

# Appendixes

Appendix A: Survey Design and Methodology . . . . .	175
Appendix B: Report From the National Opinion Research Center . . . . .	179
Appendix C: Survey Materials . . . . .	209
Appendix D: Background Frequencies for Chromosomal Aberrations . . . . .	227
Appendix E: Background Frequencies for Sister Chromatic Exchanges ,.....	231
Appendix F: Screening Tests (Available at Hospitals or Medical Centers) for Heritable Traits . . . . .	233
<b>Appendix G: Other Contractors and Contributors . . . . .</b>	<b>235</b>

# Survey Design and Methodology

## Study design

### SOURCE OF DATA

The survey was conducted for OTA from February 25 to June 8, 1982, by the National Opinion Research Center (NORC), a nonprofit survey research corporation affiliated with the University of Chicago. NORC sent confidential questionnaires to the chief executive officers of the 500 largest U.S. industrial companies, \* the chief executive officers of the 50 largest private utility companies, \*\* and the presidents of the 11 major unions that represent the largest numbers of employees in those companies. • \* \*

These recipients were selected based on discussions with industry scientists who indicated that a company's size rather than its major product line would more likely be the determining factor for testing. Moreover, hazardous substances are found throughout the industrial sector, including utilities, not just in the chemical industry. A company's decision to implement genetic testing most likely would be based on the extent and sophistication of its medical program, and sophisticated programs most probably would be found in large companies. Further, because unions also are interested in the health of their members, they were thought to be a potential source for undertaking such programs. All 561 recipients were surveyed, rather than just a sample, in order to eliminate sampling error that might result from a small number of companies testing and to avoid other potential problems associated with sample selection.

### QUESTIONNAIRE

**Development.** -A questionnaire addressing the purposes of the study was developed by the OTA staff and NORC over a period of approximately 2 months, during which it was extensively reviewed and revised. Reviewers for technical accuracy included individuals in science, medicine, and law, and persons affiliated with the American Industrial Health Council, the Chemical Manufacturers Association, the American Occupational Medical Association, the American Academy of Occupational Medicine, and the Genetic Toxicology Association. \* \* \* \* Their comments were evalu-

\*Identified by Fortune 500 listing of U.S. companies engaged in manufacturing mining, Fortune, vol 103 No 9, May 4, 1981

\*\*Identified by Fortune Magazine List C; Fortune Magazine, vol 103, No 9, May 4, 1981

•• Identified in the Directory of National Unions and Employees Association (1979) by the U.S. Department of Labor

••• "In view of time constraints, these people gave their opinions as individuals rather than as representatives of their organization

ated for objectivity and relevance to the purpose of the survey. The questionnaire then was revised to reflect the results of the review and prepared for pretest.

The bottom 25 companies in the Fortune 500 were selected for the pretesting phase, which was administered from February 25 to March 12, 1982. Eleven (44 percent) of the 25 companies responded. Analysis of the results indicated that the questionnaire was reasonably clear and consistent and that it should provide the data sought. A draft of the final instrument was reviewed by the OTA project panel, which included representatives from industry, academia, and labor. Minor format changes were made, and two questions were deleted. The rest of the survey population was questioned from March 23 to June 8, 1982. Because the questionnaire's changes were relatively minor, the pretest responses were included in the final analysis.

**Instrument.** —The questionnaire is a four-page printed instrument. Two slightly different versions were used, depending on whether the document was sent to a company or a union; however, the differences are semantic in nature. (See app. C.) The questionnaire was composed of:

- introductory paragraphs, which give instructions and define terminology;
- eight questions on genetic screening and eight on cytogenetic monitoring;\*
- a question on actions taken as a *result* of either type of testing;
- a question relating to the use or development of genetic tests in animal studies;
- a question to determine the major industrial sector in which the companies did business; and
- a space for explaining the answer to any question or providing additional information.

The questionnaire reflected two assumptions. One was that the individual who would respond to the questionnaire would be familiar with genetic testing. This assumption was believed to be appropriate because genetic testing has been widely discussed by various professional groups concerned with occupational health, including committees within major industrial trade associations. The second was that the definitions of genetic screening and cytogenetic

\*The questionnaire used slightly different terminology for the tests than used in this report. It used the term "biochemical genetic testing" to refer to genetic screening and the term "cytogenetic testing" to refer to cytogenetic monitoring

monitoring would be carefully and consistently followed in answering the questionnaire. Because different experts use the terminology in slightly different ways, these terms were defined in the first paragraph of the questionnaire. No reason or evidence was found to invalidate these assumptions.

*Confidentiality.*—Providing confidentiality to the individuals answering the survey was viewed as crucial for securing both a high rate of participation and accurate information, particularly in view of the sensitive nature of the subject (I). No identifying marks were placed on the questionnaire, and respondents were urged not to do so on their own. Results could be compiled only in aggregate form. Followup procedures were possible because respondents were asked to return, separate from the questionnaire, post cards that named their organization and stated that the questionnaire had been completed and returned.

**SURVEY**

The questionnaires were sent to 561 chief executive officers and presidents, with the suggestion that they route it to the person responsible for health and safety matters. This approach sought to demonstrate the importance of the survey and to ensure that the questionnaire quickly got to the appropriate person in the organization, thereby increasing the chances of a timely response.

Questionnaires were accompanied by two one-page letters—one from OTA’s Director, John H. Gibbons, and one from NORC’s project director, Cynthia Thomas—and by a post card and a return envelope. A list of the names of the members of the project’s advisory panel also was enclosed. (See app. C for copies of the questionnaire, letters, and advisory panel membership list.)

NORC began followup procedures on April 19 by sending 98 letters to nonrespondents. A second effort involved telephone calls to 200 of the nonrespondents. The effort concentrated on the top 100 companies of the Fortune listing and on those in key industrial

groups, such as chemicals, rubber and plastic products, metal manufacturing, and pharmaceuticals.

By the June 8, 1982, cutoff date, 366 organizations had answered the questionnaire, a 65.2-percent response rate, and 26 organizations had specifically declined to do so, a 4.6-percent refusal rate. Those who declined generally gave either no reason for refusal or the reason of corporate policy not to respond to surveys. Questionnaires from seven more organizations were received after the cutoff date. None of these organizations reported any testing activity and were not substantially different from the earlier respondents. Since these responses were received after the close of the survey period, they are included as nonrespondents for analysis purposes.

**Response pattern**

Can the results of this survey be generalized to the population of Fortune 500 companies, large utility companies, and major unions? An answer to this involves two additional questions: Are the responses equally distributed among the groups represented in the survey? Are characteristics of the respondents different from the nonrespondents? These two questions are discussed in turn.

Two weeks into the survey, April 13, 1982, approximately one-third (30.5 percent) of the contacted organizations returned the post card indicating they had participated in the survey. At that time, little variation was seen in the response rate by size or type of organization. The largest discrepancy was between the unions, with a 27.3-percent response rate, and the utility companies, with a 38-percent response rate. By the close of the survey (June 8, 1982), however, the discrepancy in response rate became quite noticeable. The large corporations had the highest response rates: 68 percent for utilities and 61.5 percent for the top 200 companies in the Fortune 500 listing; the unions and small corporations had the lowest response rates: 36.4 percent for unions and 44 percent among the bottom 300 companies in the Fortune 500 listing. (See table A-1.) The variation in response pattern between

**Table A-1.—Distribution of Returned Post Cards by Organization Size and Type**

Organization size/type	Cumulative number of post cards received by:					
	Apr. 13, 1982			June 8, 1982		
	Yes	No	Percent received	Yes	No	Percent received
Fortune 500 companies						
Top 200 . . . . .	65	135	32.50/o	123	77	61.50/o
Bottom 300 . . . . .	64	216	28.0	132	168	44.0
Utilities: top 50. . . . .	19	31	38.0	34	16	68.0
Unions: 11 . . . . .	3	8	27.3	4	7	36.4
Total: 561 . . . . .	171		30.5 %/o	293		52.20/o

SOURCE: National Opinion Research Center, survey conducted for OTA, 1982

April 13 and June 8 is undoubtedly due to a number of factors, most probably the followup efforts which began in the third week of the survey and focused on the top 100 companies of the Fortune 500 listing and organizations in selected industrial classifications such as utilities. Thus, the results of this survey may be more applicable to the larger manufacturing/mining and utility companies than to smaller manufacturing/mining companies and unions.

Analysis of selected characteristics of respondents compared with nonrespondents is limited to the Fortune 500 companies. Nonrespondents were identified by the process of elimination using the post card responses. The 193 nonrespondents included the 38 companies that sent in anonymous questionnaires but no post card. Respondents and nonrespondents were compared on the following characteristics: geographic location, size of organization, and type of industry. Rates of response and nonresponse did not differ greatly geographically. (See table A-2.) The largest variation occurred among the Central States where a 5-percentage-point variation occurred between the nonrespondents and the respondents. For size of com-

pany, however, the rate of nonresponses did differ widely from the rate of responses. (See table A-3.) For example, 53 percent of the nonrespondents were in the smallest companies, compared with 32 percent of the respondents. This discrepancy was not unexpected, because the followup concentrated on larger companies and the response rates may reflect these efforts. Rate of nonresponse did not vary greatly from rate of response with respect to industry classification. (See table A-4.) Eleven industries had a slightly higher rate of response than predicted, as evidenced by a comparison with the expected response rate (total company rate). Of these industries, five (chemicals, petroleum refining, rubber and plastic products, metal manufacturing, and pharmaceuticals) were the key industries selected for followup activities and the rates for the remaining six (glass/concrete, electronics, measuring equipment, motor vehicles, aerospace, and office equipment) may be explained by such factors as the effect of followup based on size of company or chance.

Thus, whereas the results of the survey may be more representative of the larger manufacturing/

**Table A-2.—Distribution of Nonrespondents, Respondents, and Total Companies by Geographic Location**  
(based on Fortune 500 companies)

Geographic location <sup>a</sup>	Non respondents		Respondents		Total companies	
	Number	Percent of total nonrespondents	Number	Percent of total respondents	Number	Percent of total companies
Northeast . . . . .	82	42/0	133	43%	215	43/0
Southeast . . . . .	8	4	22	7	30	6
Central . . . . .	80	41	111	36	191	38
Mountain . . . . .	2	1	7	2	9	2
West . . . . .	21	11	34	11	55	11
Total . . . . .	193		307		500	

<sup>a</sup>The following are included in the respective geographic locations

**Northeast** Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, Southeast Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Louisiana.

**Central** North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Montana, Iowa, Missouri, Arkansas, Michigan, Wisconsin, Illinois, Indiana, Ohio, Kentucky, West Virginia.

**Mountain** Montana, Wyoming, Utah, Colorado, New Mexico, Arizona.

**West** Alaska, Hawaii, Washington, Idaho, Oregon, California, Nevada.

SOURCE National Opinion Research Center, survey conducted for OTA, 1982.

**Table A-3.—Distribution of Nonrespondents, Respondents, and Total Companies by Size**  
(based on Fortune 500 companies)

Size of company	Non respondents		Respondents		Total companies	
	Number	Percent of total nonrespondents	Number	Percent of total respondents	Number	Percent of total companies
Fortune 100 . . . . .	29	15%	71	23/0	100	20/0
Fortune 200 and 300 . . . . .	62	32	138	45	200	40
Fortune 400 and 500 . . . . .	102	53	98	32	200	40
Total . . . . .	193		307		500	

SOURCE National Opinion Research Center, survey conducted for OTA, 1982.

**Table A“4.—Distribution of Nonrespondents, Respondents, and Total Companies by Industry Classification (based on Fortune 500 companies)**

Industry classification	Non respondents		Respondents		Total companies	
	Number	Percent of total nonrespondents	Number	Percent of total respondents	Number	Percent of total companies
Mining, crude oil . . . . .	7	3.670	6	2.0%	13	2.6%
Food . . . . .	23	11.9	31	10.1	54	10.8
Tobacco . . . . .	1	<b>0.5</b>	3	1.0	4	0.8
Textile . . . . .	5	<b>2.6</b>	8	2.6	13	2.6
Apparel . . . . .	5	<b>2.6</b>	4	1.3	9	1.8
Furniture . . . . .	1	<b>0.5</b>	0	—	1	<b>0.2</b>
Paper, fiber, wood . . . . .	16	<b>8.3</b>	14	4.6	<b>30</b>	<b>6.0</b>
Publishing, printing . . . . .	8	4.1	5	1.6	<b>13</b>	<b>2.6</b>
Chemicals . . . . .	12	6.2	28	9.1	<b>40</b>	<b>8.0</b>
Petroleum refining . . . . .	11	5.7	<b>30</b>	9.8	<b>41</b>	<b>8.2</b>
Rubber, plastic . . . . .	2	1.0	4	1.3	<b>6</b>	<b>1.2</b>
Leather . . . . .	1	<b>0.5</b>	1	0.3	<b>2</b>	<b>0.4</b>
Glass, concrete . . . . .	3	<b>1.6</b>	<b>13</b>	4.2	<b>16</b>	<b>3.2</b>
Metal manufacturing . . . . .	14	<b>7.2</b>	<b>24</b>	7.8	<b>38</b>	<b>7.6</b>
Metal products . . . . .	11	<b>5.7</b>	<b>12</b>	3.9	<b>23</b>	<b>4.6</b>
Electronics, appliances . . . . .	12	<b>6.2</b>	<b>25</b>	8.1	<b>37</b>	<b>7.4</b>
Shipbuilding, railroad, and transportation equipment . . . . .	4	2.1	5	1.6	9	1.8
Measuring equipment . . . . .	4	2.1	11	3.6	15	<b>3.0</b>
Motor vehicles . . . . .	<b>6</b>	3.1	13	<b>4.2</b>	19	<b>3.8</b>
Aerospace . . . . .	<b>3</b>	1.6	11	<b>3.6</b>	14	<b>2.8</b>
Pharmaceuticals . . . . .	<b>6</b>	3.1	11	<b>3.6</b>	17	<b>3.4</b>
Soaps, cosmetics . . . . .	3	1.6	5	1.6	8	<b>1.6</b>
Office equipment . . . . .	3	1.6	10	3.2	13	<b>2.6</b>
Industrial and farm equipment . . . . .	<b>23</b>	11.9	<b>20</b>	6.5	43	<b>8.6</b>
Musical instruments, toys . . . . .	3	1.6	<b>2</b>	0.6	5	<b>1.0</b>
Broadcasting, motion pictures . . . . .	3	1.6	<b>3</b>	1.0	6	<b>1.2</b>
Beverages . . . . .	3	1.6	<b>8</b>	2.6	11	<b>2.2</b>
Total . . . . .	193		<b>307</b>		<b>500</b>	

<sup>a</sup>Industrial classification is based on Fortune 500 listing for each company; that listing was the Standard Industrial Classification Code

SOURCE: National Opinion Research Center, survey conducted for OTA, 1982.

mining corporations and private utility companies as identified in Fortune magazine listings, the respondents do not appear to differ greatly from the non-respondents in geographic location or type of company.

### **Appendix A reference**

I. Jones, Wesley H., "Generalizing Most Survey Inducement Methods: Population Interactions With Anonymity and Sponsorship)" *Public Opinion Quarter*, spring 1979, p. 108.