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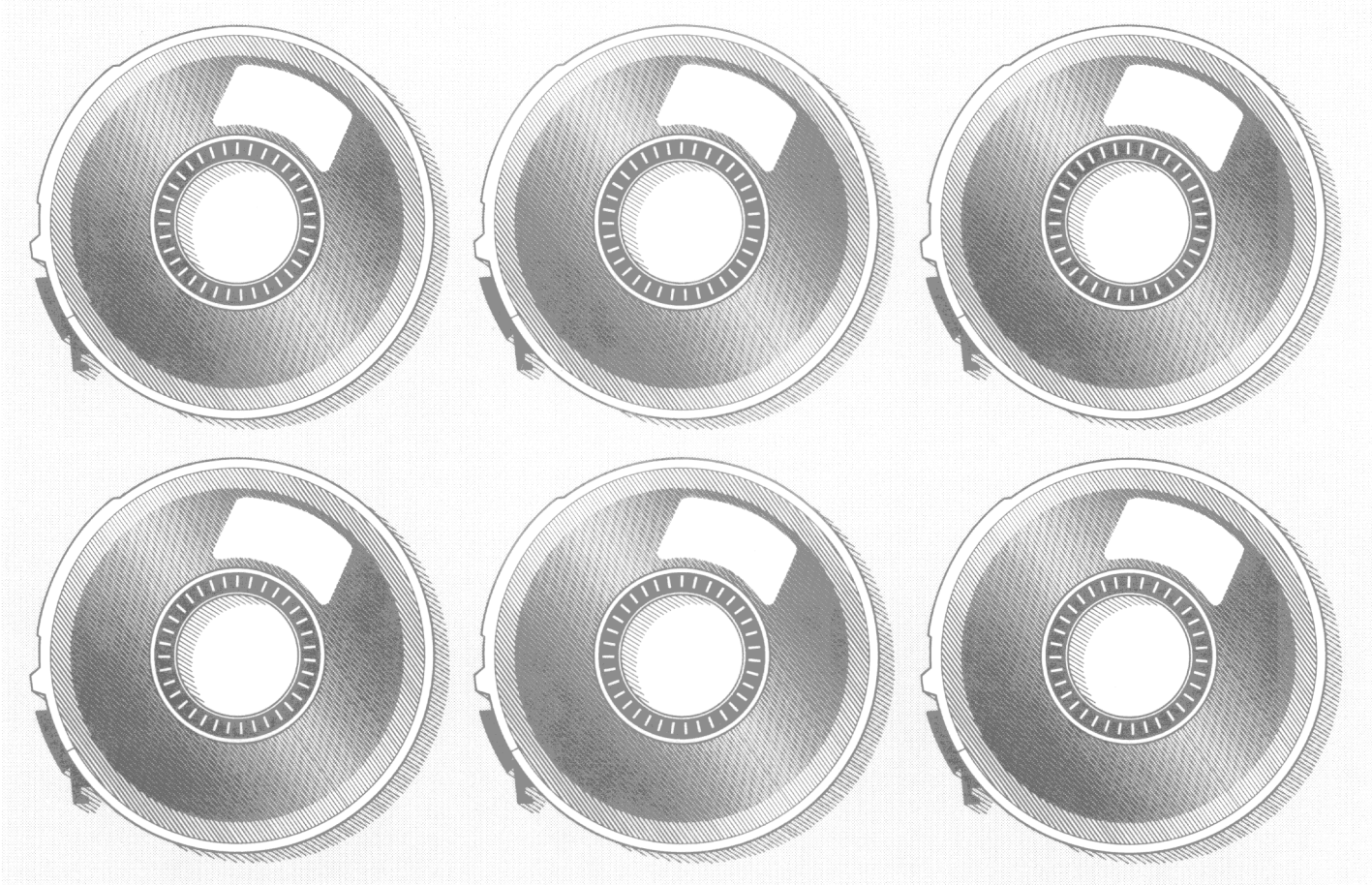
Public Use Data Tape Documentation

Measurement and Interpretation of Electrocardiograms Ages 20 - 74 years, Tape Number 6540, Version 1

Hispanic Health and Nutrition Examination Survey, 1982 - 84



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Center for Health Statistics

CENTERS FOR DISEASE CONTROL

Public Use Data Tape Documentation

Measurement and Interpretation of Electrocardiograms, Ages 20 - 74 Years Tape Number 6540, Version 1

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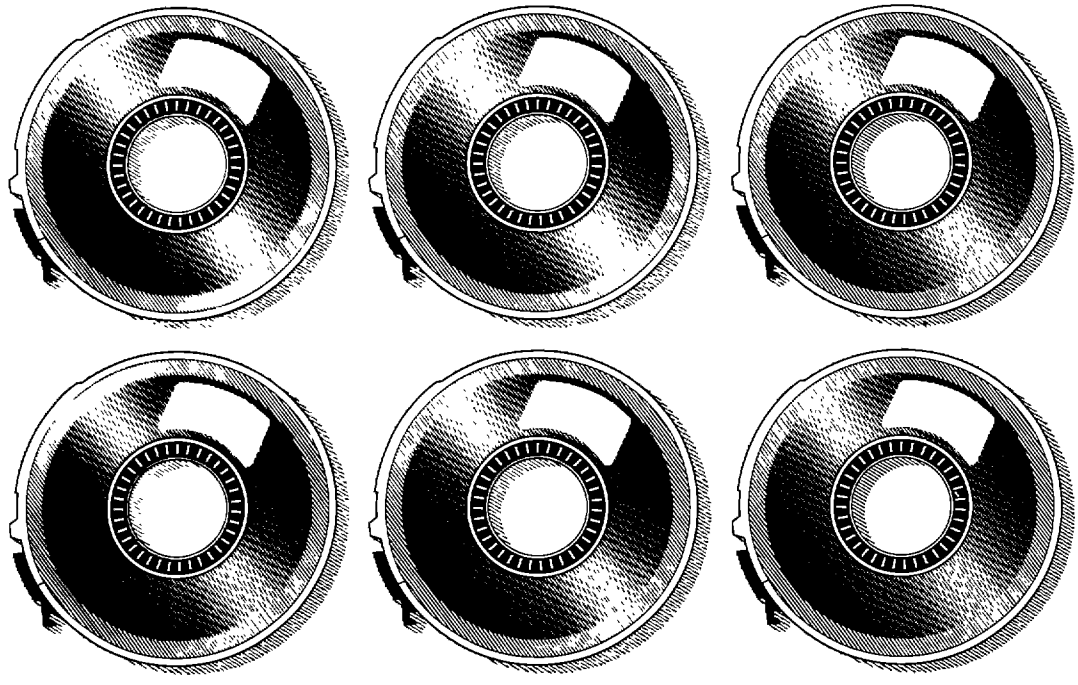

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Center for Health Statistics

Hyattsville, Maryland
December 1992

Hispanic Health and Nutrition Examination Survey

Mexican Americans
Cuban Americans
Puerto Ricans

Tape Number 6540

MEASUREMENT AND INTERPRETATION OF ELECTROCARDIOGRAMS

Ages 20 Years - 74 Years

Version 1

December 1992

The Hispanic Health and Nutrition Examination Survey (HHANES) was conducted from July 1982 through December 1984. The data on the tape documented here are from all three portions of the survey:

Mexican Americans
Residing in selected counties of Texas, Colorado, New Mexico, Arizona and California
Surveyed from July 1982 through November 1983
9,894 persons sampled; 8,554 interviewed; 7,462 examined

Cuban Americans
Residing in Dade County (Miami), Florida
Surveyed from January 1984 through April 1984
2,244 persons sampled; 1,766 interviewed; 1,357 examined

Puerto Ricans
Residing in the New York City area, including parts of New Jersey and Connecticut
Surveyed from May 1984 through December 1984
3,786 persons sampled; 3,369 interviewed; 2,834 examined

The following tape characteristics are those of the version of the tape kept at NCHS and of the tape transmitted to the National Technical Information Service for release to users:

Tape labels: IBM standard
Data set name: HHANES.DU654001
Data set organization: Physical sequential
Record format: Fixed block
Record length: 1017
Block size: 24408
Number of records: 5815
Data code: EBCDIC

CAUTION

BEFORE USING THIS DATA TAPE,
PLEASE READ THIS PAGE

- Read the accompanying description of the survey, "The Plan and Operation of the Hispanic Health and Nutrition Examination Survey", DHHS Publication No. (PHS) 85-1321 before conducting analyses of the data on this tape.
- Two aspects of HHANES, especially, should be taken into account when conducting any analyses: the sample weights and the complex survey design.
- Analyses should not be conducted on data combined from the three portions of the survey (Mexican-American, Cuban-American, Puerto Rican).
- HHANES is a survey of Hispanic households and some of the sample persons included on this tape are not of Hispanic origin. A detailed description of the data codes dealing with national origin or ancestry appears in the NOTES section of this document.
- Examine the range and frequency of values of a variable before conducting an analysis of data. The range may include unusual or unexpected values. The frequency counts may be useful to determine which analyses may be worthwhile.
- Language of interview, which may appear several places on this tape, can vary depending on the questionnaire (several used in the survey) and on whether the response was provided by the sample person or by a proxy.
- For some data items, reference is made to a note. The notes (in a separate section of this document) may be very important in data analyses. Attention to them is strongly urged.
- For some data items, the number of sample persons with a positive response is very small. In these instances, it may not be possible to produce a reliable population estimate.

This Public Use Data Tape has been edited very carefully. Numerous consistency and other checks were also performed. Nevertheless, due especially to the large number of data items, some errors may have gone undetected.

Please bring to the attention of NCHS any errors in the data tape or the documentation. Errata sheets will be sent to people who have purchased the data tapes and corrections will be made to subsequently released data tapes.

In publications, please acknowledge NCHS as the original data source. The acknowledgment should include a disclaimer crediting the authors for analyses, interpretations, and conclusions; NCHS should be cited as being responsible for only the collection and processing of the data. In addition, NCHS requests that the acronym HHANES be placed in the abstracts of journal articles and other publications based on data from this survey in order to facilitate the retrieval of such materials through automated bibliographic searches. Please send reprints of journal articles and other publications that include data from this tape to NCHS.

Divsion of Health Examination Statistics
National Center for Health Statistics
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6525 Belcrest Road
Hyattsville, MD 20782

Public Use Data Tapes for the Hispanic Health and Nutrition Examination Survey will be released through the National Technical Information Service (NTIS) as soon as the data have been edited, validated and documented. A list of NCHS Public Use Data Tapes that can be purchased from NTIS may be obtained by writing the Scientific and Technical Information Branch, NCHS.

Scientific and Technical Information Branch
National Center for Health Statistics
Presidential Building, Room 1064
6525 Belcrest Road
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301-436-8500

CONTENTS

SECTION A. INTRODUCTION AND SURVEY DESCRIPTION

The National Center for Health Statistics (NCHS) collects, analyzes, and disseminates data on the health status of Americans. The results of surveys, analyses, and studies are made known primarily through publications and the release of computer data tapes. This document contains details required to guide programmers, statistical analysts, and research scientists in the use of a Public Use Data Tape.

From 1960 through 1980 NCHS conducted five population-based, national health examination surveys. Each survey involved collecting data by direct physical examination, the taking of a medical history, and laboratory and clinical tests and measurements. Questionnaires and examination components have been designed to obtain and support analyses of data on certain targeted conditions such as diabetes, hypertension, and anemia. Beginning with the first National Health and Nutrition Examination Survey (NHANES I) a nutrition component was added to obtain information on nutritional status and dietary practices. The numbers of Hispanics in these samples were, however, insufficient to enable adequate estimation of their health conditions. From 1982 through 1984 a Hispanic Health and Nutrition Examination Survey (HHANES) was conducted to obtain data on the health and nutritional status of three Hispanic groups: Mexican Americans from Texas, Colorado, New Mexico, Arizona and California; Cuban Americans from Dade County, Florida; and Puerto Ricans from the New York City area, including parts of New Jersey and Connecticut.

The general structure of the HHANES sample design was similar to that of the previous National Health and Nutrition Examination Surveys. All of these studies have used complex, multistage, stratified, clustered samples of defined populations. The major difference between HHANES and the previous surveys is that HHANES was a survey of three special subgroups of the population in selected areas of the United States rather than a national probability sample. A detailed presentation of the design specifications is found in Chapter 5 of "Plan and Operation of the Hispanic Health and Nutrition Examination Survey, 1982-84" (Ref. No. 1).

Data collection began with a household interview. Several questionnaires were administered:

- A Household Screener Questionnaire (HSQ), administered at each selected address, for determining household eligibility and for selecting sample persons.

- A Family Questionnaire (FQ), administered once for each family containing sample persons, which included sections on family relationships, basic demographic information for sample persons and head of family, Medicare and health insurance coverage, participation in income assistance programs, and housing characteristics.

- An Adult Sample Person Questionnaire (ASPQ), for persons 12 through 74 years which, depending on age, included sections on health status measures, health services utilization, smoking (20 through 74 years), meal program participation, and acculturation. Information on the use of medicines and vitamins in the past two weeks was also obtained.

- A Child Sample Person Questionnaire (CSPQ), for sample persons 6 months through 11 years which included sections on a number of health status issues, health care utilization, infant feeding practices, participation in meal programs, school attendance, and language use. Information on the use of medicines and vitamins in the past two weeks was also obtained.

At the Mobile Examination Center two questionnaires were administered and an examination performed.

- An Adult Sample Person Supplement (ASPS), for sample persons 12 through 74 years, which included sections on alcohol consumption, drug abuse, depression, smoking (12 through 19 years), pesticide exposure, and reproductive history.

- A Dietary Questionnaire (DQ), for persons 6 months through 74 years, by which trained dietary interviewers collected information about "usual" consumption habits and dietary practices, and recorded foods consumed 24-hours prior to midnight of the interview.

- An examination which included a variety of tests and procedures. Age at interview and other factors determined which procedures were administered to which examinees. A dentist performed a dental examination and a vision test. Technicians took blood and urine specimens and administered a glucose tolerance test, X-rays, electrocardiograms, and ultrasonographs of the gallbladder. Technicians also performed hearing tests and took a variety of body measurements. A physician performed a medical examination focusing especially on the cardiovascular, gastrointestinal, neurological and musculoskeletal systems. The physician's impression of overall health, nutritional and weight status, and health care needs were also recorded. Some blood and urine specimen analyses were performed by technicians in the examination center; others were conducted under contract at various laboratories.

Because the HHANES sample is not a simple random one, it is necessary to incorporate sample weights for proper analysis of the data. These sample weights are a composite of individual selection probabilities, adjustments for noncoverage and nonresponse, and poststratification adjustments. The HHANES sample weights, which are necessary for the calculation of point estimates, are located on all data tapes in positions 184-213. Because of the complex sample design and the ratio adjustments used to produce the sample weights, commonly used methods of point and variance estimation and hypothesis testing which assume simple random sampling may give misleading results. In order to provide users with the capability of estimating the complex sample variances in the HHANES data, Strata and Pseudo Primary Sampling Unit (PSU) codes have been provided on all data tapes in positions 214-217. These codes and the sample weights are necessary for the calculation of variances.

There are computer programs available designed for variance estimation for complex sample designs. The balanced repeated replication approach (Ref. No. 2) is used in &REPERR and a linearization approach is used in &PSALMS to calculate variance-covariance matrixes. Both routines are available within the OSIRIS IV library (Ref. No. 3). SURREGR (Ref. No. 4) and SUPERCARP (Ref. No. 5) are programs that calculate variance-covariance matrixes using a linearization approach (Ref. No. 6) (Taylor series expansion). Another program, SESUDAAN (Ref. No. 7) calculates standard errors, variances, and design effects. (Note: This version of SESUDAAN should not be used to obtain variances for totals.) SURREGR and SESUDAAN are special procedures which run data under the SAS system (Ref. No. 8).

Even though the total number of examined persons in this survey is quite large, subclass analyses can lead to estimates that are unstable, particularly estimates of variances. Consequently, analyses of subclasses require that the user pay particular attention to the number of sample persons in the subclass and the number of PSU's that contain at least one sample person in the subclass. Small sample sizes, or a small number of PSU's used in the variance calculations, may produce unstable estimates of the variances.

A more complete discussion of these issues and possible analytic strategies for examining various hypotheses is presented in Chapter 11 of "Plan and Operation of the Hispanic Health and Nutrition Examination Survey, 1982-84" (Ref. No. 1) and in an earlier NCHS methodology (Series 2) publication (Ref. No. 9).

Some users, however, may not have access to the computer programs for estimating complex sample variances or may want to do their preliminary analyses without using them. In addition, variance estimates calculated from HHANES data through use of the programs described previously are likely to be unstable because there were so few sample areas for each portion of HHANES. This instability is not due to there being too few people in the sample but may be due to the fact that the sample was selected from relatively few areas. Therefore, the following

discussion is designed to provide an alternative approach to deal with the unavailability of software and the small number of PSU's. The approach is based on using average design effects (Ref. No. 10).

The design effect, defined as the ratio of the variance of a statistic from a complex sample to the variance of the same statistic from a simple random sample of the same size, that is,

$$\text{DESIGN EFFECT (DEFF)} = \frac{\text{COMPLEX SAMPLE VARIANCE}}{\text{SIMPLE RANDOM SAMPLE VARIANCE}}$$

is often used to show the impact of the complex sample design on variances. If the design effect is near 1, the complex sample design has little effect on the variances and the user could consider assuming simple random sampling for the analysis.

Some illustrative design effects for HHANES data on this tape are given in the following tables. The design effects in the tables are the average for the age groups usually presented in NCHS Series 11 publications. If the average design effect for a subgroup was less than 1.0 (implying an improvement over simple random sampling), it was coded as 1.0.

The following guidelines were used in the calculation of the average design effects:

1. Exclude all persons of non-Hispanic origin,
2. Exclude all estimates for large age ranges, such as all ages combined or 'all adults', and
3. Exclude all estimates where the proportion of the subpopulation with the specific characteristic or condition was zero percent or one hundred percent.

Design effects tend to be larger when age groups are combined, just as they are when the sexes are combined, as shown in the tables. The data in the tables give the user an idea of the range in design effects for selected response variables from this data tape. If a response variable is not one shown in the tables take the range into account; it is possible that a user could have one of the higher, rather than one of the lower, design effects.

Suppose for example, that of the 3,532 Mexican-Americans ages 20-74 years who had an electrocardiogram (ECG), 8.9 percent have an equivocal ECG finding. Suppose, also, that their mean heart rate was 67.

Assuming simple random sampling, the variance for the percent is calculated by converting the percent to a proportion and using the standard formula for the variance of a proportion,

$$V = \frac{pq}{n}$$

This variance (V) multiplied by the design effect (DEFF) provides an estimate of the variance from a complex sample of the same sample size (n). In the example above,

$$V = \frac{(.089)(.911)}{3532}$$

$$= .000029 = \text{variance for a simple random sample}$$

Average Design Effects, by Sex, for Selected Variables --
Mexican-American Portion

Variable	Mean or Proportion	Tape Positions	Both Sexes	Male	Female
ECG Estimate of LV Mass Index	x	456-459	1.3	1.1	1.3
Major Abnormality (adjusted)	p	461	1.0	1.0	1.0
Minor Abnormality (adjusted)	p	462	1.4	1.0	1.3
Diagnostic ECG (adjudicated)	p	463	1.5	1.4	1.0
Equivocal ECG (adjudicated)	p	464	1.2	1.0	1.2
Heart Rate/min	x	513-516	1.3	1.0	1.1

Source: NCHS, HHANES, 1982-84, Tape Number 6540, Version 01

Average Design Effects, by Sex, for Selected Variables --
Cuban-American Portion

Variable	Mean or Proportion	Tape Positions	Both Sexes	Male	Female
ECG Estimate of LV Mass Index	x	456-459	1.4	1.6	1.3
Major Abnormality (adjusted)	p	461	1.1	1.0	1.0
Minor Abnormality (adjusted)	p	462	1.0	1.0	1.1
Diagnostic ECG (adjudicated)	p	463	1.3	1.3	1.0
Equivocal ECG (adjudicated)	p	464	1.0	1.0	1.0
Heart Rate/min	x	513-516	1.0	1.0	1.1

Source: NCHS, HHANES, 1982-84, Tape Number 6540, Version 01

Average Design Effects, by Sex, for Selected Variables --
Puerto Rican Portion

Variable	Mean or Proportion	Tape Positions	Both Sexes	Male	Female
ECG Estimate of LV Mass Index	x	456-459	1.0	1.0	1.1
Major Abnormality (adjusted)	p	461	1.5	1.5	1.1
Minor Abnormality (adjusted)	p	462	1.0	1.3	1.3
Diagnostic ECG (adjudicated)	p	463	1.1	1.0	1.0
Equivocal ECG (adjudicated)	p	464	1.1	1.6	1.1
Heart Rate/min	x	513-516	1.0	1.3	1.0

Source: NCHS, HHANES, 1982-84, Tape Number 6540, Version 01

Then, multiplying by the design effect,

$$= \quad (.000022)(1.2)$$

$$= \quad .000028 \quad = \quad \text{estimated variance for the complex sample}$$

In a similar way, the complex sample variance of the mean heart rate is determined by multiplying the simple random sample variance of the mean by the appropriate design effect--in this example, 1.3.

The user can then proceed with estimating confidence intervals and testing hypotheses in the usual manner.

The user should recognize that this approach does not incorporate the variance covariance matrix. In most cases, this leads to a slight overestimate of the variance because the covariance terms, which are subtracted in the variance of a ratio, in general are positive. Thus, in a borderline case, the null hypothesis would be less likely to be rejected (Ref. No. 11).

Alternative or better approaches may exist or be developed. Users who want to suggest such approaches, or who want the latest information should contact the Scientific and Technical Information Branch (address given in the beginning of this documentation).

SECTION B. DATA COLLECTION AND PROCESSING PROCEDURES

Data presented in Sections E through H and the family relationships data in Section J were collected on the Household Screener and Family Questionnaires. These interview schedules were administered in sample persons' households. (Data presented in Section K were collected in the Mobile Examination Centers.) Completed interview schedules were reviewed in the Survey's field offices and again at the data processing center of NCHS by clerical editors. The editors checked the forms for completeness, clarity, and compliance with skip patterns, and they coded items such as industry and occupation. At the data processing center the questionnaires were keyed and verified on key-to-disk data entry equipment under the control of programs that checked for valid codes and ranges, compliance with skip patterns and consistency. After being keyed, data were reedited by analysts for reasonableness and consistency and for compliance with instructions for sampling and questionnaire administration.

The general tape description format is Tape Position X Item X Counts. The item (field) may be a tape descriptor (e.g., Version Number), a sample person descriptor (e.g. Age at Interview), or a question (e.g., Is sample person covered by Medicare?). Where appropriate, data entries are presented by codes. Frequency counts are given for each code. The counts are included to help the user in planning analyses and in verifying that programs account for all data. The data source is given also (e.g., from Family Questionnaire). In some cases, a note is referenced. The notes contain explanations of the item (e.g., how Poverty Index is calculated).

The questionnaire data have undergone many quality control and editing procedures. The responses of sample persons to some questions may appear extreme or illogical. Self-reported data, especially, are subject to a number of sources of variability, including recall and other reporting errors. In the data clean-up process, responses that varied considerably from expected were verified through direct review of the collection form or a copy of it. Such responses may not represent fact, but they are included as recorded in the field. The user must determine if these responses should be included in analyses.

Responses to "other" and "specify" were recoded to existing categories, if possible. For responses that could not be recoded, new code categories were created if the information was deemed analytically useful. Caution should be used in interpreting the data from these new categories because there is no way of knowing which other respondents would have selected one of the new categories if given the option.

For the adult sample person questionnaires there are three codes for missing information: 7's, 8's, and blanks. In a few questions, 7's were used when the question was not applicable. A code "8", which is labeled as "blank but applicable", is used to indicate that a sample person should have a data value for a particular item but for varying reasons that value is unavailable. Blanks were used to follow skip patterns, i.e., when a question was not supposed to be asked or was not applicable. The "don't know" codes (9, 99, 999) were used only when given as a printed response on the original questionnaire.

Copies of the questionnaires, both in English and Spanish, can be found in the plan and operation report for HHANES (Ref. No. 1). Detailed information on interviewing and examination procedures is contained in the household interviewer's manual (Ref. No. 12) and the examination staff procedures manual (Ref. No. 13). These manuals are available upon request from:

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The electrocardiographic data presented in Section K give an objective measure of cardiac health status of individuals examined in the HHANES. The electrocardiogram is a relatively insensitive tool for the assessment of cardiac health status. In addition, the individual electrocardiographic measures of cardiac health status have varying specificity in terms of the extent to which they represent abnormality. Despite these limitations, the electrocardiographic variables are carefully and completely defined. Also, an extensive process was used to ensure the accuracy of findings described in this data tape.

Data Collection Procedures

The procedure for collection of the electrocardiographic data which is summarized below, is described in detail in the Examination Staff Procedures Manual for HHANES, 1982-1984 (Instruction Manual, 15a). Marquette Electronics Microcomputer Augmented Cardiograph Digital Recording Electrocardiograph units (MAC-DR) were used for recording the electrocardiograms. These units recorded 10 seconds of ECG data simultaneously for 8 independent components of the 12 standard leads, followed by a calibration signal. The following computer algorithm:

$$\begin{aligned} \text{III} &= \text{II} - \text{I} \\ \text{aVR} &= -1/2(\text{I} + \text{II}) \\ \text{aVL} &= \text{I} - 1/2(\text{II}) \\ \text{aVF} &= \text{II} - 1/2(\text{I}) \end{aligned}$$

provided the remaining 4 leads, III, aVR, aVL and aVF from leads I and II. Subsequently, a 20-second rhythm strip was recorded from the Frank XYZ leads. The electrocardiographic data were stored on magnetic tape cassettes after analog to digital conversion. The sampling rate was 250 samples/sec channel for the 12-lead ECG and 500 samples/sec channel for the XYZ leads. These data were subsequently transferred to IBM compatible 9-track digital tapes for processing and permanent storage. Hardcopy tracings including 5.4 seconds from each of the standard leads and 5.4 seconds from the XYZ leads were printed at a paper speed of 25mm/sec. A 35-Hz filter was used to reduce noise on the ECG paper tracing. Frequency response was equal to or exceeded the American Heart Association recommendations (Circulation 52(2):11, 1975). Frequency response was -3db at 0.001 Hz low frequency measured from initial 320 ms of step input response, -3db at 140 Hz high frequency with 5mm amplitude signal.

Tracings were recorded by health technicians. Their performance was monitored by a supervisory health technician who reviewed samples of the tracings for poor technique. Field calibration of the electrocardiographic units was performed weekly and included: 1) a self-calibration testing gain, linearity, step response, frequency response and offset; 2) external source calibration testing response of unit to external-generated calibrated signals, and; 3) playback calibration testing the ability to produce an identical copy of a previously recorded electrocardiogram. A staff bioengineer reviewed the results of these tests and ensured continued adequate functioning of the equipment.

All electrocardiograms were performed prior to any glucose load. Time since last meal varied because some sample persons had fasted overnight and some had afternoon examinations after lunch.

Data Processing Procedures

The procedure for measurement, classification and validation of the electrocardiographic variables involved:

1. A computer reading of all electrocardiograms;

2. A manual reading of electrocardiograms with myocardial infarction-associated codes by an expert cardiologist;

3. Manual reading of the latter subset of electrocardiograms by technician coders;

4. Adjudication of differences in the computer reading and the two sets of manual readings by three expert electrocardiographers.

The digital electrocardiographic data collected in the field at the mobile examination centers were initially sent to the Dalhousie University Heart Disease Research Centre for computer measurement and coding of the waveforms. The procedures for this computer coding are documented in Section M. These measurements and codes are the source of the "Dalhousie" computer-generated variables which are provided. Electrocardiograms with Dalhousie computer-generated myocardial infarction-associated codes (Minnesota codes 1.1.1-1.2.5, 1.2.7, 1.2.8-1.3.6, 9.2, 4.1-4.3, 5.1-5.3) were then manually assessed by Cardiologist, Daniel Savage, MD, PhD and coders at the University of Minnesota Electrocardiography Coding Laboratory. Procedures at the Coding Laboratory are documented in Reference 4 (Section M). Finally, differences among the manual readings and the computer readings were adjudicated in a review of individual tracings by three experts (Pentti Rautaharju, MD, PhD, Ronald Prineas, BM, PhD and Daniel D. Savage, MD, PhD). This latter process is the source of the adjudicated readings.

SECTION C. REFERENCES

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12. National Center for Health Statistics: Instruction Manual Part 15h, Household Interviewer's Manual for the Hispanic Health and Nutrition Examination Survey, 1982-84. Hyattsville, MD. 1986.

13. National Center for Health Statistics: Instruction Manual Part 15a, Examination Staff Procedures Manual for the Hispanic Health and Nutrition Examination Survey, 1982-84. Hyattsville, MD. 1986.

SECTION D. TAPE POSITION INDEX

TAPE POSITIONS 1-400 contain data categories common to all data tapes: sociodemographic data, family composition, family income, residence and household. Sample weights are also in this set of data.

TAPE POSITION 401+ contain data categories unique to this data tape.

SOCIODEMOGRAPHIC DATA - SAMPLE PERSON (SECTION E)

1 - 5	Sample Person Sequence Number
6 - 15	Survey and Tape Indentifiers
16	Examination Status
17	Language of Interview
18 - 21	Date of Interview
22 - 25	Date of Examination
26 - 29	Date of Birth
30 - 32	Age at Interview
33 - 38	Age at Examination
39 - 43	Family Number
44 - 45	Relationship to Head of Family
46	Sex
47	Race
48 - 49	National Origin or Ancestry
50 - 52	Birth Place
53	National Origin Recode
54 - 56	Education
57	Marital Status
58	Service in Armed Forces
59 - 69	Work/Occupation/Employment
70 - 95	Health Insurance/Health Care Support
96 - 99	Income Assistance/Public Compensation or Support

SOCIODEMOGRAPHIC DATA - HEAD OF FAMILY (SECTION F)

100	Interview and Examination Status
102 - 105	Date of Birth
106 - 108	Age at Inteview
109	Sex
110	Race
111 - 112	National Origin or Ancestry
113 - 115	Birth Place
116 - 118	Education
119	Marital Status
120	Service in Armed Forces
121 - 131	Work/Occupation/Employment

FAMILY COMPOSITION AND INCOME DATA (SECTION G)

132-133	Number of People in Family
134-135	Number of Sample People in Family
136-138	Combined Family Income
139-143	Per Capita Income
144-146	Poverty Index
147-162	Income, Food Stamps

RESIDENCE AND HOUSEHOLD DATA (SECTION H)

163	Size of Place
164	Standard Metropolitan Statistical Area
165-166	Number of People in Household
167-168	Number of Sample People in Household
169-170	Number of Rooms
171	Kitchen Facilities Access
172-183	Heating/Cooling Equipment

SAMPLE WEIGHTS (SECTION I)

184-189	Examination Final Weight
190-195	Interview Final Weight
196-201	GTT/Ultrasound Weight
202-207	Audiometry/Vision Weight
208-213	Pesticide Weight
214-215	Strata Code
216-217	Pseudo PSU Code

FAMILY RELATIONSHIPS (SECTION J)

218-400	Data not yet available

CONVENTIONAL 12-LEAD ECG DATA (SECTION K)

401-404	Tape number
410-415	Summary diagnoses based on computer readings
416-444	Minnesota Code items coded by computer
445-451	Cardiac Infarction/Injury Score
452-460	LV Mass and LV Mass Index estimates
461-482	Minnesota codes after adjudication
513-539	Heart rate, basic ECG interval and mean axis data
542-1017	Amplitude and duration measurements

SECTION E. SOCIODEMOGRAPHIC DATA - SAMPLE PERSON (POS 1-99)

Source: Family Questionaire (FQ)
Household Screener Questionnaire (HSQ)

Position	Item Description and Code	Counts M	C	P	Source and Notes
1-5	**Sample person sequence number**				
	00001-09894 Mexican Americans	3555	-	-	
	10002-12238 Cuban Americans	-	907	-	
	13001-16785 Puerto Ricans	-	-	1353	
6-12	**Blank**				
13	**Portion of survey**				
	1 Mexican-American (M)	3555	-	-	
	2 Cuban-American (C)	-	907	-	
	3 Puerto Rican (P)	-	-	1353	
14	**Family Questionnaire missing**				
	1 Yes	10	4	5	See Note 1
	2 No	3545	903	1348	
15	**Version number**				
	1	3555	907	1353	
16	**Examination status**				
	1 Examined	3555	907	1353	See Note 2
	2 Not examined	0	0	0	
17	**Language of interview (Pos 1-400)**				FQ
	1 English	2127	157	561	
	2 Spanish	1418	746	787	
	Blank	10	4	5	
	Date of interview				HSQ 4
18-19	01-12 Month	3555	907	1353	
20-21	82-84 Year	3555	907	1353	
	Date of examination				
	From survey control record				
22-23	01-12 Month	3555	907	1353	
24-25	82-84 Year	3555	907	1353	
	Date of birth				HSQ 2e
26-27	01-12 Month	3555	907	1353	
	88 Blank but applicable	0	0	0	
28-29	08-64 Year	3555	907	1353	
88	Blank but applicable	0	0	0	
30-31	**Age at interview** (computed)				
	20-74 (See next column for units)	3555	907	1353	
32	**Age at interview units**				HSQ 2f
	1 Years	3555	907	1353	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
	Age at examination (computed)				
	Positions 33-38 are all 0 for non-examined persons				
33-34	20-75 Years	3555	907	1353	
35-36	00-11 Months	3555	907	1353	
37-38	00-30 Days	3555	907	1353	
39-43	**Family number**				See Note 3
	00002-03527	3555	-	-	
	04005-04922	-	907	-	
	07003-08584	-	-	1353	
44-45	**What is sample person's relationship to head of family? Sample person is:**				HSQ 2b See Note 4
	01 Head of family living alone (1 family with only 1 member)	143	56	113	
	02 Head of family with no related persons in household (2+ persons in household)	70	23	23	
	03 Head of family with related persons in household	1566	368	674	
	04 Wife of head (husband living at home and not in Armed Forces)	1264	297	290	
	05 Wife of head (husband living at home and is in Armed Forces)	5	0	0	
	06 Husband of head (wife living at home and not in Armed Forces)	35	12	37	
	07 Husband of head (wife living at home and is in Armed Forces)	0	0	0	
	08 Child of head or head's spouse	277	76	126	
	09 Grandchild of head or head's spouse	7	0	3	
	10 Parent of head or head's spouse	57	35	33	
	11 Other relative (includes ex-spouse, daughter-in-law, etc.)	131	40	54	
	12 Foster child	0	0	0	
46	**Sex**				FQ B-4
	1 Male	1572	393	498	
	2 Female	1983	514	855	
47	**Observed race**				FQ B-5
	1 White	3446	870	1220	See Note 5
	2 Black	30	13	62	
	3 Other	6	2	27	
	8 Blank but applicable	41	12	28	
	9 Not observed	22	6	11	
	Blank	10	4	5	
48-49	**Sample person's national origin or ancestry**				HSQ 2c See Note 6
	01 Mexican/Mexicano	940	1	1	
	02 Mexican-American	2230	0	0	
	03 Chicano	46	0	0	
	04 Puerto Rican	7	3	1202	
	05 Boricuan	0	0	15	
	06 Cuban	3	796	14	
	07 Cuban-American	0	69	0	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
48-49	**Sample person's national origin or ancestry (Cont'd)**				HSQ 2c See Note 6
	08 Hispano - specify	61	10	20	
	09 Other Latin-American or other Spanish - specify	25	16	25	
	00 Other - specify	217	12	76	
	10 Spanish-American	13	0	0	
	11 Spanish (Spain)	13	0	0	
50-52	**In what state or foreign country was sample person born?**				FQ B-6
	001-115 State/country code	3528	900	1324	
	888 Blank but applicable	17	3	24	
	Blank	10	4	5	
53	**National origin recode** "Hispanic" = Mexican-American in Southwest, Cuban-American in Florida, and Puerto Rican in New York City area				See Note 8
	1 "Hispanic"	3326	865	1220	
	2 Not "Hispanic"	229	42	133	
54-55	**What is the highest grade or year of regular school sample person has ever attended?**				FQ B-7
	00 Never attended or kindergarten only	141	6	23	
	01-08 Elementary grade	1312	342	435	
	09-12 High school grade	1442	292	666	
	13-16 College	536	228	195	
	17 Graduate school	69	30	14	
	88 Blank but applicable	45	5	15	
	Blank	10	4	5	
56	**Did sample person finish that grade/year?**				FQ B-8
	1 Yes	2779	779	1055	
	2 No	580	108	236	
	8 Blank but applicable	45	10	34	
	Blank	151	10	28	
57	**Is sample person now married, widowed, divorced, separated or has he or she never been married?**				FQ B-9
	1 Married - spouse in household	2539	622	647	
	2 Married - spouse not in household	68	17	53	
	3 Widowed	161	50	66	
	4 Divorced	209	92	154	
	5 Separated	149	21	147	
	6 Never married	403	100	275	
	8 Blank but applicable	16	1	6	
	Blank	10	4	5	

Position	Item Description and Code	Counts M	C	P	Source and Notes
58	**Did sample person ever serve in the Armed Forces of the United States?**				FQ B-11
	1 Yes	413	27	141	
	2 No	3125	874	1198	
	8 Blank but applicable	7	2	9	
	Blank	10	4	5	
59	**During the past 2 weeks, did sample person work at any time at a job or business, not counting work around the house?**				FQ B-12
	1 Yes	2028	581	566	
	2 No	1507	317	767	
	8 Blank but applicable	10	5	15	
	Blank	10	4	5	
60	**Even though sample person did not work during those 2 weeks, did he or she have a job or business?**				FQ B-13
	1 Yes	44	12	21	
	2 No	1462	303	743	
	8 Blank but applicable	11	7	18	
	Blank	2038	585	571	
61	**Was sample person looking for work or on layoff from a job?**				FQ B-14
	1 Yes	200	39	51	
	2 No	1306	276	713	
	8 Blank but applicable	11	7	18	
	Blank	2038	585	571	
62	**Which, looking for work or on layoff from a job or both?**				FQ B-15
	1 Looking	131	30	35	
	2 Layoff	45	6	8	
	3 Both	22	2	7	
	8 Blank but applicable	13	8	19	
	Blank	3344	861	1284	
63-65	**What kind of business or industry does sample person work for?**				FQ B-19 See Note 9
	010-932 Industry code	2238	621	628	
	990 Blank but applicable	31	10	21	
	Blank	1286	276	704	
66-68	**What kind of work was sample person doing?**				FQ B-20 See Note 9
	003-889 Occupation code	2240	622	628	
	999 Blank but applicable	29	9	21	
	Blank	1286	276	704	
69	**Class of worker**				FQ B-22
	1 An employee of a private company, business or individual for wages, salary, or commission	1742	502	501	
	2 A Federal government employee	72	6	18	
	3 A State government employee	119	18	17	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
69	**Class of worker (Cont'd)**				FQ B-22
	4 A Local government employee	163	16	56	
	5 Self-employed in own incorporated business or professional practice	17	12	7	
	6 Self-employed in own unincorporated business, professional practice or farm	125	66	26	
	7 Working without pay in family business or farm	1	0	0	
	8 Blank but applicable	29	10	23	
	0 Never worked or never worked at a full-time civilian job lasting 2 weeks or more	1	1	1	
	Blank	1286	276	704	
70	**Is sample person now covered by Medicare?**				FQ C-2
	1 Covered	258	103	109	
	2 Not covered	3279	796	1234	
	8 Blank but applicable	5	3	5	
	9 Don't know	3	1	0	
	Blank	10	4	5	
71	**Is sample person now covered by the part of Social Security Medicare which pays for hospital bills?**				FQ C-3
	1 Yes	230	96	100	
	2 No	13	4	4	
	8 Blank but applicable	14	3	10	
	9 Don't know	6	3	0	
	Blank	3292	801	1239	
72	**Is sample person now covered by that part of Medicare which pays for doctor's bills? This is the Medicare plan for which he or she or some agency must pay a certain amount each month.**				FQ C-4
	1 Yes	227	98	92	
	2 No	14	3	11	
	8 Blank but applicable	14	3	10	
	9 Don't know	8	2	1	
	Blank	3292	801	1239	
73	**Type of Medicare coverage** As shown on Medicare card				FQ C-5
	2 Medical	2	0	0	
	3 Card not available	3	0	1	
	4 Hospital and medical	5	3	0	
	8 Blank but applicable	14	3	10	
	Blank	3531	901	1342	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
	HEALTH INSURANCE				See Note 10
74	**Is sample person covered by any health insurance plan which pays any part of a hospital, doctor's, or surgeon's bill?**				FQ C-11
	1. Yes	2009	556	560	
	2 No	1526	343	779	
	8 Blank but applicable	6	4	9	
	9 Don't know	4	0	0	
	Blank	10	4	5	
75	**Is sample person covered by a plan that pays any part of hospital expenses?**				FQ C-9
	1 Yes	1979	550	525	
	2 No	3	3	4	
	8 Blank but applicable	27	7	35	
	9 Don't know	6	0	5	
	Blank	1540	347	784	
76	**Is sample person covered by a plan that pays any part of a doctor's or surgeon's bills for operations?**				FQ C-10
	1 Yes	1982	546	523	
	2 No	9	7	17	
	8 Blank but applicable	15	7	20	
	9 Don't know	9	0	9	
	Blank	1540	347	784	
	Many people do not carry health insurance for various reasons. Which of these statements describes why sample person is not covered by any health insurance (or Medicare)? (Positions 77-80)				FQ C-13/15 See Note 10
77-78	Main reason				
	01 Care received through Medicaid or welfare	79	14	289	
	02 Unemployed, or reasons related to unemployment	180	29	68	
	03 Can't obtain insurance because of poor health, illness, or age	17	2	9	
	04 Too expensive, can't afford health insurance	756	163	226	
	05 Dissatisfied with previous insurance	23	2	2	
	06 Don't believe in insurance	14	3	4	
	07 Have been healthy, not much sickness in the family, haven't needed health insurance	94	15	13	
	08 Military dependent, (CHAMPUS), Veteran's benefits	20	1	11	
	09 Some other reason--not specified	1	0	2	
	10 Some other reason--specified	112	19	37	
	88 Blank but applicable	49	23	29	
	Blank	2210	636	663	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
79-80	Second reason				
	00 No second reason reported	1102	199	564	
	01 Care received through Medicaid or welfare	25	10	23	
	02 Unemployed, or reasons related to unemployment	46	16	12	
	03 Can't obtain insurance because of poor health, illness, or age	3	1	2	
	04 Too expensive, can't afford health insurance	81	14	56	
	05 Dissatisfied with previous insurance	8	1	2	
	06 Don't believe in insurance	7	1	1	
	07 Have been healthy, not much sickness in the family, haven't needed health insurance	21	4	3	
	08 Military dependent, (CHAMPUS), Veteran's benefits	0	0	0	
	09 Some other reason--not specified	0	0	0	
	10 Some other reason--specified	13	6	2	
	88 Blank but applicable	39	19	25	
	Blank	2210	636	663	
81-87	**Blank**				
88	**During the last 12 months, has sample person received health care which has been or will be paid for by Medicaid?**				FQ D-6
	1 Yes	195	66	385	
	2 No	3328	832	949	
	8 Blank but applicable	22	5	14	
	9 Don't know	0	0	0	
	Blank	10	4	5	
89	**Does sample person have a Medicaid card?**				FQ D-8
	1 Yes	198	67	403	
	2 No	3329	825	931	
	8 Blank but applicable	18	11	14	
	9 Don't know	0	0	0	
	Blank	10	4	5	
90	**Status of sample person's Medicaid card.**				FQ D-9
	1 Medicaid card seen--current	148	52	285	
	2 Medicaid card seen--expired	2	0	5	
	3 No card seen	43	13	103	
	4 Other card seen	0	0	0	
	5 Other card seen (specify)	3	0	1	
	8 Blank but applicable	20	13	23	
	Blank	3339	829	936	
91	**Is sample person now covered by any other public assistance program that pays for health care?**				FQ D-11
	1 Yes	12	2	12	
	2 No	3527	900	1331	
	8 Blank but applicable	6	1	5	
	9 Don't know	0	0	0	
	Blank	10	4	5	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
92	**Does sample person now receive military retirement payments from any branch of the Armed Forces or a pension from the Veteran's Administration? Do not include VA disability compensation.**				FQ D-13
	1 Yes	45	2	9	
	2 No	3492	900	1335	
	8 Blank but applicable	8	1	4	
	9 Don't know	0	0	0	
	Blank	10	4	5	
93	**Which does sample person receive: the Armed Forces retirement, the VA pension, or both?**				FQ D-14
	1 Armed Forces	12	0	2	
	2 Veteran's Administration	24	0	5	
	3 Both	4	2	1	
	8 Blank but applicable	13	1	5	
	Blank	3502	904	1340	
94	**Is sample person now covered by CHAMP-VA, which is medical insurance for dependents or survivors of disabled veterans?**				FQ D-16
	1 Yes	20	2	6	
	2 No	3520	900	1340	
	8 Blank but applicable	5	1	2	
	9 Don't know	0	0	0	
	Blank	10	4	5	
95	**Is sample person now covered by any other program that provides health care for military dependents or survivors of military persons?**				FQ D-18
	1 Yes	20	1	5	
	2 No	3518	901	1336	
	8 Blank but applicable	7	1	7	
	9 Don't know	0	0	0	
	Blank	10	4	5	
96	**Is sample person included in the AFDC, "Aid to Families with Dependent Children", assistance program?**				FQ D-2
	1 Yes	87	15	182	
	2 No	3448	885	1153	
	8 Blank but applicable	10	2	12	
	9 Don't know	0	1	1	
	Blank	10	4	5	
97	**Does sample person now receive the "Supplemental Security Income" or "SSI" gold-colored check?**				FQ D-4
	1 Yes	92	43	91	
	2 No	3441	852	1247	
	8 Blank but applicable	12	8	10	
	9 Don't know	0	0	0	
	Blank	10	4	5	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
98	**Does sample person have a disability related to his or her service in the Armed Forces of the United States?**				FQ D-20
	1 Yes	48	2	14	
	2 No	343	20	106	
	8 Blank but applicable	29	7	30	
	Blank	3135	878	1203	
99	**Does sample person now receive compensation for this disability from the Veteran's Administration?**				FQ D-21
	1 Yes	31	1	9	
	2 No	17	1	4	
	8 Blank but applicable	29	7	31	
	Blank	3478	898	1309	

SECTION F. SOCIODEMOGRAPHIC DATA - HEAD OF FAMILY (POS 100-131)

Source: Family Questionnaire (FQ)
Household Screener Questionnaire (HSQ)

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
100	**Interview and examination status of head of family**				See Note 4
	1 Selected as sample person, interviewed on Adult Sample Person Questionnaire, and examined	3158	764	1266	
	2 Selected as sample person, interviewed on Adult Sample Person Questionnaire, but not examined	120	32	30	
	3 Selected as sample person, not interviewed, and not examined	98	21	5	
	4 Not selected as sample person	169	86	47	
	Blank	10	4	5	
101	**Blank**				
	Date of birth				HSQ 2e
102-103	01-12 Month	3535	902	1352	
	88 Blank but applicable	0	5	1	
104-105	00-86, 89-99 Year	3545	904	1352	
	88 Blank but applicable	10	3	1	
106-107	**Age at interview**				
	18-95 Years	3555	907	1353	
108	**Blank**				
109	**Sex**				FQ B-4
	1 Male	2939	719	768	
	2 Female	606	184	580	
	Blank	10	4	5	
110	**Observed race**				FQ B-5
	1 White	3417	862	1218	See Note 5
	2 Black	35	17	67	
	3 Other	4	2	22	
	8 Blank but applicable	54	18	29	
	9 Not observed	35	4	12	
	Blank	10	4	5	
111-112	**Head of family's national origin or ancestry.**				HSQ 2c See Note 6
	01 Mexican-Mexicano	948	0	2	
	02 Mexican-American	2180	0	0	
	03 Chicano	46	0	0	
	04 Puerto Rican	9	5	1198	
	05 Boricuan	0	0	14	
	06 Cuban	4	801	22	
	07 Cuban-American	0	58	0	
	08 Hispano--specify	65	14	16	
	09 Other Latin-American or other Spanish--specify	24	11	16	
	00 Other--specify	254	18	85	
	10 Spanish-American	11	0	0	
	11 Spanish (Spain)	14	0	0	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
113-115	**In what state or foreign country was head of family born?**				FQ B-6 See Note 7
	001-118 State/country code	3509	893	1320	
	888 Blank but applicable	36	10	28	
	Blank	10	4	5	
116-117	**What is the highest grade or year of regular school head of family has ever attend?**				FQ B-7
	00 Never attended or kindergarten only	138	4	17	
	01-08 Elementary grade	1406	350	482	
	09-12 High school grade	1323	256	630	
	13-16 College	515	236	175	
	17 Graduate school	88	41	24	
	88 Blank but applicable	75	16	20	
	Blank	10	4	5	
118	**Did head of family finish that grade/year?**				FQ B-8
	1 Yes	2733	788	1083	
	2 No	603	90	216	
	8 Blank but applicable	71	21	32	
	Blank	148	8	22	
119	**Is the head of family now married, widowed, divorced, separated or has he or she never been married?**				FQ B-9
	1 Married--spouse in household	2741	694	710	
	2 Married--spouse not in household	56	7	48	
	3 Widowed	179	41	70	
	4 Divorced	198	94	156	
	5 Separated	143	14	178	
	6 Never married	189	46	183	
	8 Blank but applicable	39	7	3	
	Blank	10	4	5	
120	**Did head of family ever serve in the Armed Forces of the United States?**				FQ B-11
	1 Yes	780	38	239	
	2 No	2730	854	1096	
	8 Blank but applicable	35	11	13	
	Blank	10	4	5	
121	**During the past 2 weeks, did head of family work at any time at a job or business, not counting work around the house?**				FQ B-12
	1 Yes	2529	661	699	
	2 No	986	230	638	
	8 Blank but applicable	30	12	11	
	Blank	10	4	5	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
122	**Even though head of family did not work during those 2 weeks, did he or she have a job or business?**				FQ B-13
	1 Yes	52	14	15	
	2 No	934	216	623	
	8 Blank but applicable	30	12	11	
	Blank	2539	665	704	
123	**Was head of family looking for work or on layoff from a job?**				FQ B-14
	1 Yes	220	46	54	
	2 No	766	184	583	
	8 Blank but applicable	30	12	12	
	Blank	2539	665	704	
124	**Which, looking for work or on layoff from a job or both?**				FQ B-15
	1 Looking	115	31	32	
	2 Layoff	63	9	10	
	3 Both	40	3	9	
	8 Blank but applicable	32	15	15	
	Blank	3305	849	1287	
125-127	**What kind of business or industry does head of family work for?**				FQ B-19 See Note 9
	010-932 Industry code	2769	705	752	
	990 Blank but applicable	49	15	22	
	Blank	737	187	579	
128-130	**What kind of work was head of family doing?**				FQ B-20 See Note 9
	003-889 Occupation code	2771	705	750	
	999 Blank but applicable	47	15	24	
	Blank	737	187	579	
131	**Class of worker**				FQ B-22
	1 Employee of a private company, business or individual for wages, salary, or commission	2155	543	567	
	2 A Federal government employee	98	3	24	
	3 A State government employee	118	11	29	
	4 A Local government employee	180	19	90	
	5 Self-employed in own incorporated business or professional practice	26	19	10	
	6 Self-employed in own unincorporated business, professional practice, or farm	201	108	32	
	7 Working without pay in family business or farm	0	0	0	
	8 Blank but applicable	39	17	21	
	0 Never worked or never worked at a full-time civilian job lasting 2 weeks or more	1	0	1	
	Blank	737	187	579	

SECTION G. FAMILY COMPOSITION AND INCOME DATA (POS 132-162)

Source: Family Questionnaire (FQ)

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
132-133	**Number of persons in family** (computed)				
	01-18 Persons	3555	907	1353	
134-135	**Number of sample persons in family** (computed)				
	01-13 Persons	3555	907	1353	
136	**Was the total combined family income during the past 12 months more or less than $20,000? Include money from jobs, Social Security, retirement income, unemployment payments, public assistance, and so forth. Also include income net from interest, dividends, income from business, farm or rent, and any other money income received.**				FQ E-10
	1 $20,000 or more	1195	361	326	
	2 Less than $20,000	2233	526	1000	
	7 Refused information	18	1	5	
	8 Blank but applicable	99	15	17	
	Blank	10	4	5	
137-138	**Of those income groups, which best represents the total combined family income during the past 12 months? Include wages, salaries, and other items we just talked about (in dollars).**				FQ E-11
	01 Less than 1,000	22	7	4	
	02 1,000 - 1,999	46	6	15	
	03 2,000 - 2,999	51	14	34	
	04 3,000 - 3,999	82	20	55	
	05 4,000 - 4,999	97	21	126	
	06 5,000 - 5,999	117	32	75	
	07 6,000 - 6,999	143	26	82	
	08 7,000 - 7,999	146	31	68	
	09 8,000 - 8,999	118	26	45	
	10 9,000 - 9,999	126	33	56	
	11 10,000 - 10,999	132	46	59	
	12 11,000 - 11,999	109	31	33	
	13 12,000 - 12,999	143	39	53	
	14 13,000 - 13,999	90	21	29	
	15 14,000 - 14,999	111	17	32	
	16 15,000 - 15,999	99	23	41	
	17 16,000 - 16,999	95	22	31	
	18 17,000 - 17,999	104	21	32	
	19 18,000 - 18,999	147	20	45	
	20 19,000 - 19,999	116	34	46	
	21 20,000 - 24,999	336	101	79	
	22 25,000 - 29,999	293	61	68	
	23 30,000 - 34,999	163	44	51	
	24 35,000 - 39,999	145	48	31	
	25 40,000 - 44,999	107	32	22	
	26 45,000 - 49,999	52	27	21	
	27 50,000 and over	54	34	31	
	77 Refused information	41	9	25	
	88 Blank but applicable	260	57	59	
	Blank	10	4	5	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
139-143	**Per capita income** (computed)				See Note 11
	00083-50000 Dollars	3244	837	1264	
	88888 Blank but applicable	301	66	84	
	Blank	10	4	5	
144-146	**Poverty index** (computed)				See Note 12
	Decimal not shown on tape				
	0.04-9.78	3244	837	1264	
	999 Blank but applicable	301	66	84	
	Blank	10	4	5	
147	**Did any member of this family receive any Government food stamps in any of the past 12 months?**				FQ E-12
	1 Yes	619	149	506	
	2 No	2921	752	840	
	8 Blank but applicable	5	2	2	
	Blank	10	4	5	
148-149	**In how many months of the past 12 months did any member of this family receive food stamps?**				FQ E-13
	01-12 Months	613	149	504	
	88 Blank but applicable	11	2	4	
	Blank	2931	756	845	
150	**Did this family receive any government food stamps last month?**				FQ E-14
	1 Yes	502	120	481	
	2 No	116	29	25	
	8 Blank but applicable	6	2	2	
	Blank	2931	756	845	
151-152	**In which month did any member of this family last receive food stamps?**				FQ E-15
	01-12 Month	114	29	25	
	88 Blank but applicable	8	2	2	
	Blank	3433	876	1326	
153-154	**For how many persons were those food stamps authorized?**				FQ E-16
	01-13 Persons	614	149	505	
	88 Blank but applicable	10	2	3	
	Blank	2931	756	845	
155-157	**What was the total face value of those food stamps received by this family in that month?**				FQ E-17
	010-520 Dollars	585	147	499	
	888 Blank but applicable	39	4	9	
	Blank	2931	756	845	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
158	**Did this family spend more for food in that month than the value of your food stamps?**				FQ E-18
	1 Yes	539	128	492	
	2 No	74	21	14	
	8 Blank but applicable	11	2	2	
	Blank	2931	756	845	
159-161	**How much more?**				FQ E-19
	003-880 Dollars	501	120	482	
	888 Blank but applicable	49	10	12	
	Blank	3005	777	859	
162	**Is your family receiving food stamps at the present time?**				FQ E-20
	1 Yes	474	116	473	
	2 No	3061	783	869	
	8 Blank but applicable	10	4	6	
	Blank	10	4	5	

SECTION H. RESIDENCE AND HOUSEHOLD DATA (POS 163-183)

Source: Family Questionnaire (FQ)
Household Screener Questionnaire (HSQ)

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
163	**Size of place**				See Note 13
	1 1 million or more	484	0	1009	
	2 500,000 - 999,999	423	0	0	
	3 250,000 - 499,999	450	334	0	
	4 100,000 - 249,999	91	235	155	
	5 50,000 - 99,999	568	49	32	
	6 25,000 - 49,999	386	131	98	
	7 10,000 - 24,999	352	76	46	
	8 200 - 9,999	491	52	13	
	9 Not in a place	310	30	0	
164	**Standard Metropolitan Statistical Area**				See Note 13
	1 In SMSA, in central city	1771	334	1173	
	2 In SMSA, not in central city	1332	573	180	
	4 Not in SMSA	452	0	0	
165-166	**Number of persons in household**				HSQ 1a
	01-18 Persons	3555	907	1353	
167-168	**Number of sample persons in household** (computed)				
	01-13 Persons	3555	907	1353	
169-170	**How many rooms are in this home? Count the kitchen, but not the bathroom.**				FQ E-1
	01-14 Rooms	3541	902	1346	
	88 Blank but applicable	4	1	2	
	Blank	10	4	5	
171	**Do you have access to complete kitchen facilities in this home; that is, a kitchen sink with piped water, a refrigerator and a range or cookstove?**				FQ E-2
	1 Yes	3397	879	1213	
	2 No	40	7	8	
	8 Blank but applicable	108	17	127	
	Blank	10	4	5	
172-173	**What is the main fuel used for heating this home?**				FQ E-3 See Note 14
	00 No fuel used	214	164	5	
	01 Oil	2	0	940	
	02 Natural gas	2888	45	362	
	03 Electricity	277	682	15	
	04 Bottled gas (propane)	85	2	0	
	05 Kerosene	7	2	0	
	06 Wood	45	3	0	
	07 Coal	0	0	6	
	08 Other, not specified	0	0	1	
	09 Other, specified	6	0	2	
	88 Blank but applicable	21	5	17	
	Blank	10	4	5	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
174-175	**What is the main heating equipment for this home?**				FQ E-4 See Note 14
	00 No heating equipment used	214	164	6	
	01 Steam or hot water with radiators or convectors	19	4	686	
	02 Central warm air furnace with ducts to individual rooms, or central heat pump	1296	340	96	
	03 Built-in electric units (permanently installed in wall, ceiling or baseboard)	219	219	32	
	04 Floor, wall or pipeless furnace	783	30	12	
	05 Room heaters with flue or vent burning oil, gas, or kerosene	403	12	301	
	06 Room heaters without flue or vent burning oil, gas, or kerosene	406	4	189	
	07 Heating stove burning wood, coal or coke	37	0	2	
	08 Fireplace(s)	37	4	0	
	09 Portable electric heater(s)	68	95	2	
	10 Other, not specified	0	0	0	
	11 Other, specified	53	26	7	
	88 Blank but applicable	1	5	8	
	99 Don't know	9	0	7	
	Blank	10	4	5	
176-177	**Are any other types of equipment used for heating this home?**				FQ E-5 See Note 14
	00 No other heating equipment used	2877	707	1132	
	01 Steam or hot water with radiators or convectors	0	0	3	
	02 Central warm air furnace with ducts to individual rooms or central heat pump	5	9	5	
	03 Built-in electric units (permanently installed in wall, ceiling or baseboard)	16	0	1	
	04 Floor, wall or pipeless furnace	5	0	0	
	05 Room heaters with flue or vent burning oil, gas, or kerosene	12	0	0	
	06 Room heaters without flue or vent burning oil, gas, or kerosene	15	1	16	
	07 Heating stove burning wood, coal or coke	42	0	5	
	08 Fireplace(s)	239	5	4	
	09 Portable electric heater(s)	95	14	166	
	10 Other, not specified	4	1	0	
	11 Other, specified	10	1	1	
	88 Blank but applicable	15	1	9	
	Blank	224	168	11	
178-179	**What is the main fuel used by this additional equipment?**				FQ E-6 See Note 14
	00 No fuel used	1	0	1	
	01 Oil	0	0	9	
	02 Natural gas	51	1	10	
	03 Electricity	116	24	162	
	04 Bottled gas (propane)	6	0	1	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
178-179	**What is the main fuel used by this additional equipment? (Cont'd)**				FQ E-6 See Note 14
	05 Kerosene	2	0	14	
	06 Wood	250	5	6	
	07 Coal	2	0	0	
	08 Other, not specified	0	0	0	
	09 Other, specified	5	0	0	
	88 Blank but applicable	21	2	7	
	Blank	3101	875	1143	
180-181	**What is the main fuel used for cooking in this home?**				FQ E-7
	00 No fuel used	10	4	2	
	01 Oil	5	0	9	
	02 Natural gas	2789	163	1236	
	03 Electricity	639	726	78	
	04 Bottled gas (propane)	85	7	7	
	05 Kerosene	0	0	3	
	06 Wood	0	0	0	
	07 Coal	0	0	0	
	08 Other, not specified	0	0	0	
	09 Other, specified	8	1	0	
	88 Blank but applicable	9	2	13	
	Blank	10	4	5	
182	**Do you have air-conditioning--either individual room units, a central system or evaporative cooling?**				FQ E-8
	1 Yes	1733	829	347	
	2 No	1806	73	995	
	8 Blank but applicable	6	1	6	
	Blank	10	4	5	
183	**Which do you have?**				FQ E-9
	1 Individual room unit	779	411	328	
	2 Central air-conditioning	603	410	10	
	3 Evaporative cooling	349	3	4	
	8 Blank but applicable	8	6	11	
	Blank	1816	77	1000	

SECTION I. SAMPLE WEIGHTS (POS 184-217)

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
184-189	**Examined final weight**				
	000439-002711	3555	-	-	
	000248-000891	-	907	-	
	000177-002000	-	-	1353	
190-195	**Interview final weight**				
	000447-002096	3555	-	-	
	000207-000578	-	907	-	
	000175-001220	-	-	1353	
	GTT/ULTRASOUND, AUDIOMETRY/VISION, PESTICIDE WEIGHTS By design, only some of the persons in the sample were included in the GTT/ultrasound, audiometry/vision, and pesticide components of the survey. Tape positions for those persons not part of these subsamples are BLANK.				
196-201	**GTT/ultrasound weight**				
	000843-005302	1777	-	-	
	000469-001685	-	449	-	
	000349-003110	-	-	667	
	Blank	1778	458	686	
202-207	**Audiometry/vision weight**				
	000870-006283	1778	-	-	
	000454-001600	-	458	-	
	000343-003123	-	-	686	
	Blank	1777	449	667	
208-213	**Pesticide Weight**				
	000872-005584	1778	-	-	
	000454-001600	-	458	-	
	000343-003117	-	-	686	
	Blank	1777	449	667	
214-215	**Strata code**				
	01-08	3555	907	1353	
216-217	**Pseudo PSU code**				
	01-02	3555	907	1353	

SECTION J. FAMILY RELATIONSHIPS (POS 218-400)

Source: Adult Sample Person Questionnaire
Family Questionnaire

Position	Item Description and Code	Counts M	C	P	Source and Notes
218-400	**Blank** Data not yet available.				

SECTION K. CONVENTIONAL 12-LEAD ECG DATA (POS 401-1017)

Source: Measurement and interpretation of digital ECG

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
401-404	**Tape Number**				
	6540	3555	907	1353	
405-409	**Blank**				
	Summary of Presence/Absence of Major and Minor ECG abnormalities according to the Minnesota Code as coded by the Dalhousie Program (positions 410-411)				See Note 15
410	**Major ECG abnormalities**				
	1 Present	298	75	114	
	0 Absent	3234	820	1224	
	Blank	23	12	15	
411	**Minor ECG abnormalities**				
	1 Present	529	163	288	
	0 Absent	3003	732	1050	
	Blank	23	12	15	
	Likelihood of Myocardial Infarction according to the Minnesota Code (positions 412-413)				See Note 16
412	**Probable MI - Diagnostic Q Waves**				
	1 Present	72	14	21	
	0 Absent	3460	881	1317	
	Blank	23	12	15	
413	**Possible MI - Equivocal Q Waves or related abnormalities**				
	1 Present	43	12	15	
	0 Absent	3489	883	1323	
	Blank	23	12	15	
	Likelihood of Left Ventricular Hypertrophy according to the Minnesota Code (positions 414-415)				See Note 17
414	**Probable LVH**				
	1 Present	28	10	18	
	0 Absent	3505	885	1320	
	Blank	23	12	15	
415	**Possible LVH**				
	1 Present	183	69	156	
	0 Absent	3349	826	1182	
	Blank	23	12	15	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
	Minnesota Code (MC) Items Coded by Computer				See Appendix 1
	MC 1 (Q, QS waves and related items)				See Note 18
416-417	**MC 1 Leadgroup L(I, aVL, V6)**				
	1.0-1.3.1	3532	895	1338	
	Blank	23	12	15	
418-419	**MC 1 Leadgroup F(II, III, aVF)**				
	1.0-1.3.6	3532	895	1338	
	Blank	23	12	15	
420-421	**MC 1 Leadgroup V(V1-V5)**				
	1.0-1.3.2	3532	895	1338	
	Blank	23	12	15	
	Highest code 1.1 in any lead group	8	4	7	
	Highest code 1.2	68	9	21	
	Highest code 1.3	35	11	7	
	Highest code 1.0	3421	871	1303	
	MC 4 (ST depression)				See Note 19
422-423	**MC 4 Leadgroup L**				
	4.0-4.4.0	3532	895	1338	
	Blank	23	12	15	
424-425	**MC 4 Leadgroup F**				
	4.0-4.4.0	3532	895	1338	
	Blank	23	12	15	
426-427	**MC 4 Leadgroup V**				
	4.0-4.4.0	3532	895	1338	
	Blank	23	12	15	
	Highest code 4.1 in any lead group	3	3	4	
	Highest code 4.2	33	14	10	
	Highest code 4.3	19	5	3	
	Highest code 4.4	9	2	2	
	Highest code 4.0	3468	871	1319	

Position	Item Description and Code	Counts M	C	P	Source and Notes
	MC 5 (T wave abnormalities)				See Note 20
428	**MC 5 Leadgroup L**				
	5.0-5.4	3532	895	1338	
	Blank	23	12	15	
429	**MC 5 Leadgroup F**				
	5.0-5.4	3532	895	1338	
	Blank	23	12	15	
430	**MC 5 Leadgroup V**				
	5.0-5.4	3532	895	1338	
	Blank	23	12	15	
	Highest code 5.1 in any leadgroup	2	2	5	
	Highest code 5.2	107	35	43	
	Highest code 5.3	112	22	50	
	Highest code 5.4	60	22	38	
	Highest code 5.0	3251	814	1202	
	MC 9.2 (ST elevation)				See Note 21
431	**MC 9.2 Leadgroup L**				
	9.2.0 - 9.2.2	3532	895	1338	
	Blank	23	12	15	
432	**MC 9.2 Leadgroup F**				
	9.2.0 - 9.2.2	3532	895	1338	
	Blank	23	12	15	
433	**MC 9.2 Leadgroup V**				
	9.2.0 - 9.2.2	3532	895	1338	
	Blank	23	12	15	
	Highest Code 9.2.2 in any lead group	76	12	37	

Position	Item Description and Code	Counts M	C	P	Source and Notes
	Other Minnesota Codes				
434-435	**MC 2 (QRS axis code)**				
	2.0-2.3.0	3532	895	1338	
	Blank	23	12	1	
436-437	**MC 3 (Computer code for high-amplitude R waves)**				
	3.0-3.3.2	3532	895	1338	
	Blank	23	12	15	
438-439	**MC 6 (A-V conduction)**				
	6.0-6.5.0	3532	895	1338	
	Blank	23	12	15	
440	**MC 7 (Ventricular conduction)**				
	7.0-7.6	3532	895	1338	
	Blank	23	12	15	
441	**MC 9.1 (Low-amplitude QRS)**				
	9.1.0-9.1.1	3532	895	1338	
	Blank	23	12	15	
442	**MC 9.3 (High-amplitude P)**				
	9.3.0-9.3.3	3532	895	1338	
	Blank	23	12	15	
443	**MC 9.4 (QRS transition zone)**				
	9.4.0-9.4.2	3532	895	1338	
	Blank	23	12	15	
444	**MC 9.5 (High-amplitude T)**				
	9.5.0-9.5.5	3532	895	1338	
	Blank	23	12	15	

Position	Item Description and Code	Counts M	C	P	Source and Notes
	Likelihood of Myocardial Infarction and Left Ventricular Hypertrophy according to Dalhousie ECG Program				
445-448	**Cardiac Infarction/Injury Score for 12-Lead ECG Multiplied by 10**				See Note 22
	-220 - 500	3484	891	1337	
	Blank	71	16	16	
449	**Infarction/Injury probable**				
	1 Present	74	27	21	
	0 Absent	3410	864	1316	
	Blank	71	16	16	
450	**Infarction/Injury possible**				
	1 Present	78	24	14	
	0 Absent	3406	867	1323	
	Blank	71	16	16	
451	**Consider Infarction/Injury**				
	1 Present	174	41	54	
	0 Absent	3310	850	1283	
	Blank	71	16	16	
	LV Mass and LVMI Estimates				See Note 23
452-455	**ECG estimate of LV Mass**				
	40 - 529	3485	892	1328	
	Blank	70	15	25	
456-459	**ECG estimate of LV Mass Index**				
	12 - 295	3485	892	1328	
	Blank	70	15	25	
	Likelihood of LVH				
460	**Probable LVH**				
	1 Present	118	47	58	
	0 Absent	3367	845	1270	
	Blank	70	15	25	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
	Minnesota Codes after Visual Adjudication of Coding Differences between Computer Coding and Coding by Human Coders				
	Presence/Absence of Major and Minor ECG abnormalities after adjudication				See Note 15
461	**Major abnormalities**				
	2 By computer only	170	41	71	
	1 By computer and visual coder	135	35	45	
	0 absent	3227	819	1222	
	Blank	23	12	15	
462	**Minor abnormalities**				
	2 By computer only	106	26	51	
	1 By computer and visual coder	355	110	181	
	0 absent	3091	759	1106	
	Blank	23	12	15	
	Likelihood of Myocardial Infarction according to the adjudicated Minnesota Code				
463	**Diagnostic ECG - Diagnostic Q Waves or ST Elevation with Inverted T Waves**				See Note 16
	2 By computer only	27	7	11	
	1 By computer and visual coder	6	2	2	
	0 absent	3499	886	1325	
	Blank	23	12	15	
464	**Equivocal ECG - Equivocal Q Waves or ST-T abnormalities**				
	2 By computer only	238	57	103	
	1 By computer and visual coder	88	19	39	
	0 absent	3206	819	1196	
	Blank	23	12	15	

Position	Item Description and Code	Counts M	C	P	Source and Notes
	Adjudicated MC 1				See Note 18
465-466	**Leadgroup L**				
	1.0 - 1.3.3	3532	895	1338	
	Blank	23	12	15	
467-468	**Leadgroup F**				
	1.0 - 1.3.3	3532	895	1338	
	Blank	23	12	15	
469-470	**Leadgroup V**				
	1.0 - 1.3.2	3532	895	1338	
	Blank	23	12	15	
	Highest Code 1.1 in any lead group	11	5	8	
	Highest Code 1.2	60	8	16	
	Highest Code 1.3	25	9	3	
	Highest Code 1.0	3436	873	1311	
	Adjudicated MC 4				See Note 19
471-472	**Leadgroup L**				
	4.0-4.4.0	3532	895	1338	
	Blank	23	12	15	
473-474	**Leadgroup F**				
	4.0-4.4.0	3532	895	1338	
	Blank	23	12	15	
475-476	**Leadgroup V**				
	4.0-4.4.0	3532	895	1338	
	Blank	23	12	15	
	Highest code 4.1 in any leadgroup	1	2	3	
	Highest code 4.2	20	10	8	
	Highest code 4.3	13	6	0	
	Highest code 4.4	15	2	1	
	Highest code 4.0	3483	875	1326	

Position	Item Description and Code	Counts M	C	P	Source and Notes
	Adjudicated MC 5				See Note 20
477	**Leadgroup L**				
	5.0-5.4	3532	895	1338	
	Blank	23	12	15	
478	**Leadgroup F**				
	5.0-5.4	3532	895	1338	
	Blank	23	12	15	
479	**Leadgroup V**				
	5.0-5.4	3532	895	1338	
	Blank	23	12	15	
	Highest code 5.1 in any leadgroup	1	2	5	
	Highest code 5.2	93	29	34	
	Highest code 5.3	81	19	41	
	Highest code 5.4	69	26	42	
	Highest code 5.0	3288	819	1216	
	Adjudicated MC 9.2				See Note 21
480	**Leadgroup L**				
	9.2.0 - 9.2.2	3532	895	1338	
	Blank	23	12	15	
481	**Leadgroup F**				
	9.2.0 - 9.2.2	3532	895	1338	
	Blank	23	12	15	
482	**Leadgroup V**				
	9.2.0 - 9.2.2	3532	895	1338	
	Blank	23	12	15	
	Highest Code 9.2.2 in any lead group	50	6	26	
483-512	**Blank**				

Position	Item Description and Code	Counts M	C	P	Source and Notes
	Heart rate, basic ECG interval and mean axis data				
513-516	**Heart rate**				
	33-117 beats per min	3530	895	1338	
	Blank	25	12	15	
517-519	**PR interval**				
	39-300 msec	3497	893	1329	
	Blank	58	14	24	
520-522	**QRS interval**				
	57-187 msec	3497	893	1329	
	Blank	58	14	24	
523-525	**QT Interval**				
	303 - 512 msec	3497	893	1329	
	Blank	58	14	24	
526-529	**P axis, frontal plane**				
	-165 - 156 degrees	3497	893	1329	
	Blank	58	14	24	
530-533	**QRS axis, frontal plane**				
	-180 - 174 degrees	3531	895	1338	See Note 24
	Blank	24	12	15	
534-537	**T axis, frontal plane**				
	-177 - 179 degrees	3497	893	1329	
	Blank	58	14	24	
538	**Rhythm Codes**				
	1 Sinus rhythm	2310	641	864	
	2 Sinus tachycardia	27	8	19	
	3 Sinus bradycardia	485	108	140	
	4 Sinus arrhythmia	397	79	169	
	5 Atrial fibrillation	7	3	1	
	6 Ventricular ectopic complexes	14	7	13	
	7 Supraventricular ectopic complexes	7	7	8	
	8 Wolff-Parkinson-White	8	1	2	
	Blank	300	53	137	
539-541	**Blank**				

Position	Item Description and Code	Counts M	C	P	Source and Notes
	12 Lead ECG amplitude and duration measurements				
542-545	**P amplitude, positive phase, lead II**				
	0-358 μV	3496	893	1329	
	Blank	59	14	24	
546-548	**P duration, lead II**				
	0-173 msec	3496	893	1329	
	Blank	59	14	24	
549-552	**P amplitude, positive phase, lead V1**				
	0-252 μV	3488	893	1329	
	Blank	67	14	24	
553-556	**P amplitude, negative phase, lead V1**				
	-227-0 μV	3488	893	1329	
	Blank	67	14	24	
557-560	**Q or QS amplitude, lead I**				
	0-367 μV	3495	893	1329	
	Blank	60	14	24	
561-564	**Q or QS amplitude, lead II**				
	0-611 μV	3495	893	1329	
	Blank	60	14	24	
565-568	**Q or QS amplitude, lead III**				
	0-1877 μV	3495	893	1329	
	Blank	60	14	24	
569-572	**Q or QS amplitude, lead aVL**				
	0-630 μV	3495	892	1328	
	Blank	60	15	25	
573-576	**Q or QS amplitude, lead aVF**				
	0-1244 μV	3495	893	1329	
	Blank	60	14	24	
577-580	**Q or QS amplitude, lead V1**				
	0-2233 μV	3487	893	1329	
	Blank	68	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
581-584	**Q or QS amplitude, lead V2**				
	0-3401 μv	3487	892	1329	
	Blank	68	15	24	
585-588	**Q or QS amplitude, lead V3**				
	0-3578 μV	3491	892	1329	
	Blank	64	15	24	
589-592	**Q or QS amplitude, lead V4**				
	0-2345 μV	3496	893	1329	
	Blank	59	14	24	
593-596	**Q or QS amplitude lead V5**				
	0-680 μV	3495	893	1329	
	Blank	60	14	24	
597-600	**Q or QS amplitude, lead V6**				
	0-634 μV	3496	893	1329	
	Blank	59	14	24	
601-603	**Q or QS duration, lead I**				
	0-48 msec	3495	893	1329	
	Blank	60	14	24	
604-606	**Q or QS duration, lead II**				
	0-116 msec	3495	893	1329	
	Blank	60	14	24	
607-609	**Q or QS duration, lead III**				
	0-128 msec	3495	893	1329	
	Blank	60	14	24	
610-612	**Q or QS duration, lead aVL**				
	0-88 msec	3495	892	1328	
	Blank	60	15	25	
613-615	**Q or QS duration, lead aVF**				
	0-116 msec	3495	893	1329	
	Blank	60	14	24	
616-618	**Q or QS duration, lead V1**				
	0-136 msec	3487	893	1329	
	Blank	68	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
619-621	**Q or QS duration, lead V2**				
	0-116 msec	3487	892	1329	
	Blank	68	15	24	
622-624	**Q or QS duration, lead V3**				
	0-112 msec	3491	892	1329	
	Blank	64	15	24	
625-627	**Q or QS duration, lead V4**				
	0-96 msec	3496	893	1329	
	Blank	59	14	24	
628-630	**Q or QS duration, lead V5**				
	0-52 msec	3495	893	1329	
	Blank	60	14	24	
631-633	**Q or QS duration, lead V6**				
	0-52 msec	3496	893	1329	
	Blank	59	14	24	
634-637	**R amplitude, lead I**				
	33-2235 µV	3496	893	1329	
	Blank	59	14	24	
638-641	**R amplitude, lead II**				
	0-3799 µV	3496	893	1329	
	Blank	59	14	24	
642-645	**R amplitude, lead III**				
	0-2759 µV	3496	893	1329	
	Blank	59	14	24	
646-649	**R amplitude, lead aVR**				
	0-569 µV	3496	893	1329	
	Blank	59	14	24	
650-653	**R amplitude, lead aVL**				
	0-1913 µV	3496	892	1328	
	Blank	59	15	25	
654-657	**R amplitude, lead aVF**				
	0-3279 µV	3496	893	1329	
	Blank	59	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
658-661	**R amplitude lead V1**				
	0 - 2293 µV	3488	893	1329	
	Blank	67	14	24	
662-665	**R amplitude lead V2**				
	0 - 5432 µV	3488	892	1329	
	Blank	67	15	24	
666-669	**R amplitude lead V3**				
	0 - 4428 µV	3492	892	1329	
	Blank	63	15	24	
670-673	**R amplitude lead V4**				
	0 - 5759 µV	3497	893	1329	
	Blank	58	14	24	
674-677	**R amplitude lead V5**				
	45 - 5275 µV	3496	893	1329	
	Blank	59	14	24	
678-681	**R amplitude lead, V6**				
	32 - 4449 µV	3497	893	1329	
	Blank	58	14	24	
682-684	**R duration, lead I**				
	12 - 184 msec	3496	893	1329	
	Blank	59	14	24	
685-687	**R duration, lead II**				
	0 - 144 msec	3496	893	1329	
	Blank	59	14	24	
688-690	**R duration, lead III**				
	0 - 136 msec	3496	893	1329	
	Blank	59	14	24	
691-693	**R duration, lead aVR**				
	0 - 108 msec	3496	893	1329	
	Blank	59	14	24	
694-696	**R duration, lead aVL**				
	0 - 184 msec	3496	892	1328	
	Blank	59	15	25	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
697-699	**R duration, lead aVF**				
	0 - 128 msec	3496	893	1329	
	Blank	59	14	24	
700-702	**R duration lead V1**				
	0 - 156 msec	3488	893	1329	
	Blank	67	14	24	
703-705	**R duration, lead V2**				
	0 - 132 msec	3488	892	1329	
	Blank	67	15	24	
706-708	**R duration lead V3**				
	0 - 132 msec	3492	892	1329	
	Blank	63	15	24	
709-711	**R duration, lead V4**				
	0 - 160 msec	3497	893	1329	
	Blank	58	14	24	
712-714	**R duration, lead V5**				
	12 - 172 msec	3496	893	1329	
	Blank	59	14	24	
715-717	**R duration, lead V6**				
	8 - 172 msec	3497	893	1329	
	Blank	58	14	24	
718-721	**S amplitude, lead I**				
	0 - 860 µV	3496	893	1329	
	Blank	59	14	24	
722-725	**S amplitude, lead II**				
	0 - 1211 µV	3496	893	1329	
	Blank	59	14	24	
726-729	**S amplitude, lead III**				
	0 - 2336 µV	3496	893	1329	
	Blank	59	14	24	
730-733	**S amplitude, lead aVR**				
	0 - 2529 µV	3496	893	1329	
	Blank	59	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
734-737	**S amplitude, lead aVL**				
	0 - 1476 µV	3496	892	1328	
	Blank	59	15	25	
738-741	**S amplitude, lead aVF**				
	0 - 1773 µV	3496	893	1329	
	Blank	59	14	24	
742-745	**S amplitude, lead V1**				
	0 - 3482 µV	3488	893	1329	
	Blank	67	14	24	
746-749	**S amplitude, lead V2**				
	0 - 4898 µV	3488	892	1329	
	Blank	67	15	24	
750-753	**S amplitude, lead V3**				
	0 - 3766 µV	3492	892	1329	
	Blank	63	15	24	
754-757	**S amplitude, lead V4**				
	0 - 2687 µV	3497	893	1329	
	Blank	58	14	24	
758-761	**S amplitude, lead V5**				
	0 - 2542 µV	3496	893	1329	
	Blank	59	14	24	
762-765	**S amplitude, lead V6**				
	0 - 1434 µV	3497	893	1329	
	Blank	58	14	24	
766-768	**S duration, lead I**				
	0 - 108 msec	3496	893	1329	
	Blank	59	14	24	
769-771	**S duration, lead II**				
	0 - 112 msec	3496	893	1329	
	Blank	59	14	24	
772-774	**S duration, lead III**				
	0 - 140 msec	3496	893	1329	
	Blank	59	14	24	

Position	Item Description and Code	Counts M	Counts C	Counts P	Source and Notes
775-777	**S duration, lead aVR**				
	0 - 120 msec	3496	893	1329	
	Blank	59	14	24	
778-780	**S duration, lead aVL**				
	0 - 116 msec	3496	892	1328	
	Blank	59	15	25	
781-783	**S duration, lead aVF**				
	0 - 136 msec	3496	893	1329	
	Blank	59	14	24	
784-786	**S duration, lead V1**				
	0 - 144 msec	3488	893	1329	
	Blank	67	14	24	
787-789	**S duration, lead V2**				
	0 - 144 msec	3488	892	1329	
	Blank	67	15	24	
790-792	**S duration, lead V3**				
	0 - 148 msec	3492	892	1329	
	Blank	63	15	24	
793-795	**S duration, lead V4**				
	0 - 116 msec	3497	893	1329	
	Blank	58	14	24	
796-798	**S duration, lead V5**				
	0 - 104 msec	3496	893	1329	
	Blank	59	14	24	
799-801	**S duration, lead V6**				
	0 - 108 msec	3497	893	1329	
	Blank	58	14	24	
802-805	**R' amplitude, lead I**				
	0 - 1085 µV	3496	893	1329	
	Blank	59	14	24	
806-809	**R' amplitude, lead II**				
	0 - 1114µV	3496	893	1329	
	Blank	59	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
810-813	**R' amplitude, lead III**				
	0 - 1481 µV	3496	893	1329	
	Blank	59	14	24	
814-817	**R' amplitude, lead aVR**				
	0 - 509 µV	3496	893	1329	
	Blank	59	14	24	
818-821	**R' amplitude, lead aVL**				
	0 - 1240 µV	3496	892	1328	
	Blank	59	15	25	
822-825	**R' amplitude, lead aVF**				
	0 - 1193 µV	3496	893	1329	
	Blank	59	14	24	
826-829	**R' amplitude, lead V1**				
	0 - 1869 µV	3488	893	1329	
	Blank	67	14	24	
830-833	**R' amplitude, lead V2**				
	0 - 2317 µV	3488	892	1329	
	Blank	67	15	24	
834-837	**R' amplitude, lead V3**				
	0 - 701 µV	3492	892	1329	
	Blank	3	15	24	
838-841	**R' amplitude, lead V4**				
	0 - 2605 µV	3497	893	1329	
	Blank	58	14	24	
842-845	**R' amplitude, lead V5**				
	0 - 227 µV	3496	893	1329	
	Blank	59	14	24	
846-849	**R' amplitude, lead V6**				
	0 - 311 µV	3497	893	1329	
	Blank	58	14	24	
850-853	**J amplitude, lead I**				
	- 178 - 157 µV	3496	893	1329	
	Blank	59	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
854-857	**J amplitude, lead II**				
	- 212 - 194 µV	3496	893	1329	
	Blank	59	14	24	
858-861	**J amplitude, lead III**				
	- 150 - 170 µV	3496	893	1329	
	Blank	59	14	24	
862-865	**J amplitude, lead aVR**				
	- 141 - 178 µV	3496	893	1329	
	Blank	59	14	24	
866-869	**J amplitude, lead aVL**				
	- 154 - 105 µV	3496	892	1328	
	Blank	59	15	25	
870-873	**J amplitude, lead aVF**				
	- 144 - 142 µV	3496	893	1329	
	Blank	59	14	24	
874-877	**J amplitude, lead V1**				
	- 138 - 359 µV	3488	893	1329	
	Blank	67	14	24	
878-881	**J amplitude, lead V2**				
	- 179 - 438 µV	3488	892	1329	
	Blank	67	15	24	
882-885	**J amplitude, lead V3**				
	- 228 - 291 µV	3492	892	1329	
	Blank	63	15	24	
886-889	**J amplitude, lead V4**				
	- 201 - 367 µV	3497	893	1329	
	Blank	58	14	24	
890-893	**J amplitude, lead V5**				
	- 181 - 284 µV	3496	893	1329	
	Blank	59	14	24	
894-897	**J amplitude, lead V6**				
	- 176 - 209 µV	3497	893	1329	
	Blank	58	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
898-902	**Negative T amplitude, lead I**				
	- 515 - 0 µV	3496	893	1329	
	Blank	59	14	24	
903-907	**Negative T amplitude, lead II**				
	- 284 - 0 µV	3496	893	1329	
	Blank	59	14	24	
908-912	**Negative T amplitude, lead III**				
	- 376 - 0 µV	3496	893	1329	
	Blank	59	14	24	
913-917	**Negative T amplitude, lead aVR**				
	- 817 - 0 µV	3496	893	1329	
	Blank	59	14	24	
918-922	**Negative T amplitude, lead aVL**				
	- 416 - 0 µV	3496	892	1328	
	Blank	59	15	25	
923-927	**Negative T amplitude, lead aVF**				
	- 210 - 0 µV	3496	893	1329	
	Blank	59	14	24	
928-932	**Negative T amplitude, lead V1**				
	- 582 - 0µV	3488	893	1329	
	Blank	67	14	24	
933-937	**Negative T amplitude, lead V2**				
	- 1149 - 0 µV	3488	892	1329	
	Blank	67	15	24	
938-942	**Negative T amplitude, lead V3**				
	- 993 - 0 µV	3492	892	1329	
	Blank	63	15	24	
943-947	**Negative T amplitude, lead V4**				
	- 1376 - 0 µV	3497	893	1329	
	Blank	58	14	24	
948-952	**Negative T amplitude, lead V5**				
	- 1233 - 0 µV	3496	893	1329	
	Blank	59	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
953-957	**Negative T amplitude, lead V6**				
	- 859 - 0 μV	3497	893	1329	
	Blank	58	14	24	
958-962	**Positive T amplitude, lead I**				
	0 - 883 μV	3496	893	1329	
	Blank	59	24	24	
963-967	**Positive T amplitude, lead II**				
	0 - 795 μ V	3496	893	1329	
	Blank	59	14	24	
968-972	**Positive T amplitude lead III**				
	0 - 569 μV	3496	893	1329	
	Blank	59	14	24	
973-977	**Positive T amplitude lead aVR**				
	0 - 413 μV	3496	893	1329	
	Blank	59	14	24	
978-982	**Positive T amplitude lead aVL**				
	0 - 588 μV	3496	892	1328	
	Blank	59	15	25	
983-987	**Positive T amplitude lead aVF**				
	0 - 643 μV	3496	893	1329	
	Blank	59	14	14	
988-992	**Positive T amplitude lead V1**				
	0 - 1359 μV	3488	893	1329	
	Blank	67	14	24	
993-997	**Positive T amplitude lead V2**				
	0 - 1618 μV	3488	892	1329	
	Blank	67	15	24	
998-1002	**Positive T amplitude lead V3**				
	0 - 1731 μV	3492	892	1329	
	Blank	63	15	24	
1003-1007	**Postitive T amplitude lead V4**				
	0 - 1564 μV	3497	893	1329	
	Blank	58	14	24	

Position	Item Description and Code	Counts M	C	P	Source and Notes
1008-1012	**Positive T amplitude lead V5**				
	0 - 1417 µV	3496	893	1329	
	Blank	59	14	24	
1013-1017	**Positive T amplitude lead V6**				
	0 - 1075 µV	3497	893	1329	
	Blank	58	14	24	

SECTION L. NOTES

NOTE 1: FAMILY QUESTIONNAIRE MISSING

A Family Questionnaire was to be completed for each eligible family in a household with sample persons. However, a few Family Questionnaires are missing. Data records for sample persons in families with missing questionnaires are flagged with a code = 1, and all family data are blank. Data records for sample persons in families with a Family Questionnaire are flagged with a code = 2.

During the Mexican-American portion of the HHANES survey, a Family Questionnaire continuation booklet containing sample person information was lost for one sample person. Therefore, the sociodemographic data for this sample person are missing. The reference person, family composition, income, residence, and household data for this person were obtained from another person in the household.

NOTE 2: EXAMINATION STATUS

Not all sample persons consented to come to a Mobile Examination Center to participate in the examination phase of the survey. In certain rare instances (less than 0.1%), sample persons who came to the Mobile Examination Centers did not participate in sufficient components of the examination to be considered as "examined". This data field contains code = 1 for those persons who participated fully in the examination phase, and code = 2 for those who did not come to the examination center or who did not satisfactorily complete the examination.

NOTE 3: FAMILY NUMBER

In HHANES, all household members who were related by blood, marriage, or adoption were considered to be one "family". All sample persons in the same family unit have the same computer-generated family unit code.

NOTE 4: HEAD OF FAMILY

Relationship of Sample Person to Head of Family (Pos. 44-45)

Each family containing sample persons has a designated "head of family", and the relationship of each sample person to the head of his or her family is coded in tape position 44-45. The first three categories of this variable describe the "head" of three different kinds of families.

- Code '01' identifies sample persons who lived alone (i.e., "head" of one-person families, no unrelated individuals living in the household).
- Code '02' identifies sample persons who lived only with unrelated persons.
- Code '03' identifies sample persons who were "heads" of families containing at least one other person (whether or not the household included additional families unrelated to the sample person).

Sociodemographic Data (Pos. 100-131)

This data tape includes some sociodemographic data about the head of each sample person's family (Section F). Because there can only be one "head" per family, the data in this section (positions 100-131) are the same for all sample persons in the same family (i.e., with the same family number codes in positions 39-43). If the sample person is the head of his or her family, the data in positions 100-131 are the same as in the corresponding positions in Section E.

NOTE 5: OBSERVED RACE

"Race" was observed by the interviewer for all sample persons actually seen. Rules for classification of observed race were consistent with those used in the NHANES II and the National Health Interview Survey at that time. The categories were coded as follows:

White - Includes Spanish origin persons unless they are definitely Black, Indian or other nonwhite.

Black - Black or Negro

Other - Race other than White or Black, including Japanese, Chinese, American Indian, Korean, Eskimo

NOTE 6: NATIONAL ORIGIN OR ANCESTRY

The value for national origin or ancestry is based on Item 2c in the Household Screener Questionnaire and was reported by the household respondent for all household members. In the Mexican-American portion of the survey, if "other Latin-American or other Spanish" (code 9) or "Other" (code 0) was recorded and the specified origin was "Spanish-American" or "Spanish (Spain)", a code of 10 or 11, respectively, was assigned. In all three portions of the survey, if more than one category was reported, the first appropriate "Hispanic" code, if any, was assigned (codes 1, 2, 3, 8, 10 or 11 in the Mexican-American portion; codes 6 or 7 in the Cuban-American portion; codes 4 or 5 in the Puerto Rican portion). If none of these codes was recorded, the first category entered was coded.

NOTE 7: CODES FOR STATES AND FOREIGN COUNTRIES

Code	State or Foreign Country
001	Alabama
002	Alaska
004	Arizona
005	Arkansas
006	California
008	Colorado
009	Connecticut
010	Delaware
011	District of Columbia
012	Florida
013	Georgia
015	Hawaii
016	Idaho
017	Illinois
018	Indiana
019	Iowa
020	Kansas
021	Kentucky
022	Louisiana
023	Maine
024	Maryland
025	Massachusetts
026	Michigan
027	Minnesota
028	Mississippi

Codes for States and Foreign Countries (Cont'd)

Code	State or Foreign Country
029	Missouri
030	Montana
031	Nebraska
032	Nevada
033	New Hampshire
034	New Jersey
035	New Mexico
036	New York
037	North Carolina
038	North Dakota
039	Ohio
040	Oklahoma
041	Oregon
042	Pennsylvania
044	Rhode Island
045	South Carolina
046	South Dakota
047	Tennessee
048	Texas
049	Utah
050	Vermont
051	Virginia
053	Washington
054	West Virginia
055	Wisconsin
056	Wyoming
060	American Samoa
093	Canada
061	Canal Zone
062	Canton and Enderbury Islands
091	Central America
095	Costa Rica
063	Cuba
064	Dominican Republic
065	El Salvador
062	Enderbury Islands
087	Germany
066	Guam
068	Guatemala
069	Haiti
070	Jamaica
090	Japan
067	Johnston Atoll
080	Mexico
088	Honduras
071	Midway Islands
081	Nicaragua
096	Palestine
097	Austria
098	Lebanon
099	Chile
100	Philippines

Codes for States and Foreign Countries (Cont'd)

Code	State or Foreign Country
101	Brazil
102	Holland
103	Colombia
082	Panama
072	Puerto Rico
092	Saudi Arabia
083	Spain
094	Taiwan
089	Turkey
084	Uruguay
085	Venezuela
073	Ryukyu Islands, Southern
074	Swan Islands
075	Trust Territories of the Pacific Islands (includes Caroline, Mariana and Marshall Island groups)
076	U.S. miscellaneous Caribbean Islands (includes Navassa Islands, Quito Sueno Bank, Roncador Cay, Serrana Bank and Serranilla Bank)
077	U.S. miscellaneous Pacific Islands (includes Kingman Reef, Howland, Baker & Jarvis Islands, and Palmyra Atoll)
086	United States
078	Virgin Islands
079	Wake Island
104	Azores
105	Peru
106	England
107	Vietnam
108	Italy
109	Ecuador
110	North America
111	Surinam
112	Argentina
113	Portugal
114	Trinidad
115	Egypt
116	Sudan
117	British Honduras
118	China
888	Blank but applicable

NOTE 8: ORIGIN RECODE

In the HHANES, if any household member was identified as "Hispanic" (as defined below), all household members, regardless of origin, were eligible to be selected as sample persons. The national origin recode specifies whether a sample person is considered to be "Hispanic" or "not Hispanic" for purposes of analysis. "Hispanic" is defined as:

Mexican-American residing, in selected counties of Texas, Colorado, New Mexico, Arizona, and California;
Cuban-American, residing in Dade County (Miami), Florida; or
Puerto Rican, residing in the New York City area, including parts of New Jersey and Connecticut.

The recode was assigned as follows:

A. Southwest portion

1) If the original national origin or ancestry code on the Household Screener Questionnaire was 1, 2, 3, 8, 10, or 11, then National origin recode = 1;

2) If national origin or ancestry was 4, 5, 6, 7, 9, or 0 but the person specified Mexican/Mexicano, Chicano, or Mexican-American self-identification on the Adult Sample Person Questionnaire (question M10), or the person was the biological child of a household member with Recode equal to 1 (as determined by questions A-1-A-11 on the Family Questionnaire), then National origin recode = 1;

3) In all other cases, National origin recode = 2.

B. Dade County, Florida portion

1) If the original national origin or ancestry code was 6 or 7, then National origin recode = 1;

2) In all other cases, National origin recode = 2;

C. New York City area portion

1) If the original national origin or ancestry code was 4 or 5, then National origin recode = 1;

2) If national origin or ancestry was 1, 2, 3, 6, 7, 8, 9 or 0 but the person specified Boricuan or Puerto Rican self-identification on the Adult Sample Person Questionnaire (question M10), or the person was the biological child of a household member with Recode equal to 1 (as determined by questions A-1/A-11 on the Family Questionnaire), then National origin recode = 1;

3) In all other cases, National origin recode = 2.

The national origin recode may be used in analysis in one of two ways:

a) Selecting on Recode = 1 will restrict analysis to "Hispanics" only. In this case, in the Southwest portion of the survey, the weighted estimates by age and sex will approximately equal the U.S. Bureau of the Census population estimates of the number of Mexican Americans and a small proportion of other Hispanics assumed to be Hispano in the five Southwest States (Arizona, California, Colorado, New Mexico, and Texas) at the midpoint of the Mexican-American portion of HHANES--March 1983. The weighted estimates of Cuban Americans represents an independent estimate of the number of Cuban Americans in Dade County at the midpoint--February 1984. The weighted estimates of Puerto Ricans represents an independent estimate of the number of Puerto Ricans in the sample counties in New York, New Jersey, and Connecticut at the midpoint of the Puerto Rican portion--September 1984.

b) Using Recode greater than 0, that is, all sample persons, will include "Hispanic" and "not Hispanic" persons and the Southwest weighted estimates by age and sex will overestimate the U.S. Bureau of the Census population estimates of Mexican Americans and other Hispanics by about 4.5 percent. In Dade County, using Recode greater than 0 will increase the weighted estimates by about 5.3 percent over that for Cuban Americans only, using Recode greater

than 0 for the New York area will increase the weighted estimates by about 9.2 percent over that for Puerto Ricans only.

NOTE 9: INDUSTRY AND OCCUPATION CODE

Family Questionnaire questions B-12 through B-15 (see page 117 or 139 of Ref. No. 1 in Section C) identified sample persons 17 years old or older who were in the labor force working for pay at a job or business or who worked without pay in a family business or farm operated by a related member of the household without receiving wages or salary for work performed.

Questions B-17 through B-22 provided a full description of sample persons' current or most recent job or business. The detail asked for in these questions was necessary to properly and accurately code each occupation and industry. Interviewers were trained to define a job as a definite arrangement for regular work for pay every week or every month. This included arrangements for either regular part-time or regular full-time work. If a sample person was absent from his or her regular job, worked at more than one job, was on layoff from a job or was looking for work during the two-week reference period, interviewers were trained to use the following criteria to determine the job described:

a) If a sample person worked at more than one job during the two-week reference period or operated a farm or business and also worked for someone else, the job at which he or she worked the most hours was described. If the sample person worked the same number of hours at all jobs, the job at which he or she had been employed the longest was entered. If the sample person was employed at all jobs the same length of time, the job the sample person considered the main job was entered.

b) If a sample person was absent from his or her regular job all of the two-week reference period, but worked temporarily at another job, the job at which the sample person actually worked was described, not the job from which he or she was absent.

c) If a sample person had a job but did not work at all during the two-week reference period, the job he or she held was described.

d) If a sample person was on layoff during the two-week reference period, the job from which he or she was laid off, regardless of whether a full-time or part-time job, was described.

e) If a sample person was looking for work or waiting to begin a new job within 30 days of the interview, the last full-time civilian job which lasted two consecutive weeks or more was described.

The 1980 census of population Alphabetical Index of Industries and Occupations was used in the coding of both industry and occupation. This book has Library of Congress Number 80-18360, and is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for $3.00. Its Stock Number is 003024049-2.

NOTE 10: HEALTH INSURANCE

In the Health Insurance section of the Family Questionnaire, up to three separate health insurance plans could be reported for a family. Each sample person could have been covered by any combination of the three, or by none at all. In order to simplify the health insurance coverage data, the information on all reported plans was combined to a single variable for each sample person, i.e., whether or not the person is covered by any plan (position 74). For all persons covered by at least one plan, information on the type of coverage is then indicated; position 75 specifies whether any of the sample person's plans pays hospital expenses and position 76 specifies whether any of the sample person's plans pays doctor's or surgeon's bills.

For all sample persons who were not covered by Medicare or any health insurance plan, the reasons for not being covered were ascertained. Positions 77-78 contain the main or only reason reported. For persons with one or more additional reasons, the first (lowest) code entered on the questionnaire was coded in positions 79-80.

NOTE 11: PER CAPITA INCOME

Per capita income was computed by dividing the total combined family income by the number of people in the family.

NOTE 12: POVERTY INDEX

The poverty index is a ratio of two components. The numerator is the midpoint of the income bracket reported for each family in the Family Questionnaire (E-11). Respondents were asked to report total combined family income during the 12 months preceding the interview. The denominator is a poverty threshold which varied with the number of persons in the family, the adult/child composition of the family, the age of the reference person, and the month and the year in which the family was interviewed.

Poverty thresholds published in U.S. Bureau of the Census reports* are based on calendar years and were adjusted to reflect differences caused by inflation between calendar years and 12-month income reference periods to which question E-11 referred. Average Consumer Price Indexes for all Urban consumers (CPI-U) for the calendar year for which the poverty thresholds were published (see table below) and for the 12 months representing the income reference period for the respondent were calculated. The percentage difference between these two numbers represents the inflation between these two periods and was applied to the poverty threshold appropriate for the family (based on the characteristics listed above). For example, for a family interviewed in November 1983, the 1982 poverty threshold was updated to reflect inflation by multiplying by the percent change in the average CPI-U for the 12-month reference period, which would have been November 1982 through October 1983, over the calendar year January through December 1982, in this example. To compute poverty indexes, the midpoint of the total combined family income bracket was divided by the updated poverty threshold.

Members of families with incomes equal to or greater than poverty thresholds have poverty indexes equal to or greater than 1.0 and can be described as "at or above poverty"; those with incomes less than the poverty threshold have indexes less than 1.0 and can be described as "below poverty".

Poverty thresholds used were computed on a national basis only. No attempt was made to adjust these thresholds for regional, State, or other variations in the cost of living. None of the noncash public welfare benefits such as food stamp bonuses were included in the income of the low income families receiving these benefits.

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* U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 138, "Characteristics of the Population Below the Poverty Level: 1981", U.S. Government Printing Office, Washington, D.C., March 1983.

U.S. Bureau of the Census, Current Population Reports, Series P-60, No. 144, "Characteristics of the Population Below the Poverty Level: 1982", U.S. Government Printing Office, Washington, D.C., March 1984.

Average Consumer Price Index, all Urban consumers (CPI-U), U.S. city average, 1981-84

MONTH	YEAR			
	1981	1982	1983	1984
January	260.5	282.5	293.1	305.2
February	263.2	283.4	293.2	306.6
March	265.1	283.1	293.4	307.3
April	266.8	284.3	295.5	308.8
May	269.0	287.1	297.1	309.7
June	271.3	290.6	298.1	310.7
July	274.4	292.2	299.3	311.7
August	276.5	292.8	300.3	313.0
September	279.3	293.3	301.8	
October	279.9	294.1	302.6	
November	280.7	293.6	303.1	
December	281.5	292.4	303.5	
Average	**272.4**	**289.1**	**298.4**	

Source: U.S. Department of Labor, Bureau of Labor Statistics

NOTE 13: SIZE OF PLACE AND SMSA

Codes for size of place and SMSA were obtained from U.S. Bureau of the Census summary tape files (STF 1B).

A place is a concentration of population. Most places are incorporated as cities, town, villages or boroughs, but others are defined by the U.S. Bureau of the Census around definite residential nuclei with dense, city-type street patterns, with, ideally, at least 1,000 persons per square mile. The boundaries of Census defined places may not coincide with civil divisions.

A Standard Metropolitan Statistical Area (SMSA) is a large population nucleus and nearby communities which have a high degree of economic and social integration with that nucleus. Generally, an SMSA includes one or more central cities, all urbanized areas around the city or cities, and the remainder of the county or counties in which the urbanized areas are located. SMSAs are designated by the Office of Management and Budget.

The same place size and SMSA codes were assigned to all persons in the same segment (for the definition of segments see Ref. No. 1 in Section C). In a few cases segments were divided by place boundaries. In these cases codes were assigned after inspecting segment maps. If the segment was predominantly in one place, then the place code for that place was used. If the segment was approximately evenly divided, the code for the larger place was used.

NOTE 14: HOME HEATING

Questions E-3 through E-6, pertaining to the main fuel and equipment used for heating the home, appear to have codes which are inconsistent. It has been verified that these are codes that were recorded on the original document; that is, codes that appear inconsistent were not incorrectly keyed.

NOTE 15: MAJOR AND MINOR ECG ABNORMALITIES

	Minnesota Code	Comments
Major abnormalities		
Major Q, QS waves	1.1 or 1.2 except 1.2.8	Highest code in any leadgroup
ST depression	4.1 or 4.2	
Negative T waves	5.1 or 5.2	
Complete AV block	6.1	Not coded by computer
WPW pattern	6.4	
Artificial pacemaker	6.8	Rhythm code 08
Ventricular conduction	7.1 or 7.2 or 7.4	
Defects		
Atrial fibrillation/flutter	8.3	Rhythm code 05
ST elevation	9.2	
Minor abnormalities		
Minor Q waves	1.2.8 or 1.3	
High R waves	3.1 or 3.3	Any 3.1 or 3.3 code
Minor ST codes	4.3 or 4.4	
Minor T wave codes	5.3 or 5.4	
Prolonged PR interval	6.3	
RR' in V1 or V2	7.3 or 7.5	
Left anterior fascicular block	7.7	
Left axis deviation	2.1.2	

NOTE 16: VISUAL CRITERIA FOR DIAGNOSTIC ECG AND EQUIVOCAL ECGs

Probable MI - Diagnostic Q waves - one of:

- Minnesota Code 1.1.1 through 1.2.5 + 1.2.7 for Q and QS Patterns.
- Minnesota code 9.2 for ST segment elevation and a major or T-wave inversion (Minnesota Code 5.1 or 5.2)

Possible MI - Equivocal Q waves or related abnormalities - one of:

- Q and QS Patterns 1.2.8 through 1.3.6
- ST Junction and segment depression 4.1 through 4.3
- T wave items 5.1 through 5.3
- ST segment elevation 9.2

NOTE 17: LIKELIHOOD OF LEFT VENTRICULAR HYPERTROPHY (LVH) ACCORDING TO THE MINNESOTA CODE

Probable LVH: Code 3.1 with code 5.1 or 5.2 or 5.3

Possible LVH: Code 3.1 without code 5.1 and 5.2 and 5.3, OR Any code 3.3

NOTE 18: RANGE OF VALUES FOR MC 1

The range indicated here does not correspond to the actual severity levels of MC 1.
See Appendix 1.

NOTE 19: RANGE OF VALUES FOR MC 4

The range indicated here does not correspond to the actual severity levels of MC 4.
See Appendix 1.

NOTE 20: RANGE OF VALUES FOR MC 5

The range indicated here does not correspond to the actual severity levels of MC 5.
See Appendix 1.

NOTE 21: RANGE OF VALUES FOR MC 9.2

Minnesota Code 9.2 categorizes ST elevation into two levels;
9.2.0 (ST elevation absent), and
9.2.2 (ST elevation present).

NOTE 22: CARDIAC INFARCTION/INJURY SCORE (CIIS)

This ECG coding scheme was developed as a measure of the likelihood of myocardial infarction on a continuous scale. The following thresholds for the score define the likelihood of infarction in a decreasing order:

Probable infarction	CIIS $\geq$ 20
Possible infarction	15 $\leq$ CIIS < 20
Consider infarction	10 $\leq$ CIIS < 15

These thresholds correspond to the estimated specificity levels of 98%, 95% and 90%.

Reference: Rautaharju PM, Warren J, Jain U, Wolf HK and Nielsen CL. Cardiac Infarction/Injury Score: An electrocardiographic coding scheme for ischemic heart disease. *Circulation* 64:249-258,1981.

NOTE 23: COEFFICIENTS FOR THE REGRESSION EQUATION USED FOR ECG ESTIMATION OF LEFT VENTRICULAR MASS (LVM) AND LEFT VENTRICULAR MASS INDEX (LVMI)

White and Black Men

Variables	*LVM*	*LVMI*
R amplitude in V5 (μV)	0.0217	0.0100
Q or S amplitude in V1 (μV)*	0.0338	0.0203
Q or S amplitude in III (μV)*	0.0600	0.0287
Negative T amplitude in V6 (μV)	0.3158	0.1819
Positive T amplitude in aVR (μV)	-0.2958	-0.1482
QRS duration (msec.)	1.8204	1.0485
Intercept	-58.5098	-36.4290

White Women

Variables	*LVM*	*LVMI*
R amplitude on aVL (μV)	0.0320	--
R amplitude in V5 (μV)	0.0233	0.0178
Q or S amplitude in V5 (μV)*	0.0693	0.0528
Q or S amplitude in I (μV)*	-0.1545	-0.1128
Positive T amplitude in V1 (μV)	0.1122	0.1075
Negative T amplitude in aVF (μV)	--	0.1701
Positive T amplitude in V6 (μV)	-0.1236	-0.0939
Intercept	134.7722	88.4357

Black Women

Variables	*LVM*	*LVMI*
R amplitude in aVL (μV)	--	0.0216
R amplitude in I (μV)	0.0507	--
(R amplitude in V6 + S amplitude in V2) (μV)	0.0235	0.0184
R amplitude in V1	-0.0507	--
R amplitude in V2 (μV)	--	-0.0143
Q or S amplitude in V6 (μV)*	-0.0980	-0.0693
Negative T amplitude in aVL (μV)	--	0.199
Negative T amplitude in I (μV)	0.5225	--
QRS duration (msec.)	1.8478	0.7460
Intercept	-90.7136	-22.3064

* whichever is larger

The following limits for LVMI are taken to indicate the presence of probable left ventricular hypertrophy:

	Males	Females
Probable LVH	LVMI > 131g/m^2	LVMI > 110g/m^2

NOTE 24: FRONTAL PLANE QRS AXIS

The algorithm used for QRS axis determination provides a more accurate estimation of the mean frontal plane axis than the approximation used in Minnesota Code 2 according to the conventional visual measurement.

The algorithm used for the QRS axis determination is also used for P and T axis calculation.

Values of QRS integrals (net QRS 'areas', A) determined from the six limb leads are used for the mean frontal plane QRS axis calculation.

Three separate axis angle (ANG) values are calculated from three pairs of limb leads. The lead vectors of these three pairs of leads are assumed to be orthogonal according to the Einthoven's equilateral triangle approximation, and the relative strength of the lead vectors of leads aVR, aVL and aVF are assumed to be $\sqrt{3}/2$ times the lead vector strengths of leads I, II and III. Consequently, the augmented unipolar limb leads are scaled by factor 1.16 in these pairwise calculations of the three angles ANG(1), ANG(2) and ANG(3).

ANG(1) = ARCTG (1.16 x A(aVF), A(I)),

ANG(2) = ARCTG (A(II), 1.16 x A(aVF)),

ANG(3) = ARCTG (1.16 x A(aVR), A(III)) + 120

In case the three values are reasonably consistent, the final mean frontal plane axis is taken as the mean value of these three separate angle determinations. Several inconsistency checks are performed, and if abnormally large discrepancies are found, the angle is termed 'undetermined'.

QRS axis values can be used to identify abnormal axis deviations. Please refer to Appendix 2, Category 2. QRS Axis *(criteria for Category 2).*

SECTION M. NOVACODE ECG MEASUREMENT AND CLASSIFICATION PROGRAM

P.M. Rautaharju

Introduction

The Novacode ECG measurement and classification program incorporates the classic Minnesota Code (1) and two more recent ECG classification modules designed for improved estimation of the likelihood of myocardial infarction (MI) (2) and left ventricular hypertrophy (LVH) (3). This document describes these two new ECG classifiers. It also contains the first published report which documents the Minnesota Code ECG wave measurements and ECG codes using logic operators and a glossary of symbols and concise definitions of the variables used in ECG coding. This was done in order to reduce the ambiguities in traditional Minnesota Code definitions for the fairly complex visual ECG wave measurement and classification "rules" when expressed in everyday English (4).

There have been substantial technological improvements in ECG acquisition since the introduction of the Minnesota Code nearly three decades ago and the development of its guidelines for ECG wave identification and measurement. These guidelines were devised for visual ECG measurement of ECG complexes primarily from single-channel ECG tracings. The "majority rule" was introduced in order to cope with beat-to-beat waveform variations caused, for instance, by respiration and muscle noise.

Computer processing of ECGs has considerably enhanced ECG signal quality. It has also introduced the use of a single representative signal-averaged ECG complex for wave measurements instead of beat-by-beat measurements from single-channel ECGs as traditionally done in visual ECG coding. Another recent major change has been the introduction of simultaneous acquisition of all independent components of the standard 12-lead ECG, a new procedure which was used, for instance, in HHANES. This has greatly improved the precision and accuracy of ECG interval measurements, and it has subsequently reduced the variance of ECG interval measurements compared to single-channel measurements used, for instance, in NHANES I. These technological improvements have also necessitated certain revisions in ECG wave definitions and measurement procedures which deviate from the old Minnesota Code guidelines. These differences between the traditional visual Minnesota Code measurements and measurements performed by the Novacode program will be discussed in this document.

A record library composed in 1015 visually coded ECGs was initially available when the Novacode ECG program development was initiated over a decade ago. An iterative program performance optimizing scheme was employed to minimize the discrepancies between computer and visual measurements. Thus, the choice for various thresholds and other program parameters in various wave detection algorithms was made iteratively within a wide range of possible values. The subsequent program development was performed in connection with the Multiple Risk Factor Intervention Trial (MRFIT) which required a parallel visual and computer ECG coding of nearly 100,000 ECGs (5).

Key Characteristics of the Novacode Program

The basic ECG measurement module of the Novacode program was initially developed for processing of both rest and exercise ECGs (6-8). The measurement program was probably the first ECG program which relied on measurements made from representative complexes obtained after clustering and selective averaging instead of making measurements from individual complexes on a beat-to-beat basis. This has resulted in an excellent noise tolerance. A recent revision with an advanced baseline drift correction algorithm has further improved the robustness of the program.

QRS Wave Detection

A. Initial search interval for QRS waves

QRS wave detection is performed on each set of simultaneously recorded ECG leads by detecting the earliest and the latest sign of ventricular excitation. These time coherent demarcation lines are called reference lines C(QRS onset) and D(QRS offset) See figure 1. According to the Minnesota Code measurement rules, the beginning of the Q wave or the initial R wave in any given individually considered lead does not necessarily coincide with time line C, and a refined wave detection algorithm is needed (for excluding so called isoelectric segments) to satisfy the initial QRS wave measurements for the Minnesota Code. The initial search interval for QRS wave detection extends from C-16 msec to D+16 msec.

B. Differences between visual and computer measurements

The Minnesota Code definitions for measurement and classification were formulated as instructions to human coders. In spite of serious attempts at consistent, clear and explicit definitions when the Minnesota Code was initially developed, numerous ambiguities became evident when a systematic effort was made to formulate the definitions following rigid rules of logic. These ambiguities in measurement and coding partially explain the relatively poor repeatability in visual coding of some of the categories.

There are several minor but important differences from visual measurement rules introduced in the Novacode program. In view of the importance of these differences in practical applications, they will be listed next and discussed in some detail.

1. **Baseline:** The Minnesota Code measurement rules suggest that QRS and ST amplitude measurements be made "by measuring the vertical distance between the upper edge of the trace at the beginning of the QRS interval and the upper edge of the trace at the apex of the deflection" (9). (Negative deflections are measured following the lower edge of the tracing.) This baseline definition is valid also for all ST measurements. However, the precise definition of the 'upper edge of the trace at the beginning of QRS interval' is missing. The Novacode program defines the baseline as a smoothed 18 msec. segment centered at 16 msec before the beginning of QRS. This choice, instead of the beginning of QRS, resulted in improved stability and reduced vulnerability to possible minor errors in defining the QRS onset. The Novacode program uses this common baseline for amplitude measurements for all Minnesota Code categories with the exception of Code 5. The inertia of tradition, rather than any sound scientific or technical reason, compelled us to accept, as an interim compromise, the TP baseline for T amplitude measurements.

2. **Majority Rule:** The Novacode program makes measurements from the average complex of the members of the majority cluster formed on the basis of QRS duration, amplitude and RR interval data. The selection of a 'model complex' rather than the average would perhaps be closer to the majority rule followed by visual codes. On the other hand, the choice of the average complex results in a substantially improved consistency and repeatability particularly if the record quality is borderline. There are two important deviations from the majority rule in visual coding which may result in discrepancies in comparison with the measurements made from the average complex. Firstly, the R wave amplitudes for Code 3 are most commonly measured from the 'second to the last good beat' in a given lead group. Secondly, the presence of an initial R wave exceeding 25μV in any QRS complex rules out the Q and QS waves in that lead.

3. **Threshold for Initial R Wave Amplitude:** The threshold for the detection of initial R waves from the averaged QRS complex was reduced to 20μV from the 25μV used by visual

coders for single beat measurements. This improved the agreement between visual and computer coding of Q waves.

4. **Code 2. Frontal Plane QRS Axis:** The coding categories have been rearranged into mutually exclusive groups. A new category is included for borderline left axis deviation.

5. **CODE 4. J Amplitude, ST Slope:** The classic definition of the J point well illustrates the difficulties encountered in the attempts to formulate rapid logic rules for computer coding of ECGs. "The term 'ST-T junction' or 'J' (RS-T junction) should be used to indicate the point or shoulder which marks the end of the QRS complex, the point when steep slopes of the QRS deflections are more or less abruptly replaced by the more gradual slopes which precede or comprise the first limb of the T wave (9)." This definition is further qualified by the following rules: "If more than one change of slope makes J point determination arbitrary, choose the latest one, or if ambiguous, do not code," "If there is no clear S-T demarcation, include the whole length of the line as S-T for coding 4.3."

   An analysis of the logic followed by visual coders in identifying J amplitude measurement from single-lead ECG complexes for Code 4 reveals a variety of subjective choices depending on combinations of relative changes in the linearity, slope and amplitude values in the proximity of the apparent end of QRS. In addition, the choice of the ST depression measurement point is different, if the ST segment is 'U-shaped' or 'bell-shaped' without a clearly delineated inflection point suggesting the presence of a definable J point. In fact, three different J points may be chosen to designate the end of QRS, ST depression and ST elevation in a given lead. For instance, in case of a bell-shaped ST segment, the visual coders compare the amplitude of the J point with the amplitude of the inflection point in the beginning of the T wave or T wave nadir amplitude. If J amplitude is larger than that of the latter two amplitudes the whole ST slope is considered negative and the maximum point of the ST segment is measured for coding of ST depression.

   Our attempts to define functionally the logic for these diverse definitions of the J point were not entirely successful, to a large extent because of the difficulty in reproducing visual measurements for optimization tests. Therefore, instead of J amplitude, it was decided to select the maximum ST amplitude within the initial part of the ST segment in the interval from QRS end +6 msec. to QRS end + 25 msec. for coding of ST depressions.

   Best agreement for ST slope measurements was reached by identifying the minimum 50 msec. slope in the interval from QRS end + 25 msec. to one-third of the total ST-T segment length. Finally, a bell-shaped ST segment is considered to have a negative slope for classification purposes if T wave nadir (amplitude of the first negative wave in the ST-T complex) is more negative than the J amplitude. Admittedly, these decision rules are still more complex than desirable. However, they were able to reproduce with adequate accuracy visual coding in categories 4.1 and 4.2.

The most recent version of the Novacode ECG program is described in detail in (10).

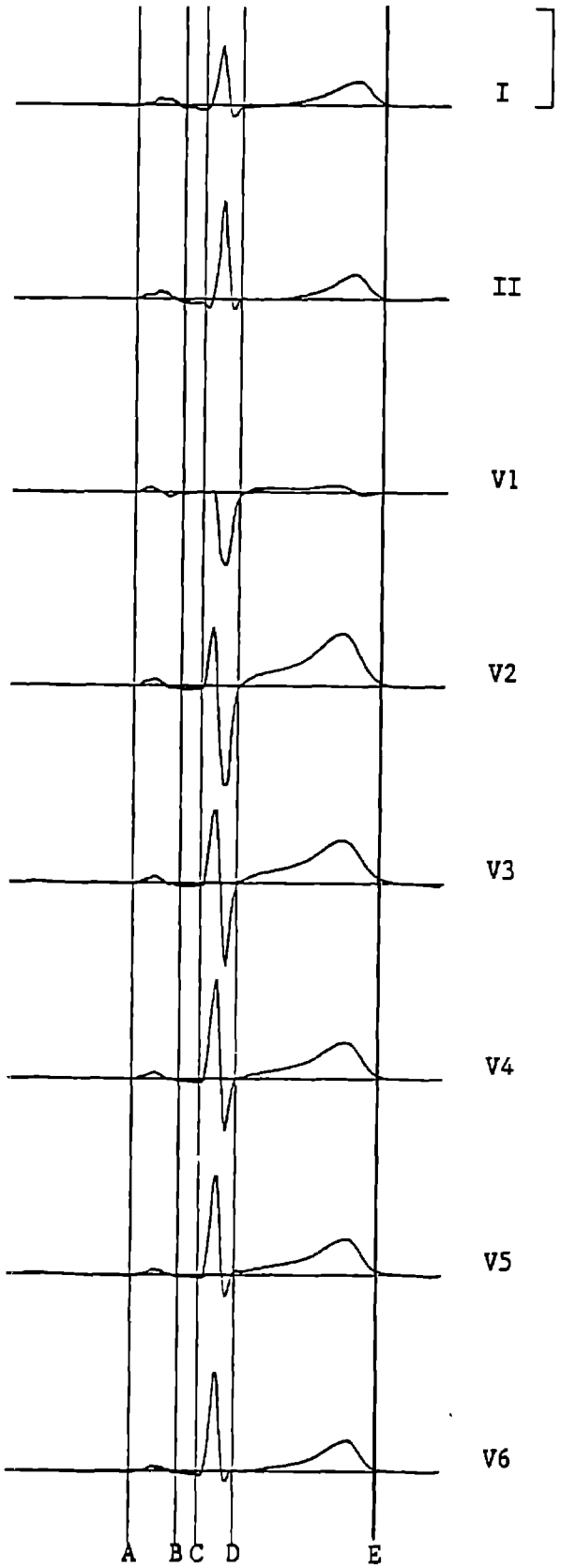

Fig. 1. Representative average complexes of the eight simultaneously recorded ECG leads. Time demarcation lines A to E identify common reference time points for the beginning and end of atrial depolarization (A-B), ventricular depolarization (C-D) and the end of ventricular depolarization (E).

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APPENDIX 1

Glossary of Symbols and Definitions
used for Computer Coding of the Minnesota Code

1. Definition of logical operators

~ Denotes logical negation. Thus, if ~ C is true, then C is false.

+ Denotes logical disjunction, OR. Thus, if C + D is true, then either C or D is true or both are true. C + D is false only if both C and D are false.

• Elevated period between symbols denotes logical conjunction AND, implying that both C and D are true if C•D is true. If either C or D is false or both are false, then C•D is false.

$\cap_L[---]$ Denotes extended logical conjunction (AND) for all leads L specified. This is a functional operator whose arguments are in brackets.

Example of extended logical conjunction:

$V1.1.7 = \cap_L[QS_L]$

for L = V1→V4

V1.1.7 will be true if there is a QS wave in all of the leads V1, V2, V3 and V4

$\cup_L[---]$ Denotes extended logical disjunction (OR) for all leads L specified. This is a functional operator whose arguments are in brackets.

Example of extended logical disjunction:

$V1.2.1 = \cup_L[Q_L \bullet (QR_L \geq 1/3) \bullet (QDUR_L \geq 20 \text{ msec.}) \bullet (QDUR_L < 30 \text{ msec.})]$
for L = V2, V3, V4, V5

V1.2.1 will be true if in at least one of the leads V2, V3, V4 and V5 all of the following conditions are true: there exists a codable Q wave and the ratio of Q wave amplitude to R wave amplitude is greater than or equal to one third and the duration of the Q wave is 20 msec. or more and the duration of the Q wave is less than 30 msec. Otherwise, V1.2.1 will be false.
(Note: The existence of a codable Q wave implies the existence of a codable R wave also. Thus, the ratio QR will never be undefined if a codable Q wave exists.)

2. Definitions of global variables common to all ECG waves.

Baseline (L)	A reference amplitude for ECG voltage and time integral measurements. This reference amplitude is taken as the smoothed value at 16 msec. preceding time demarcation line C (QRS onset). Smoothing is done by fitting a quadratic polynomial spanning 18 msec. and centered at C-16 msec. by the method of least squares.
Time demarcation lines	Time coherent reference points for all simultaneously recorded ECG leads. These demarcation points identify the beginning and end of the P and QRS waves and the end of the T wave, and they are used for global ECG interval measurements (See figure 1).
Line A	Time demarcation point denoting the beginning of atrial excitation (onset of P wave)
Line B	Time demarcation point denoting the latest sign of atrial excitation (end of P wave)
Line C	Time demarcation point denoting the earliest sign of ventricular excitation (QRS complex)
Line D	Time demarcation point denoting the latest sign of ventricular excitation (end of QRS or the J point)
Line E	Time demarcation point denoting the latest sign of ventricular repolarization (end of T wave)

3. Symbols for codable ECG waves

$INTDEF_L$	Intrinsicoid deflection; time interval from the beginning of QRS to the peak of the largest codable positive QRS wave in lead L
P_L	Denotes existence of a codable P wave in lead L
$PNEG_L$	Absolute amplitude of negative phase of the P wave in lead L
$PPOS_L$	Absolute amplitude of positive phase of the P wave in lead L
Q_L	Denotes the existence of a codable Q wave in lead L
$QAMP_L$	Absolute amplitude of Q wave in lead L
$QDUR_L$	Duration of Q wave in lead L
QR_L	Ratio of QAMP to RAMP in lead L
$QRSDUR_L$	Duration of QRS in lead L
QS_L	Existence of a codable QS wave in lead L
R_L	Existence of a codable R wave in L
$RAMP_L$	Absolute amplitude of the largest codable positive QRS wave (R or R') in lead L

$R1_L$	Absolute amplitude of first codable positive QRS wave in lead L
$R2_L$	Absolute amplitude of R' wave in lead L (largest positive wave following R1, if any)
RS_L	Ratio of RAMP to SAMP in lead L
RT_L	Ratio of RAMP to TAMP in lead L
R'_L	Existence of a codable R' wave in lead L
S_L	Existence of a codable S wave in lead L
$SAMP_L$	Absolute amplitude of S wave in lead L
STJ_L	Amplitude of J point (QRS offset) in lead L
STM_L	Average amplitude of the initial 3/8th of ST-T in lead L
STS_L	Slope of least squares line fitted in the window (D + 10 msec.) to (D + 76 msec.) in lead L
$SLMIN_L$	Minimum of all 50 msec. forward slopes calculated in the ST segment excluding the initial 25 msec. in lead L
$SL00_L$	Initial 50 msec. forward slope of ST segment at time point D in lead L
$SL25_L$	50 msec. forward slope of ST segment at (D + 25 msec.) in lead L
$SL50_L$	50 msec. forward slope of ST segment at (D + 50 msec.) in lead L
$STMAX_L$	Maximum amplitude of the initial 3/8th portion of the smoothed ST-T segment in lead L
$STMIN_L$	Minimum amplitude of the smoothed ST segment in lead L

4. Special definitions for ST-T waves for computer coding

C(t)	Convexity function; a generating function used for identification of positive, negative, flat and multiphasic ST-T waves. The convexity function is computed from the smoothed ST-T complex S(t) according to the following formula: $C(t) = 1/2[S(t - 50) + S(t + 50)] - S(t)$ for all sample points t within the ST-T complex of each lead
$AW1_L$	Amplitude of first wave of ST-T wave train in lead L
$AW2_L$	Amplitude of second wave of ST-T wave train in lead L
$AW3_L$	Amplitude of third wave of ST-T wave train in lead L
$TFLAT_L$	T wave which does not meet criteria for Positive (P) or negative (N) T waves in lead L

$TNEG_L$	Minimum amplitude (A) of negative wave within terminal 5/8th of ST-T in lead L with A < -30μV and convexity C > 30 μV
$TPOS_L$	Maximum amplitude of a positive wave within terminal 5/8th of ST-T in lead L with amplitude A > 5μV and convexity C < - 30μV

5. Logical variable for ST-T wave identification

FFF_L	Logical variable denoting that no ST-T waves were detected in lead L
FFN_L	Logical variable denoting detection of only one wave which was negative
FFP_L	Logical variable denoting detection of only one wave which was positive
FPN_L	Logical variable denoting detection of two waves which were in temporal order positive and negative
FNP_L	Logical variable denoting detection of two waves which were in temporal order negative and positive
NPN_L	Logical variable denoting detection of three waves which were in temporal order negative, positive and negative
PNP_L	Logical variable denoting detection of three waves which were in temporal order positive, negative and positive

6. Symbols for measurement units

V	Volt
mV	millivolt; V x 10^{-3}
μV	microvolt; V x 10^{-6}
sec.	second
msec.	millisecond; sec. x 10^{-3}
μVsec.	microvolt-second

APPENDIX 2

Minnesota Code, 1982 Version

Category 1. Q and QS Patterns

Category 1. Leadgroup L (Leads I, aVL, V6)

Code	Expression	Lead
L1.1.1	$\cup_L[Q_L \bullet (QR_L \geq 1/3) \bullet (QDUR_L \geq 30 \text{ msec.})]$	L = I, V6
L1.1.2	$\cup_L[Q_L \bullet (QDUR_L \geq 40 \text{ msec.})]$	L = I, V6
L1.1.3	$Q_{aVL} \bullet (QDUR_{aVL} \geq 40 \text{ msec.}) \bullet (RAMP_{aVL} \geq 300\mu V)$	
L1.1.6	$QS_{V6} \bullet (\sim QS_{V5})$	
L1.2.1	$\cup_L[Q_L \bullet (QR_L \geq 1/3) \bullet (QDUR_L \geq 20 \text{ msec.}) \bullet (QDUR_L < 30 \text{ msec.})]$	L = I, V6
L1.2.2	$\cup_L[Q_L \bullet (QDUR_L \geq 30 \text{ msec.}) \bullet (QDUR_L < 40 \text{ msec.})]$	L = I, V6
L1.3.1	$\cup_L[Q_L \bullet (QR_L \geq 1/5) \bullet (QR_L < 1/3) \bullet (QDUR_L \geq 20 \text{ msec.}) \bullet (QDUR_L < 30 \text{ msec. })]$	L = I, V6
L1.3.3	$Q_{aVL} \bullet (QDUR_{aVL} \geq 30 \text{ msec.}) \bullet (RAMP_{aVL} \geq 300\mu V)$	

Category 1. Leadgroup F (Leads II, III, aVF)

Code	Expression	Lead
F1.1.1	$Q_{II} \bullet (QR_{II} \geq 1/3) \bullet (QDUR_{II} \geq 30 \text{ msec.})$	
F1.1.2	$Q_{II} \bullet (QDUR_{II} \geq 40 \text{ ms.})$	
F1.1.4	$Q_{III} \bullet Q_{aVF} \bullet (QDUR_{III} \geq 50 \text{ msec.}) \bullet (QAMP_{aVF} \geq 100\mu V)$	
F1.1.5	$Q_{aVF} \bullet (QDUR_{aVF} \geq 50 \text{ msec.})$	
F1.2.1	$Q_{II} \bullet (QR_{II} \geq 1/3) \bullet (QDUR_{II} \geq 20 \text{ msec.}) \bullet (QDUR_{II} < 30 \text{ msec.})$	
F1.2.2	$Q_{II} \bullet (QDUR_{II} \geq 30 \text{ msec.}) \bullet (QDUR_{II} < 40 \text{ msec.})$	
F1.2.3	QS_{II}	
F1.2.4	$Q_{III} \bullet Q_{aVF} \bullet (QDUR_{III} \geq 40 \text{ msec.}) \bullet (QDUR_{III} < 50 \text{ msec.}) \bullet QAMP_{aVF} \geq 100\mu V)$	

F1.2.5	$Q_{aVF} \bullet (QDUR_{aVF} \geq 40$ msec.) $\bullet (QDUR_{aVF} < 50$ msec.)	
F1.2.6	$\cup_L[Q_L \bullet (QAMP_L \geq 500\mu V)]$	L = III, aVF
F1.3.1	$Q_{II} \bullet (QR_{II} \geq 1/5) \bullet (QR_{II} < 1/3) \bullet (QDUR_{II} \geq 20$ msec.) $\bullet$ $(QDUR_{II} < 30$ msec.)	
F1.3.4	$Q_{III} \bullet Q_{aVF} \bullet (QDUR_{III} \geq 30$ msec.) $\bullet (QDUR_{III} < 40$ msec.) $\bullet$ $(QAMP_{aVF} \geq 100\mu V)$	
F1.3.5	$(QDUR_{aVF} \geq 30$ msec.) $\bullet (QDUR_{aVF} < 40$ msec.)	
F1.3.6	$QS_{III} \bullet QS_{aVF}$	

Category 1. Leadgroup V (Leads V1, V2, V3, V4, V5)

Code	Expression	Lead
V1.1.1	$\cup_L[Q_L \bullet (QR_L \geq 1/3) \bullet (QDUR_L \geq 30$ msec.)]	L = V2 → V5
V1.1.2	$\cup_L[Q_L \bullet (QDUR_L \geq 40$ msec.)]	L = V1 → V5
V1.1.6	$\cup_L[QS_L \bullet (\sim QS_{L-1})]$	L = V2 → V5
V1.1.7	$\cap_L(QS_L)$	L = V1 → V4
V1.2.1	$\cup_L[Q_L \bullet (QR_L \geq 1/3) \bullet (QDUR_L \geq 20$ msec.) $\bullet$ $(QDUR_L < 30$ msec.)]	L = V2 → V5
V1.2.2	$\cup_L[Q_L \bullet (QDUR_L \geq 30$ msec.) $\bullet (QDUR_L < 40$ msec.)]	L = V2 → V5
V1.2.7	$\cap_L(QS_L)$	L = V1 → V3
V1.2.8	$\cup_L[R_L \bullet R_{L+1} \bullet (R_L > 200\ \mu V) \bullet (R_{L+1} \leq 200\ \mu V)]$	L = V2 → V5
V1.3.1	$\cup_L[Q_L \bullet (QR_L \geq 1/5) \bullet (QR_L < 1/3) \bullet (QDUR_L \geq 20$ msec.) $\bullet$ $(QDUR_L < 30$ msec.)]	L = V2 → V5
V1.3.2	$QS_{V1} \bullet QS_{V2} \bullet (RAMP_{V5} \leq 2600\mu V) \bullet (RAMP_{V6} \leq 2600\mu V)$	

Category 2. QRS Axis

Criteria for Category 2

Code	Expression	Description
C2.0	$90° \geq AXIS \geq 0°$	Normal Axis
C2.1.1	$0° > AXIS > -30°$	Borderline Left Axis Deviation
C2.1.2	$-30° \geq AXIS > -90°$	Left Axis Deviation
C2.2.1	$90° \leq AXIS < 120°$	Borderline Right Axis Deviation
C2.2.2	$AXIS \geq 120° + AXIS \leq -150°$	Right Axis Deviation
C2.3	$-150° < AXIS \leq -90°$	Extreme Axis Deviation
C2.4	Axis not computed because measurements are incomplete	Undetermined Axis

Category 3. High Amplitude R Waves and Related Items

A hiearchial classification is performed using the following sequence:

Code	Expression	Lead
C3.1.1	$(C3.1.2 + C3.1.3 + C3.1.4) \bullet C3.2$	
C3.1.2	$\cup_L(RAMP_L > 2600\mu V)$	L = V5,V6
C3.1.3	$\cup_L(RAMP_L > 2000\mu V)$	L = I, II, III, aVF
C3.1.4	$RAMP_{aVL} > 1200\mu V$	
C3.2	$\cup_L(RAMP_L < SAMP_L) \bullet (RAMP_{V1} > 500\mu V) \bullet (RAMP_{V1} > SAMP_{V1})$	$L = V2 \rightarrow V6$
C3.3.1	$(RAMP_I > 1500\mu V) \bullet (RAMP_I < 2000\mu V)$	
C3.3.2	$[(RAMP_{V5} + QSAMP_{V1}) > 3500\mu V] + [(RAMP_{V6} + QSAMP_{V1}) > 3500\mu V]$ where $QSAMP_L$ is the larger of $QAMP_L$ and $SAMP_L$	

Category 4. ST Abnormalities

Definitions

$AMAX_L$ = MIN [1/2(STJ_L + $STMAX_L$), $STMAX_L$]

C411(L) = ($AMAX_L$ < -200μV) • ($S25_L$ < 0.15mV/sec) • ($S50_L$ < 0.15mV/sec)

C412(L) = ($AMAX_L$ < -100μV) • ($S25_L$ < 0.15mV/sec) • ($S50_L$ < 0.15mV/sec)

C42(L) = ($AMAX_L$ < -50μV) • ($S25_L$ < 0.15mV/sec) • ($S50_L$ < 0.15mV/sec)

C43(L) = ($AMAX_L$ ≥ -50μV) • ($S25_L$ < -0.15mV/sec) • ($S50_L$ < -0.15mV/sec)
• ($SLMIN_L$ < -0.20mV/sec) • [(STMIN < -50μV) + (W1 < -50μV)]
• (STJ_L < STJ_L - 6μV)

C44(L) = [($S25_L$ ≥ 0.15mV/sec) + ($S50_L$ ≥ 0.15mV/sec)] • [1/2(STJ_L + $STMIN_L$) ≤ -100μV]

Criteria for Category 4

Category 4. Leadgroup L (Leads I, aVL, V6)

Code	Expression	Lead
L4.1.1	$\cup_L$[C411(L)]	L = I, aVL, V6
L4.1.2	$\cup_L$[C412(L)]	L = I, aVL, V6
L4.2	∪[C42(L)]	L = I, aVL, V6
L4.3	$\cup_L$[C43(L)]	L = I, aVL, V6
L4.4	$\cup_L$[C44(L)]	L = I, aVL, V6

Category 4. Leadgroup F (Leads II, III, aVF)

Code	Expression	Lead
F4.1.1	$\cup_L$[C411(L)]	L = II, aVF
F4.1.2	$\cup_L$[C412(L)]	L = II, aVF
F4.2	$\cup_L$[C42(L)]	L = II, aVF
F4.3	C43(II)	
F4.4	C44(II)	

Category 4. Leadgroup V (Leads V1, V2, V3, V4, V5)

Code	Expression	Lead
V4.1.1	$\cup_L$[C411(L)]	L = VI → V5
V4.1.2	$\cup_L$[C412(L)]	L = V1 → V5
V4.2	$\cup_L$[C42(L)]	L = V1 → V5
V4.3	$\cup_L$[C43(L)]	L = V2 → V5
V4.4	$\cup_L$[C44(L)]	L = V1 → V5

Category 5* T wave abnormalities

Definitions

$$C51(L) = FFN_L \bullet (AW3_L \leq -500\mu V) + FNP_L \bullet (AW2_L \leq -500\mu V) + FPN_L \bullet (AW3_L \leq -500\mu V) + NPN_L \bullet (AW1_L \leq -500\mu V) + NPN_L \bullet (AW3_L \leq -500\mu V) + PNP_L \bullet (AW2_L \leq -500\mu V)$$

$$C52(L) = FFN_L \bullet (AW3_L \leq -100\mu V) + FNP_L \bullet (AW2_L \leq -100\mu V) + FPN_L \bullet (AW3_L \leq -100\mu V) + NPN_L \bullet (AW1_L \leq -100\mu V) + NPN_L \bullet (AW3_L \leq -100\mu V) + PNP_L \bullet (AW2_L \leq -100\mu V)$$

$$C53(L) = FFF_L \bullet (TPOS_L \leq 6\mu V) + FFN_L \bullet (AW3_L > -100\mu V) + FNP_L \bullet (AW2_L > -100\mu V) + NPN_L \bullet (AW1_L > -100\mu V) \bullet (AW3_L > -100\mu V) + PNP_L \bullet (AW2_L > -100\mu V)$$

$$C54(L) = FFF_L \bullet (TPOS_L > 6\mu V) \bullet (RT_L > 20\mu V) \bullet (RAMP_L > 1000\mu V) + FFP_L \bullet (RT_L > 20\mu V) \bullet (RAMP_L > 1000\mu V)$$

$$UPRIGHT(L) = R_L \bullet Q_L \bullet S_L \bullet (RAMP_L > QAMP_L) \bullet (RAMP_L > SAMP_L) + R_L \bullet Q_L \bullet \sim S_L \bullet (RAMP_L > QAMP_L) + R_L \bullet \sim Q_L \bullet S_L \bullet (RAMP_L > SAMP_L) + R_L \bullet \sim Q_L \bullet \sim S_L$$

*if TPR is > 0μV then TPR is subtracted from AW1, AW2 and AW3 before coding. TPR is the T-offset baseline relative to the PR baseline.

Criteria for Category 5

Category 5. Leadgroup L (Leads I, aVL, V6)

Code	Expression	Lead
L5.1	$C51(I) + C51(aVL) \bullet (RAMP_{aVL} \geq 500\mu V) + C51(V6)$	
L5.2	$C52(I) + C52(aVL) \bullet (RAMP_{aVL} \geq 500\mu V) + C52(V6)$	
L5.3	$C53(I) + C53(aVL) \bullet (RAMP_{aVL} \geq 500\mu V)$	
L5.4	C54(I) + C54(aVL) + C54(V6)	

***Category 5. Leadgroup F* (Leads II, aVF)**

Code	Expression	Lead
F5.1	C51(II) + C51(aVF) • UPRIGHT(aVF)	
F5.2	C52(II) + C52(aVF) • UPRIGHT(aVF)	
F5.3	C53(II)	
F5.4	C54(II)	

Category 5. Leadgroup V (Leads V1, V2, V3, V4, V5)

Code	Expression	Lead
V5.1	$\cup_L[C51(L)]$	$L = V2 \rightarrow V5$
V5.2	$\cup_L[C52(L)]$	$L = V2 \rightarrow V5$
V5.3	$\cup_L[C53(L)]$	$L = V3 \rightarrow V5$
V5.4	$\cup_L[C54(L)]$	$L = V3 \rightarrow V5$

Category 6. A-V Conduction

Codes 6.1 and 6.2 (complete and second degree AV blocks, Mobitz Type II and Wenckebach) have not been implemented in the Novacode ECG Program because of the uncertainty in computer recognition of P waves uncoupled to QRS complexes. These abnormalities are rare in populations outside hospital settings.

Code 6.3 **Prolonged PR interval**

Ancillary definition:

PR-frontal — Denotes the second largest PR interval in the six limb leads I, II, III, aVR, aVL, aVF that does not differ from their median PR interval by more than 50 msec.

C6.3 = PR-frontal > 220 msec.

Code 6.4 **WPW pattern**

$$C6.4 = \cup_L[(PR_L < 120 \text{ msec.}) \bullet (INTDEF_L \geq 60 \text{ msec.}) \bullet (QRSDUR_L \geq 120 \text{ msec.})]$$

for L = I, II, aVL, V4, V5, V6

Code 6.5 **Short PR pattern**

Ancillary definition:

PR-large — Denotes the largest PR interval in the limb leads that does not differ from their median value by more than 50 msec.

C6.5 = PR-large < 120 msec.

Category 7. Ventricular Conduction Defections

Definitions

$UPRIGHT_L$ = $[(RAMP_L > QAMP_L) \bullet (RAMP_L > SAMP_L)]$

KNT = Number of leads from the conventional 12 leads with QRS duration > 120 msec.

Criteria for Category 7

Code 7.1 **Left Bundle Branch Block**

$C7.1 = \cup_L(INTDEF_L \geq 60 \text{ msec.}) \bullet (KNT \geq 2)$
for L = I, II, aVL, V5, V6

Code 7.2 **Right Bundle Branch Block**

$C7.2 = (KNT \geq 2) \bullet \cup_L[(R'AMP_L > R_1AMP_L) + (UPRIGHT_L \bullet INTDEF_L \geq 60 \text{ msec.})]$
for L = V1, V2

Code 7.3 **Incomplete Right Bundle Branch Block**

$C7.3 = \cup_L[(R'AMP_L > R_1AMP_L) \bullet (R'AMP_L > 100\mu V) \bullet (R_1AMP_L > 25\mu V)]$
for L = V1, V2

Code 7.4 **Intraventricular Block**

$C7.4 = (KNT \geq 2) \bullet (\sim 7.1) \bullet (\sim 7.2)$

Code 7.5 **RR' Pattern in V1 or V2**

$C7.5 = \cup_L[(R'AMP_L > R_1AMP_L) \bullet (R'AMP_L > 100\mu V) \bullet (R_1AMP_L > 25\mu V)]$
for L = V1, V2

Code 7.6 **Incomplete Left Bundle Branch Block**

$C7.6 = \cup_L[(QSDUR_L \geq 100 \text{ msec.}) \bullet (QSDUR_L < 120 \text{ msec.})]$
for L = I, aVL, V5

Code 7.7 **Left Anterior Fascicular Block**

$C7.7 = \cup_L(QDUR_L < 120 \text{ msec.}) \bullet (QAMP_1 > 25\mu V) \bullet (QDUR_1 < 30 \text{ msec.}) \bullet (QRSAXIS < -45)$
for L = I, II, III, aVL, aVF

Category 8. Arrhythmias

Minnesota Code definitions not implemented. Arrhythmias reported are coded by the Dalhousie ECG Program. The primary purpose of providing rhythm codes for health surveys and epidemiologic studies is to identify a major subset with no significant arrhythmias (Code 01, Sinus rhythm),

Category 9. Miscellaneous Codes

Code 9.1 Low Amplitude QRS

$$C9.1A = \cap_L[((RAMP_L + SAMP_L) < 500\mu V) \bullet ((RAMP_L + QAMP_L) < 500\mu V)]$$
for L = I, II, III

$$C9.1B = \cap_L[((RAMP_L + SAMP_L) < 1000\mu V) \bullet ((RAMP_L + QAMP_L) < 1000\mu V)]$$
for L = V1 → V6

$$C9.1 = C9.1A + C9.1B$$

Code 9.2 ST Elevation

Code 9.2 Leadgroup L (Leads I, aVL, V6)

$$C9.2.L = \cup_L[(STMIN_L \geq 100\mu V) \bullet (STJ_L \geq 100\mu V) \bullet (TPR_L < 300\mu V) \bullet (TPR_L > -300\mu V)]$$
for L = I, aVL, V6

Code 9.2 Leadgroup F (Leads II, III and aVF)

$$C9.2.F = \cup_L[(STMIN_L > 100\mu V) \bullet (STJ_L > 100\mu V) \bullet (TPR_L < 300\mu V) \bullet (TPR_L > -300\mu V)]$$
for L = I, II, aVF

Code 9.2 Leadgroup V (Leads V1, V2, V3, V4 ,V5)

$$C9.2V = \cup_L[(STMIN_L \geq 200\mu V) \bullet (STJ_L \geq 200\mu V) \bullet (TPR_L < 300\mu V) \bullet (TPR_L > -300\mu V)]$$
for L = V1 → V5

Code 9.3 **High Amplitude P Wave**

Definition

$RS_L = RAMP_L/SAMP_L$

Criteria for code 9.3

$C9.3 = \cup_L(PAMP_L \geq 250\mu V)$
for L = II, III, aVF

Code 9.4.1 **QRS Transition Zone at V3 or to the right of V3**

$C9.4.1 = [(RS_{V3} \geq 1) \bullet (RS_{V2} < 1)] + [(RS_{V2} \geq 1) \bullet (RS_{V1} < 1)]$

Code 9.4.2 **QRS Transition Zone between V4 and V6 or at V6**

$C9.4.2 = (RS_{V4} < 1) \bullet \sim C9.4.1$

Code 9.5 **High Amplitude T wave**

$C9.5 = \cup_L(TPOS_L > 1200\mu V)$
for L = I, II, III, aVR, aVL, aVF, V1 → V6

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