increased risk. For all the other risk factors, there do not seem to be economic barriers to health.

However, this study does seem to point toward changes needed in health education. For example, the observation that 50 percent of all current adult smokers began to smoke between the ages of 14 and 18 indicates that greater emphasis on educating children about a healthy lifestyle should begin in upper elementary and junior high school grades. Historically, health has been taught in the 9th or 10th grades, a few years past the stages when youths make decisions on smoking.

At the same time, the health education of adults should not be neglected. Strategies to activate adults' internal decision-making for health, as exemplified by respondents who reportedly were successful in reducing alcohol use, should be encouraged. Similarly, education in self-determination for hypertension control, stress management, and injury control through wearing seat belts can also be pursued. Future studies should include assessing the effectiveness of such risk reduction efforts and repeating a statewide risk factor prevalence survey in 1990 to measure changes since this survey and the degree to which the 1990 objectives for the nation (*11*) have been achieved in Ohio.

'The observation that drinking was more prevalent among men than women was not surprising, but the phenomenon that men were reportedly more successful in reducing their drinking was.'

Epilogue

At this writing in April 1983, at least two consequences are indirectly attributable to the completion of the statewide survey. First, the data collected in Health Ohio have formed the basis for health education-risk reduction planning by the Ohio Department of Health (*12*). Priorities for action—the ranking of risk factors based on the preventability and prevalence of the habit or practice—have been outlined as part of the State agency's agenda. Second, at least two local prevalence surveys of health risk factors have been completed, resulting in localized prevalence data. A survey conducted in Butler County, Ohio, used a similar instrument and survey methodology identical to Health Ohio's. Results of this survey were reported in the "1982 Butler County Health Risks Prevalence Survey" (*13*).

The Akron City Health Department conducted the other local prevalence survey; techniques and instrumentation differed from Health Ohio, according to information from Morris Stamm, chief, Health Education-Risk Reduction, Ohio Department of Health, and Neil Casey, of the Akron City Health Department, given to us in March 1983. These two surveys provided more precise data so that local health departments can focus their health education-risk reduction efforts more specifically.

Thus, Health Ohio and the local prevalence surveys that it has spawned have resulted in data that are based on actual rather than synthetic estimates. These data are now the benchmarks to document health education-risk reduction needs and serve to evaluate the effectiveness of health education-risk reduction efforts. It is to be hoped that Health Ohio will generate further examples of the multiplier effects of health education-risk reduction projects (*14*).

References

1. U.S. Department of Health, Education, and Welfare: Health education-risk reduction grants interim guidelines. Washington, D.C., Mar. 18, 1980.
2. Health Ohio: choice or chance? Ohio Department of Health, Columbus, 1982.
3. Colorado Department of Health: Colorado adult population survey: health risk prevalence. Denver, March 1982.
4. U.S. Department of Health and Human Services: Readability testing in cancer communications. NIH Publication No. 81–1689, Washington, D.C., June 1981.
5. Aneshensel, C. S., Frerichs, R. R., Clark, V. A., and Yokopenic, P. A.: Telephone versus in-person surveys of community health status. Am J Public Health 72: 1017–1021, September 1982.
6. Kish, L.: Survey sampling. John Wiley and Sons, Inc., New York, 1965.
7. Tortora, R. D.: A note on sample size estimation for multinominal populations. Am Statistician 32: 100–102 (1978).
8. Kreijcie, R., and Morgan, D.: Determining sample size for research activities. Ed and Psych Measurement 30: 607–610 (1970).
9. Lambert, C. A., et al.: Risk factors and life style: a statewide health-interview survey. N Engl J Med 306: 1048–1051 (1983).
10. U.S. Department of Health, Education, and Welfare: Smoking and health. A report of the Surgeon General. DHEW Publication No. (PHS) 79–50066. U.S. Government Printing Office, Washington, D.C., 1979.
11. U.S. Department of Health and Human Services: Promoting health/preventing disease: objectives for the nation. U.S. Government Printing Office, Washington, D.C., 1980.
12. Ohio Department of Health: Health education-risk reduction annual report. Columbus. Undated.
13. 1982 Butler County health risks prevalence survey. Middletown Health Department, 1 City Center Plaza, Middletown, Ohio 45042, 1982.
14. Kreuter, M. W., Christensen, G. M., and DiVincenzo, A.: The multiplier effect of the health education-risk reduction program in 28 States and 1 Territory. Public Health Rep 97: 510–515, November-December 1982.

National Library of Medicine