GENERALIZED QUESTIONNAIRE ANALYSIS PROGRAM

by

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SUMMARY

It is apparent that a simple cookbook method for designing questionnaires of all types is not available. Researchers must realize that the questionnaire is an integral part of his research effort and as such it should be tailored to his particular needs. This tailoring process is generally an iterative one whereby the researcher pilots the following aspects of the questionnaire:

- A. The letter of introduction or paragraph of explanation, whichever is appropriate.
- B. The structure of the questions, which includes the process of converting open-ended questions into multiple-choice questions.
- C. The ordering of the questions within the framework of the questionnaire.

Interview questionnaires provide the most complete kind of results, but in many cases are prohibitively expensive. The mail questionnaire, by contrast, provides an economical method of reaching large samples even if they are geographically dispersed, but control in terms of who responds is relinquished.

Personnel at the Virginia Highway Research Council can in almost every case accomplish questionnaire-based research goals by sticking to a format that is readily analyzed. This standardization allows the researcher to receive the results of his survey with a minimum of interaction and coordination with other sections. It is hoped that the guidelines contained in this report together with the program provided to analyze the results of a researcher's surveys will serve as a valuable tool for the staff of the Research Council.

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INTRODUCTION

The formulation of questions and development of answers to these questions are fundamental functions of the researcher. But when the researcher asks others to answer questions he has formulated, then these questions take on a new dimension. He assembles those questions he feels will elicit the information desired into a questionnaire. The response to these questions depends not only on the content of the question, but on other aspects as well. Principal among these are the order in which the questions are asked, the ease with which the respondent can complete the questionnaire, and the ease with which the results can be evaluated.

In the past, the Virginia Highway Research Council has undertaken several projects requiring the use of questionnaires. As those studies have evolved, each questionnaire has been individually processed by the Data Systems and Analysis Section. This approach has resulted in inefficiencies since separate programming and analysis efforts have been applied to each study. Furthermore, inappropriate questionnaire design has often hampered thorough analyses.

PURPOSE AND SCOPE

The purpose of this report is to assist the researcher in the formulation and organization of questionnaires that will provide him the information he desires and to provide a program to present the results of the questionnaire in a form that he can readily assimilate.

Implicit in this objective is the need for the questionnaire to be easily coded and readily converted into machine-compatible form for timely results. In the interest of making the tutorial manageable, many controversial aspects of design are not pursued. The omission of these should not unduly encumber the surveyor. Several references are given that provide great detail, but one should proceed cautiously when venturing into the literature for less conservative techniques.

This report includes the following topics:

- A. Developing the questionnaire
 - 1. Pilot questionnaires
 - 2. Question wording
 - 3. Questionnaire organization

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- 4. Interview questionnaires
- 5. Mail questionnaires
- 6. Reliability and validity
- B. Analysis program
 - 1. General description
 - 2. Data card specifications
 - 3. Error messages
 - 4. Example of program output

DEVELOPING THE QUESTIONNAIRE

When a research project requires that a survey be conducted to obtain information, whether opinion or fact, the instrument of the survey often is a questionnaire. It is necessary to regard the questionnaire as an integral part of the research and as such it should be given due consideration in the initial planning phase of the project. Every questionnaire is a uniquely designed instrument for a particular survey purpose and no one questionnaire can meet everyone's survey goals.

There are two general survey types; namely the descriptive and the analytical. The ten-year census is an example of the former while a survey to determine the effect of an advertising campaign is representative of the latter. Because the principles to be discussed will generally apply to both types, and since the descriptive survey is basically a counting device, emphasis will be placed on the techniques most often associated with the analytical survey.

Several types of variables are involved in the analytical survey.(1) Among these are:

- 1. Experimental Variables These are the independent variables one would like to vary in order to monitor their effect on the dependent variables.
- 2. Dependent Variables These are the results which are affected by changes made to the experimental variables. These need careful analysis to determine statistical significance.
- 3. Controlled Variables These are variables one would wish to hold constant or to have minimal effect on the results.
- 4. Uncontrolled Variables These can be either errors or correlated biases. Errors are assumed to be randomly distributed but correlated biases are extremely difficult to isolate and when present can lead to serious misinterpretations of the results. Thorough piloting of questionnaires can do much to point out correlated biases so that their effects can be minimized.

Pilot Questionnaire

The use of pilot questionnaires often can greatly increase the effectiveness of the final questionnaire. Pilot work consists of choosing a small but representative sample from the population to be measured and through successive iterations, using a different sample each time, presenting prospective questions and evaluating their effectiveness. The questions are then modified if necessary, and the process outlined above is repeated until satisfactory results are achieved. Since those subjects used in the pilot work should be excluded from the study, small populations require carefully chosen questions and severely limited pilot sample sizes.

Pilot work can be applied to other facets of the questionnaire design, two of which are noted in the following paragraphs.

- A. The letter of introduction, for instance, needs to be piloted since its purpose is to establish the necessary rapport in order to elicit responses. A brief explanation of the purpose of the study, with a few words of appreciation of the respondent's time necessary to complete the form, will do much toward establishing this rapport.
- В. Pilot work can be effectively used to design multiple-choice questions. Pilot questionnaires with open-ended questions can be used to establish the type of response one would typically get from a particular question. These answers can be reviewed and used as a guide for transforming the openended question into a multiple-choice question, which in turn should be piloted. One advantage of this transformation is that the decoding of the questionnaire is greatly facilitated, and although this burden is usually delegated to some other individual or group, there is a direct relationship between the difficulty of decoding the answers, the accuracy of the results, and the elapsed time before the results are obtained. Perhaps a more subtle reason for making this transformation is that the respondent gains further insight into what sort of answer the surveyor is expecting. This has the effect of eliminating the unclassifiable answers. Biases inherent in multiple-choice questions are minimized by this transformational approach.

Question Wording

Question wording, of course, is one of the keys to an effective questionnaire. Through carefully chosen phrasing one hopes to eliminate the offensiveness of personal questions, the personal bias of the surveyor, and the confusion of the poorly organized question. Questions miss their intended mark for various reasons. People tend to take for granted that whatever a word means to them, it will mean to everyone. Unfortunately this is not the case. The word "dinner" can serve as a very common example. To some this indicates the noon meal while for others it indicates an evening meal. The researcher should avoid words which have the possibility of diverse individual interpretations and instead describe what is intended (e.g. "the evening meal"). The surveyor's personal biases often are revealed in the form of loaded or leading questions. They in a sense suggest the type of response he would like to receive. The question "Are you against giving too much power to the trade unions?" almost requires an affirmative answer, for example. Leading questions and loaded words should obviously be avoided but the difficulty lies in detecting them. Although the question "Do you prefer being examined by a doctor of your own sex?" doesn't sound particularly loaded, explicitly stating the alternatives as in "Would you rather be examined by a male or female doctor, or doesn't it matter?" seems much more neutral. Questions utilizing negatives, and especially double negatives, should be avoided since they tend to be confusing.

Questions that deal with achievement, social standing, and the like invite bias. Almost everyone likes to view himself in a favorable light, and as a result answers to questions such as income level, health habits, and cultural interest will usually be biased toward raising the respondent's prestige level. Although this bias cannot be prevented in every case it is important to acknowledge its existence. Wherever possible the questions should be worded so as to make low prestige answers sound as acceptable as all other possible answers. An introductory phrase emphasizing the importance of accuracy tends to help minimize this bias.

Related to prestige bias is the problem of wording questions in a manner that assumes the respondent has the necessary information to respond. Rather than admit lack of knowledge the respondent may guess or even make up what he feels is an appropriate answer. The solution here is to word the question so that indicating lack of knowledge is provided as acceptable as all other possible answers.

Embarrassing questions often elicit biased answers. Whenever possible the surveyor should use bracketed responses, which, instead of forcing an exact answer to a question of the form "How much alcohol do you consume?" leave a choice of answers representing a range of values. This technique is especially useful when an exact answer is available but not necessary, such as inquiring of women's ages.

Since people tend to avoid the two extremes it is advisable to add extra ranges beyond the scope of interest to help diminish this bias.

In general the approach is to create a permissive atmosphere. In the alcohol consumption example, using daily consumption quantities instead of weekly ones would reduce the quantity levels (by a factor of 7) and thus make them sound more acceptable (e.g., 4 bottles of beer a day sounds like fewer than 28 bottles a week). In every case a guarantee of anonymity helps to overcome these biases.

Personal data questions are often presented in an abrupt manner (e.g. sex?, age?), which tends to make them offensive. Writing the question out in full (e.g. "Please indicate your sex.") helps to soften these too often asked questions. Additionally, questions should be written with frequent use of polite phrasing (e.g. "Please select one of the following answers.").

Questionnaire Organization

Several benefits are derived from careful ordering of the questions. Often one cannot be certain that the respondent has the knowledge or is the type of person for which a specific portion of the questionnaire was intended. In this case a filter question should be employed to allow him to skip portions that he is not qualified to answer. The filter question is usually one that can be answered yes or no and is in turn followed by a conditional question such as "If the answer to the above was yes, then please answer the following questions."

The sequence in which the questions are presented should be chosen in a manner that tends to build and maintain rapport. First in the sequence should be questions that seem most relevant to the stated reason for the questionnaire. This has the effect of building rapport by lending credence to the stated purpose. Personal data questions on the other hand have a negative effect and would be more acceptable if interspersed or placed at the end of the questionnaire. It is generally not advisable to group them at the beginning as is often done.

A consistent answering format should be used throughout the questionnaire whether an underline, circle, or check the box beside the answer scheme is to be used. Altering the marking method for portions of the questionnaire can be both confusing and irritiating for the respondent. It is also worth noting that having to underline or circle long answers can make answering questions tiresome, and adds an unnecessary burden to the respondent.

INTERVIEW QUESTIONNAIRES

The single most important benefit of the interviewer administered questionnaire is its flexibility. The interviewer can provide explanation for confusing questions and help maintain interest in the survey. The respondent can be allowed to answer questions in an open-ended manner while the interviewer codes the result by selecting the multiplechoice answer that best describes the response. Information about such things as the respondent's home, dress, or mannerisms can be recorded from observation. Visual material can be used to clarify a question if necessary or it can be used to establish respondent reaction. The interviewer can direct questions to a particular individual, whereas mailed questionnaires may be completed by the wrong person (e.g. a neighbor; the husband if the wife was the intended recipient) or it may become a joint effort.

Questionnaires of this type have definite disadvantages. Interviewing can be expensive, especially if the sample is widely distributed geographically. Moreover, the results may be less than satisfactory in this case. Salaries, training, and travel represent the principal expenses, and without well trained interviewers the benefits of this type of research are greatly diminished. Interviewer bias, a term which embraces a diverse list of interviewer characteristics, such as age, sex, race, dress, speech, tone of voice when reading questions, and failure to obey instructions, to mention a few, has to be recognized, minimized, and accounted for in the final results.

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The respondent is subject to biases unique to the interview situation. When multiple-choice questions are used the respondent tends to remember only the first or last in the series and often responds accordingly. This phenomenon is termed ordinal bias. It can be minimized by keeping the questions and multiple-choice answers as brief as possible, changing the order of the answers from interview to interview, and repeating the answers for the respondent. It has been suggested that the length of questions be limited to approximately twenty words, and that they should be simply stated. Prestige bias also plays an important role since the respondent wants the interviewer to see him in a good light; this is especially true when personal data are being sought. ⁽²⁾ Prestige bias can be reduced by applying the methods discussed previously and through the skills of the interviewer.

The skills necessary to conduct interviews for pilot work are similar to those needed by the questionnaire interviewer and those techniques, which are a separate topic not to be dealt with here, should be emphasized when training the interviewers. Details of these techniques are presented in chapters 7, 8, and 9 of "The Dynamics of Interviewing", by Robert L. Kahn and Charles F. Cannell.

MAIL QUESTIONNAIRES

Mailing the questionnaire to the prospective respondent presents obvious advantages and subtle disadvantages. Being able to reach a large sample over a broad geographic area at a very low cost certainly makes this approach attractive. When one's budget is severely limited this may be in fact the only way the survey can be conducted.

The consideration of primary importance is establishing and maintaining rapport with the respondent. A convincing letter of introduction stating the purpose of the survey is necessary. Then the techniques of organization as discussed should be applied with special emphasis on maintaining interest by use of a minimum of offensive questions. It should be realized that although question wording and questionnaire organization are always important considerations, they are the only means of communication when using mail questionnaires.

One might reason that non-response is not a random process and does, therefore, introduce bias. Non-response due to vacation or hospitalization can be considered random, but a heavy drinker not wishing to respond to a questionnaire on alcoholism is obviously not random. Ascertaining this bias or making suitable adjustments for it should be part of the overall plan.

Christopher $Scott^{(3)}$ has observed the following reactions to mail surveys in England. The use of stamped self-addressed envelopes improves the response rate as does the inclusion of inducements such as gifts, free samples, or money. Government sponsorship also improves response rates, but neither imposing letterheads nor colored paper have any noticeable positive effect. The length of questionnaire the respondent will tolerate is a function of his involvement, while the time of the week that he receives it makes no difference.

RELIABILITY AND VALIDITY

Questionnaires which yield consistent results with repeated application are considered reliable. Reliability is achieved through elimination of ambiguous, biased, and otherwise confusing or misleading questions. That is, a reliable questionnaire is typically one that has been carefully worded and thoroughly piloted. A reliable questionnaire may not measure the variable as accurately as desired but it will produce consistent results.

Validity, by contrast, is the measure of accuracy. If the questionnaire does in fact accurately measure the variable of interest it is considered valid. With a valid questionnaire, consistently accurate results are assured. Therefore, validity implies reliability, whereas the converse is not true.

A slightly different problem is that of determining whether or not an individual's responses to a questionnaire are reliable and valid. For factual questions, reliability can be ascertained by asking the same question in different ways at different points in the questionnaire. A more desirable approach is to ask a logically related question and compare the two responses for consistency. This aspect of verification can be performed during the programatic analysis of the data. Validity, however, is often more elusive and is best established by using a second, independent source of information. Sources such as accident or arrest records could provide the information for such a validity check. Obviously this sort of checking needs to be performed apart from the programatic analysis.

ANALYSIS PROGRAM

A program has been written to aid in the analysis of questionnaire data. This program stipulates that:

- A. Multiple-choice questions should be used exclusively.
- B. The number of possible answers should be held to a minimum, and should not exceed ten.
- C. Answers should be coded using letters A through J.
- D. The method of coding and the location of the responses on the questionnaire should be chosen to facilitate encoding and decoding.
- E. As few questions as possible should be used, with a maximum of 99 allowed.

A portion of a typical questionnaire conforming to these restrictions is illustrated in the Appendix.

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The program described is intended to be a source of fundamental summary information that will allow the researcher to make a good decision as to what further analysis if any is necessary. When the surveyor has need for a more sophisticated analysis he is advised to utilize a statistical "canned" program such as the Statistical Package for the Social Sciences (SPSS) which is available on the CDC 6400 at the University's Division of Academic Computing.

General Description

This program provides a simple routine for handling standardized questionnaires. It calculates the following for each question asked:

- 1. The number of occurrences for each response to the question, and
- 2. the percentage each response scored out of the total.

In addition there is an option to run cross tabulation analysis up to a maximum of nine different choices for each run. Cross tabulation is an analysis of the relationship of two different questions. In essence you would like to see the significance, if any, of a person's answer to question (5) if he answers question (2) by (c). An example might be to see if the fact that the respondent is a male influences his pay rate. For each cross tabs analysis the following calculations are printed:

- 1. The occurrences for each response to the question,
- 2. the percentage each response scored out of those falling into the category specified, and
- 3. the percentage each response scored out of the total number of respondents.

Data Cards

The following data cards are required:

Card 1 Format (8A10)

Up to 80 alphabetic characters to denote the title of the questionnaire study. This title will be centered on the printout if it is centered on the card.

<u>Card 2</u> Format (I3, 2I1, 1X, 37(1X, R1)), (6X, 37(1X, R1)1)

Columns 1-3 Integer - the number of questions asked on the questionnaire.

Column 4 Integer - 1 if identification numbers are to be used for the questionnaire, else 0

- Column 5 Integer the number of cross tabs to be run, (maximum of 9) 0 or blank if no cross tabulations are to be run. If more than 9 cross tabulations are required the program should be rerun.
- Columns 7-80 Alphabetic the highest alphabetic response for the first 37 questions, each response preceded by a blank. If all responses cannot be contained on the first card continue on another card beginning in column 7. (37 to a card)
- Example: From a questionnaire containing 50 questions three cross tabs are to be run. Identification numbers where b denotes a blank are to be used.

Columns	<u>Contents</u>
1-3	050
4	1
5	3
6	Ь
7-80°C°D°B°C	б́г
Card 2, Column 7 ØDØEØB	ØD

<u>Card 3</u> Format (9(I2, R1, 1X, I2, 2X))

This card will appear only if a cross tab analysis is requested (column 5 of data card 2 ± 1)

Column 1-2	Integer - the number of the question to be checked for the proper response
Column 3	Alphabetic - the proper response to the question
Column 4	Dash (-)
Columns 5-6	Integer - the number of the question which is used to check correlation.
Columns 7-8	Blank
Columns 9–16	Same as above - used for second cross tab
Columns 17–24	Same as above - used for third cross tab
Columns 25–32	Same as above - used for fourth cross tab

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Columns 33-40Same as above - used for fifth cross tabColumns 41-48Same as above - used for sixth cross tabColumns 49-56Same as above - used for seventh cross tabColumns 57-64Same as above - used for eighth cross tabColumns 64-71Same as above - used for ninth cross tab

Card 4 through N Format (I5, I1, 37(1X, R1)1)

 Columns 1-5 Integer - identification number if used
 Column 6 Integer - the data card number for the respondent (maximum of 3)
 Columns 7-80 Alphabetic - the responses to the first 37 questions,

each preceded by a blank.

2. To continue answers 38-99 continue on this same format, duplicating the identification number, incrementing the data card number, and proceeding in placing responses to the questions.

(Do steps 1-2 above for each respondent interviewed.)

Sample Data Cards



Card 1. Heading - Centered on the data card.

Card 2. This data card illustrates a setup for a questionnaire which has:

- (1) 15 questions
- (2) Identification numbers
- (3) 3 cross tab specifications

The answer to question 1 must be an A or B The answer to question 2 must be A, B, C, D, E, or F The answer to question 3 must be A, B, C, D, E, F, H, I, or J and so on...

- Card 3. The first cross tab checks to see if the respondent answered question 2 by the letter A. If so, his response to question 5 is checked and so on.
- Card 4. This is the data card for the first respondent.
 - 0001 This is his identification number.
 - 1 This is the card number.
 - B This is his response to question one.
 - C This is his response to question two.

and so on.

Error Messages

A. If the following error message appears

------FATAL ERROR------DATA SEQUENCE ERROR IN DATA GROUP NUMBER 2 IDENTIFICATION NO. 00002

then check data for the following possible causes:

- 1. The identification numbers do not match for a continuation of a respondent's data card.
- 2. Two or more respondents have the same identification numbers.
- 3. The continuation of a respondent's data card is out of sequence.
- B. If the following error message appears

THE RESPONSE TO QUESTION NUMBER 6 IS IN ERROR FOR DATA GROUP 7 IDENTIFICATION NUMBER 2562.

then check data to see if the answer to question number 6 is out of range.

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C. If the following error message appears

IMPROPER NUMBER OF QUESTIONS SPECIFIED IN CONTROL CARD NUMBER 1

then the number of questions (data card 2 column 1-3) specified is either less than 0 or greater than 99.

D. If the following error message appears

MORE THAN 20 ERRORS DETECTED - PLEASE CHECK YOUR CONTROL CARDS

then check control cards for the following:

- 1. Incorrect data range specification.
- 2. Incorrect cross tabulation specification.

Note that the questions are not stated and it is recognized that a certain amount of cross-referencing is required by the researcher to determine how the questions were stated. However, allowing this minor inconvenience greatly facilitates the coding and processing of the data. The standard output for a portion of a questionnaire is illustrated in Figure 1. Additionally this program provides a facility for cross tabulations. This feature allows the user to specify the relationship of interest. Typical output for cross tabulation is shown in Figure 2.

VIRGINIA HIGHWAY RESEARCH COUNCIL QUESTIONNAIRE ANALYSIS DRIVING UNDER THE INFLUENCE OF ALCOHOL - AN OPINION SURVEY

THE RESPONSES TO QUESTION NUMBER 1 WERE AS FOLLOWS:

*	OCCURRENCES	PERCENT
RESPONSE A	10	76.9
RESPONSE B	3	23.1
NO RESPONSE	0	0.0
DATA ERRORS	0	0.0

THE RESPONSES TO QUESTION NUMBER 2 WERE AS FOLLOWS:

	OCCURRENCES	PERCENT
RESPONSE A	0	0.0
RESPONSE B	2	15.4
RESPONSE C	4	30.8
RESPONSE D	4	30.8
RESPONSE E	0	0.0
RESPONSE F	1	7.7
NO RESPONSE	2	15.4
DATA ERRORS	0	0.0

THE RESPONSES TO QUESTION NUMBER 3 WERE AS FOLLOWS:

	OCCURRENCES	PERCENT
RESPONSE A	2	15,4
RESPONSE B	3	23.1
RESPONSE C	2	15.4
RESPONSE D	0	0.0
RESPONSE E	1	7.7
RESPONSE F	0	0.0
RESPONSE G	1	7.7
RESPONSE H	0	0.0
RESPONSE I	1	7.7
RESPONSE J	0	0.0
NO RESPONSE	3	23.1
DATA ERRORS	0	0.0

Figure 1. General computer output.

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VHRC QUESTIONNAIRE ANALYSIS — CROSS-TABULATION RESULTS DRIVING UNDER THE INFLUENCE OF ALCOHOL - AN OPINION SURVEY

NO ONE RESPONDED A TO QUESTION NUMBER 2

THOSE RESPONDING B TO QUESTION NUMBER 2 CHOSE THE FOLLOWING RESPONSES TO QUESTION NUMBER 5

		PERCENT	
	OCCURRENCES	CROSS TABS	TOTAL
RESPONSE A	0	0.0	0.0
RESPONSE B	0	0.0	0.0
RESPONSE C	0	0.0	0.0
RESPONSE D	1	50.0	7.7
RESPONSE E	1	50.0	7.7
NO RESPONSE	0	0.0	0.0
DATA ERRORS	0	0.0	0.0

NO ONE RESPONDED B TO QUESTION NUMBER 5

NO ONE RESPONDED B TO QUESTION NUMBER 5

THOSE RESPONDING B TO QUESTION NUMBER 1 CHOSE THE FOLLOWING RESPONSES TO QUESTION NUMBER 5

		PERCENT		
	OCCURRENCES	CROSS TABS	TOTAL	
RESPONSE A	0	0.0	0.0	
RESPONSE B	0	0.0	0.0	
RESPONSE C	0	0.0	0.0	
RESPONSE D	2	66.7	15.4	
RESPONSE E	1	33.3	7.7	
NO RESPONSE	0	0.0	0.0	
DATA ERRORS	0	0.0	0.0	

Figure 2. Computer output for cross tabulation.

APPENDIX

PORTION OF SAMPLE QUESTIONNAIRE

THE PURPOSE OF THIS QUESTIONNAIRE IS TO GATHER INFORMATION FOR THE VIRGINIA DEPARTMENT OF HIGHWAYS ABOUT DRINKING HABITS AND DRIVING RECORDS OF MOTORISTS ON VIRGINIA HIGHWAYS.

Do not put your name on the questionnaire - please answer with care and accuracy

(FOR EACH QUESTION CIRCLE THE LETTER ASSOCIATED WITH THE MOST APPROPRIATE ANSWER)

1.

Which of the following most closely approximates your daily consumption of mixed drinks $(1\frac{1}{2}$ ounce 80 proof):

- A. None
 B. One
 C. Two
 D. Three
 E. Four
 F. Five or more
- 2. Which of the following most closely approximates your daily consumption of 12 ounce bottles of beer:

А.	None
в.	One
с.	Two
D.	Three
E.	Four
F.	Five or more

3.

Please indicate your age at your last birthday:

Α.	16-19
в.	20-25
C.	26-35
D.	36-50
E.	51-65
F.	66 or over

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- 4. During the past twelve months I have been convicted of the following number of moving traffic violations (for example, speeding, running a red light, reckless driving).
 - A. None
 B. One
 C. Two
 D. Three
 E. Four or more

5. Please indicate your sex:

A. Male

B. Female

REFERENCES CITED

- 1. Oppenheim, A. N., <u>Questionnaire Design and Attitude Measurement</u>, New York: Basic Books, 1966.
- 2. Kahn, Robert L., and Charles F. Cannell, <u>The Dynamics of Interviewing</u>, New York: Wiley, 1957.
- 3. Scott, Christopher, "Research on Mail Surveys", Journal of the Royal Statistical Society, XXIV, Series A, 1961, pp. 143-195.

SELECTED REFERENCES

- 1. Hansen, Morris H., William N. Hurwitz, and William G. Madow, <u>Sample Survey</u> <u>Methods and Theory</u>, New York: Wiley, 1966.
- 2. Cattell, Raymond B., Factor Analysis, New York: Harper, 1952.

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