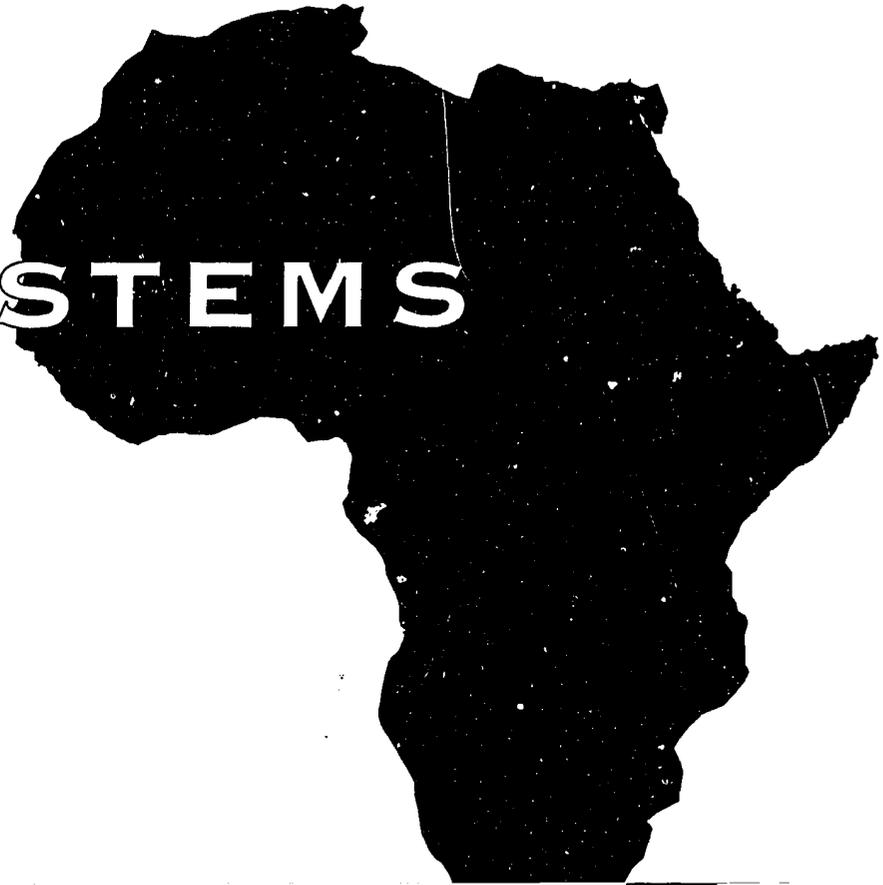


- PN-ABS-599 90254

INITIATIVE
COMMUNICABLE DISEASES
)

COMPUTER APPLICATIONS FOR HEALTH INFORMATION SYSTEMS:

HOSPITAL-BASED MORBIDITY AND MORTALITY REPORTING SYSTEM
HEALTH CENTER-BASED MORBIDITY REPORTING SYSTEM



SYSTEMS



OFFICE OF THE DIRECTOR, CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC) RESPONSIBLE FOR DEVELOPMENT AND IMPLEMENTATION OF BOTH SURVEILLANCE AND HEALTH INFORMATION SYSTEMS IN DEVELOPING COUNTRIES. MR. BUSSELL IS ALSO THE COMPUTER SYSTEMS SPECIALIST FOR THE ACSI-CCCD PROJECT ADMINISTERED BY IHPO.

THIS WORK WAS SUPPORTED AND MADE POSSIBLE BY THE AFRICA BUREAU, OFFICE OF OPERATION AND NEW INITIATIVES (ONI) AND THE OFFICE OF ANALYSIS, RESEARCH AND TECHNICAL SUPPORT (ARTS), UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (A.I.D.) THROUGH THE AFRICA CHILD SURVIVAL INITIATIVE - COMBATING CHILDHOOD COMMUNICABLE DISEASES (ACSI-CCCD) PROJECT, AFRICA REGIONAL PROJECT (698-0421) WASHINGTON, D.C.

THIS DOCUMENT WAS PREPARED BY (STAFF OF THE ACSI-CCCD PROJECT) AND DOES NOT REPRESENT THE VIEWS OR OPINIONS OF CDC OR OF THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT. THE VIEWS EXPRESSED ARE SOLELY THOSE OF THE AUTHORS.

THE AUTHOR WISHES TO EXPRESS SINCERE APPRECIATION FOR THE INDIVIDUAL CONTRIBUTIONS TO THIS PUBLICATION OF: MR. BRIAN FITZGIBBON, DR. HENRY KALTER, DR. MICHAEL TOOLE, DR. ANDREW VERNON, MS. KAREN WILKINS, MR. DAVID BOYD, DR. KEVIN SULLIVAN, DR. RICHARD SPIEGEL, DR. BRADLEY HERSH, DR. LESLIE ROBERTS, MR. BOB WEIERBACH, MR. KEVIN MURPHY AND MR. ANDREW AGLE; THE MINISTRIES OF HEALTH OF TOGO AND BURUNDI FOR PROVIDING OUTSTANDING LEADERSHIP IN THE DEVELOPMENT OF HEALTH INFORMATION SYSTEMS IN AFRICA, AND TO DR. STANLEY FOSTER AND MR. JEAN-L ROY FOR THEIR SUSTAINED SUPPORT AND ENCOURAGEMENT DURING THE MANY EXPERIENCES WHICH HAVE MADE THIS PUBLICATION POSSIBLE.

ANY PARTS OF THESE MATERIALS MAY BE COPIED OR REPRODUCED FOR NONCOMMERCIAL PURPOSES WITHOUT PERMISSION IF CREDIT IS PROPERLY GIVEN.

ADDITIONAL COPIES IN ENGLISH (CATALOGUE NUMBER 099-4022) OR IN FRENCH (099-4036) ARE AVAILABLE UPON REQUEST FROM:

ACSI-CCCD TECHNICAL COORDINATOR
INTERNATIONAL HEALTH PROGRAM OFFICE
CENTERS FOR DISEASE CONTROL AND PREVENTION
ATLANTA, GEORGIA 30333
FAX (404) 639-0277

**COMPUTER APPLICATIONS FOR
HEALTH INFORMATION SYSTEMS:**

HOSPITAL-BASED MORBIDITY AND MORTALITY REPORTING SYSTEM

HEALTH CENTER-BASED MORBIDITY REPORTING SYSTEM

**Kelly E. Bussell, Jr
International Health Program Office
Centers for Disease Control and Prevention (CDC)**

1993

2

TABLE OF CONTENTS

INTRODUCTION.....	v
How This Document Is Organized.....	v
CHAPTER 1.....	1-1
1.A Considerations in Using DCASs: Is Computerization Appropriate?.....	1-1
1.B Non-Technical Overview of the DCASs.....	1-4
CHAPTER 2.....	2-1
2.A Using DCASs.....	2-1
Important Information for All Users.....	2-1
Data.....	2-1
Practice Before Actual Use.....	2-1
Modifying Data Screens and Reports to Fit User Needs.....	2-1
Running DCAS Applications: General Rules.....	2-1
Installation of DCASs.....	2-2
System Requirements.....	2-2
Epi Info Ver. 5.01b Required.....	2-2
Choosing Automated or Manual Installation	2-3
Automated Installation.....	2-3
Manual Installation (for Experienced Computer Users).....	2-4
2.B Hospital-Based Morbidity and Mortality Reporting System: Example	2-5
Data Entry and Protection Against Data Loss.....	2-5
Data Entry.....	2-5
Protecting Against Data Loss.....	2-7
Restoring Lost Data from Back-Up Disks.....	2-8
Exiting the DCAS Program.....	2-8
Data Analysis and Reports.....	2-8
Epidemiological Uses of the Application.....	2-8
To Analyze Data.....	2-8
THE REPORTS.....	2-8
Considerations in Modification and/or Creation of New Data Entry Screens.....	2-11
2.C Health Center-Based Morbidity Reporting System: Example.....	2-14
Data Entry and Protection Against Data Loss.....	2-14
Data Entry.....	2-14
Protecting Against Data Loss.....	2-16
Restoring Lost Data from Back-Up Disks.....	2-17
Exiting the DCAS Program.....	2-17

Data Analysis and Reports.....2-17
 Epidemiological Uses of the Application.....2-17
 To Analyze Data.....2-17
 THE REPORTS.....2-18
**Considerations in Modification and/or Creation of New Data Entry
Screens**.....2-20

CHAPTER 3

**General Instructions for Installation, Use of Tools, and Modification
Capabilities of the Epi Info Software Package**.....3-1

A. **INSTALLING EPI INFO**.....3-1
B. **USING EPED AS A GENERAL WORD PROCESSOR**.....3-6
C. **CREATING QUESTIONNAIRES USING THE EPED EDITOR AND
EPIAID**.....3-11
D. **THE CHECK PROGRAM: OPTIONAL ERROR CHECKING, CODING
AND SKIP PATTERNS DURING DATA ENTRY**.....3-17
E. **MATHEMATICAL, LOGICAL, AND MULTIFIELD OPERATIONS
DURING DATA ENTRY**.....3-24
F. **ANALYSIS: PRODUCING LISTS, FREQUENCIES, TABLES,
STATISTICS, AND GRAPHS FROM EPI INFO FILES**.....3-28
G. **PRACTICAL ASPECTS OF DATA ENTRY ACCURACY USING EPI INFO**3-38

CHAPTER 4

**Other Software That Can Be Used In Collecting, Validating, Managing,
Analyzing, and Graphing Health-Related Data**.....4-1

1. **EPI INFO -
A Word Processing, Database, and Statistics System for Epidemiologists**4-1
2. **COSAS - Coverage Survey and Analysis Software**.....4-4
3. **EPICOST -
Lotus spreadsheets that can assist the user in managing and analyzing data
regarding immunization program costs**.....4-4
4. **CEIS - ..
Manages immunization program service delivery and disease surveillance
data**.....4-4
5. **IMPACT SOFTWARE - .
Manages and analyzes data collected from studies of the immunization
cold chain at different levels within a country**.....4-5
6. **PESS (Polio Eradication Surveillance Software) -
a software tool developed to manage and provide analyses of data on
individual cases of polio**.....4-5

4

7. PHLIS - Public Health Laboratory Information System.....4-6
8. CLM (Commodity and Logistics Management)(In development)
Used in management of vaccine, cold chain commodities, drugs, family
planning supplies or other goods. Monitors purchase orders, present stocks
and enables forecasting of commodity needs.....4-7
9. EGRET - State-of-the-art epidemiological statistics and graphics.....4-7
10. LogXact - Does exact logistic regression.....4-8
11. EPITABLE - Performs statistical calculations used by epidemiologists.....4-8
12. EPINUT -
Calculates design effect, confidence interval of various malnutrition
indicators.....4-9
13. EPISTATS - A series of Lotus 1-2-3 programs for epidemiologic analysis.....4-9
14. ANTHRO - Provides anthropometric calculations and analyses.....4-10
15. PHC MAP (Primary Health Care Management Advancement Program) -
a set of modules which contain practical tools to help PHC management
teams collect, analyze and use management information.....4-10
16. EPI MAP -
An Epi Info and dBase-compatible Mapping Program. A companion
program to Epi Info for producing maps.....4-11
17. ICD9CMAT -
International Classification of Disease, 9th Revision, Clinical Modifica-
tion (ICD9CM), Abbrev. Titles. Data file is in ASCII format.....4-11
18. EPISOURCE - A Guide to Resources in Epidemiology.
This is not software, but considered a useful resource.....4-12

APPENDIX I

REFERENCE MANUAL FOR DATA ENTRY FOR THE HOSPITAL-BASED MORBIDITY AND MORTALITY REPORTING SYSTEM

APPENDIX II

REFERENCE MANUAL FOR DATA ENTRY FOR THE HEALTH CENTER- BASED MORBIDITY REPORTING SYSTEM

APPENDIX III

SOFTWARE INSTALLATION DISKS FOR:

- A. HOSPITAL-BASED MORBIDITY AND MORTALITY REPORTING
SYSTEM
- B. HEALTH CENTER-BASED MORBIDITY REPORTING SYSTEM

5

COMPUTER APPLICATIONS FOR HEALTH INFORMATION SYSTEMS

INTRODUCTION

This document has two purposes: 1) to provide an introduction to computerized surveillance systems; 2) to provide a manual for using two Data Collection and Analysis Systems (DCASs) for local, regional, or national morbidity and mortality surveillance systems. Diskettes containing these DCASs and the Epi Info software (version 5.01b) which they require, are included in Appendix III of this document. Epi Info, a word processing, database, and statistics software system for epidemiology on microcomputers (DOS based, IBM compatible) was developed by the U.S. Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). Epi Info and the DCASs are non-proprietary software and can be freely copied and distributed as needed.

How This Document Is Organized

Chapter 1, *Considerations in Using DCASs: Is Computerization Appropriate?*, addresses questions concerning the computerization of a surveillance system, and introduces and provides a non-technical overview of the two DCASs: the Hospital-Based Morbidity and Mortality Reporting System, and the Health Center-Based Morbidity Reporting System. The role of computerized DCASs to support surveillance efforts within a health information system (HIS), and selected technical aspects of computer hardware and software, are discussed.

Chapter 2 instructs users in the installation, use, and modification of the Hospital-Based Morbidity and Mortality Reporting System, and the Health Center-Based Morbidity Reporting System DCASs.

Chapter 3 provides general instructions in the use of Epi Info software programs. Using selected Epi Info programs, users will be able to modify the DCASs to meet specific needs.

Chapter 4 provides a listing of additional software that has proven useful to surveillance professionals.

The two DCASs are examples of actual Hospital-Based and Health Center-Based Reporting Systems used in developing countries. Each DCAS was developed through collaboration among Ministries of Health in selected countries of sub-Saharan Africa, CDC, and the United States Agency for International Development (USAID) within the context of the African Child Survival Initiative/Combating Childhood Communicable Diseases (ACSI/CCCD) project.

Technical assistance in use of these materials is available through:

Centers for Disease Control and Prevention
International Health Program Office, Technical Support Division
1600 Clifton Road NE, Mailstop F03
Atlanta, GA 30333
USA

PHONE 404-639-0310 FAX 404-639-0277

6

CHAPTER 1

1.A Considerations in Using DCASs: Is Computerization Appropriate?

Before instituting a computerized surveillance system, a formal analysis should be conducted to determine the 1) level of functioning of the existing surveillance system, 2) human, material and financial resources needed if the surveillance system is computerized, 3) expected level of functioning after computerization, and 4) benefits of computerization.

In most developing countries, and in many developed countries, recording and analysis of data are done initially with pencil and paper. A pencil and paper surveillance system that is well managed, accurate, and timely is the best training environment for personnel and the best backup system for any computerized system. The development of a properly functioning pencil-and-paper-based HIS should be the top priority before considering computerization. Since the focus of this document is computer applications, pencil-and-paper-based surveillance systems will not be discussed; however, the same principles apply to both.

Five elements are vital to the success of a computerized surveillance system: first, location and related support issues must be resolved; second, management structures must be in place; third, appropriate hardware and software must be available; fourth, personnel must be trained; fifth, plans for maintenance and repair are needed.

1. Location

Generally, compared to regional or district level health offices, the central level of the Ministry of Health has more resources to support computerization of the surveillance system and has a need to manage larger quantities of data; therefore, computerization usually begins at the central level. Some regional, district, or hospital offices have the ability to support computerization independently, and can do so provided they acquire the hardware, software, supplies, and training. Countries with large populations may eventually want to place computers in regional or district offices to facilitate and encourage rapid data analysis at the local level. This can also improve communication and data transmission between the central level and periphery, and facilitate the use of data in decision making at local levels. The cost of multi-computer setups at many levels can be expensive (all need hardware, software, and personnel). However, a decentralized setup more fully realizes the benefits of computer technology.

2. Management

Management of information begins with making decisions about what to monitor, where to monitor, how to monitor, and the use of surveillance data for public health action. Good surveillance requires the development of:

- Standardized case definitions
- Accurate recording of patient information
- Assurance of quality
- Timely reporting
- Appropriate analysis
- Dissemination of information to those who need to know
- Appropriate action based on the information

Those who are assigned the responsibility of managing the data obtained from a surveillance activity must understand the importance of their participation, see the results of their efforts in actions being taken to affect health events, and be accountable for their efforts.

Daily schedules should be provided for those responsible for data entry, analysis, and report generation and dissemination of results. Daily routines of securing data in both paper and computer form are vital to maintaining good data processing and analysis operations.

3. Hardware and Software

The costs and benefits of computerization are affected by the selection of computer hardware and software. The selections should be made with the assistance of a professional computer systems analyst.

Chapter 2, Section 2.A, "System Requirements," describes the types of equipment recommended for use with the DCASs included with this package; however, these are only guidelines because equipment needs will vary from location to location. The equipment selected must be IBM compatible.

4. Training

One objective of computerized surveillance is the timely entering and analysis of health data. Trained personnel are essential to meet this objective. The types of computer software for which training should be provided for staff are:

- A. Disk Operating System (DOS)
- B. Word processing, e.g., Wordperfect, or Word, or EPED in Epi Info
- C. Graphics package, e.g., Harvard Graphics
- D. Spreadsheet, e.g., Lotus, Quattro Pro
- E. DataBase management, e.g., dBase, Paradox, Epi Info

Software packages used for analysis of data collected during activities such as complex sample surveys require longer study and training. Training of staff to use such software should be considered over the long term as a means to developing computer and analytic skills within the Ministry of Health (MOH).

8

Computer training facilities can usually be found in larger cities. There are organizations, e.g., the WHO and the CDC, that support computer training programs for the development of data processing and analysis skills within MOHs.

A variety of organizations exist to address the training of public health personnel in the basic principles of epidemiology and surveillance. Such training is provided and supported by the regional and national offices of the WHO, schools of public health in many countries, and the Field Epidemiology Training Programs now functioning in a dozen countries.

5. Maintenance and Repair

Computers require a stable supply of electricity at the appropriate voltage, temperature control, physical security, protection from dust, protection from computer viruses, skilled operators, regular cleaning, and a source of replacement parts.

Electrical supply can be stabilized through the use of voltage regulators and surge protectors. Air conditioning provides protection against condensation and dust. A dust cover is useful. Computers are subject to theft and must be protected. Computer viruses are a global problem; software programs are available to detect and remove viruses, but they must be used and updated frequently.

Computer breakdowns must be expected and planned for in advance. If the MOH does not have its own computer maintenance staff, a contract for scheduled bi-monthly maintenance should be secured through a local computer vendor. Establishment of a source for spare-parts with the local computer vendor is important. Selection of computer hardware could be influenced by this information. Chapter 2, Section 2.A, "System Requirements," lists the recommended equipment necessary to use the DCASs.

Be prepared -- the question is not IF the machines will break, only when.

Benefits of Computerization

Computerization can significantly improve the storage, maintenance, analysis, and transmission of health data and information (Chapter 3, Section G, provides a listing of many practical advantages of using computerized data entry systems). The two DCASs in this package were developed to meet specific data management and analysis needs for countries participating in the ACSI/CCCD project. One or both of these DCASs, with appropriate modification, may be useful in the development of a computerized surveillance system in other countries.

Failure of a computerized surveillance system can be caused by such things as electrical outage, computer failure, or loss of personnel, to mention a few. It is worth reiterating that a well managed, well organized, and properly functioning pencil-and-paper based system is the best backup when the computers fail.

9

**1.B Non-Technical Overview of the DCASs:
Hospital-Based Morbidity and Mortality Reporting System
Health Center-Based Morbidity Reporting System**

The two DCASs are a Hospital-Based Morbidity and Mortality Reporting System and a Health Center-Based Morbidity Reporting System. These DCASs use two different methods for organizing data: individual cases and aggregated cases. INDIVIDUAL CASE DATA are used with the Hospital-Based Morbidity and Mortality Reporting System (Chapter 2, Sec 2.B). AGGREGATE DATA are used with the Health Center-Based Morbidity Reporting System (Chapter 2, Section 2.C).

A basic framework for computerized facility-based morbidity and mortality surveillance is provided by these DCASs. They consist of programs for data entry, record retrieval, error detection, and data security. The DCASs also provide programs for routine reports and allow ad hoc statistical and epidemiological analysis.

There are four basic steps in using the DCASs:

1. Set-up: The DCASs and Epi Info programs are installed on a computer.
2. Data entry: A trained staff person enters data received from reporting sites.
3. Report generation and analysis: The data are analyzed by the DCAS program, and reports are generated automatically by the DCAS.
4. Modification to fit user needs: The DCASs can be modified, using software included in this package, to meet the needs of specific users.

1. Set-up

Complete instructions for installation, and all needed software, are included with this package. Your facility will have to provide the computer, printer, etc.; specifications are listed in Chapter 2, Section 2.A, "Choosing Automated or Manual Installation."

Users with limited computer experience should be able to install and use these software packages without modification. However, by using the word processing program ("EPED") in EPI Info it is possible to modify the software program files and tailor them to specific needs.

2. Data Entry

Step-by-step instructions for data entry are covered in Chapter 2. The DCAS programs have a basic data entry screen which can be modified by experienced staff to meet the specific needs of the computerized surveillance system.

Appendix I and Appendix II contain the reference manuals for the DCASs.

10

3. Report Generation and Analysis

After data are entered, each DCAS has the ability to tabulate and analyze data automatically. Standardized reports can be generated, or users can modify or create new reports to meet specific needs. The standard reports (tables) generated by the Hospital-Based Reporting Systems are listed in Chapter 2, Section 2.B, "REPORTS," and the Health Center-Based Reporting System in Chapter 2, Section 2.C, "REPORTS."

4. Modification To Fit User Needs

The DCASs included with this package can be run "as is." Due to variations of public health situations from one location to another, the DCASs are designed for easy modification by users wishing to make the programs meet their needs more exactly.

Basic instructions for modifying both data entry and report generation procedures are covered in Chapters 2 and 3. More detailed instructions can be found in Chapter 8 of the Epi Info manual.

CHAPTER 2

2.A Using DCASs

Important Information for All Users

The DCASs were designed for use in developing countries. Situations vary from country to country, and modifications may be needed for use in a specific surveillance systems. Instructions for various kinds of modifications are described in this chapter and Chapter 3.

Data

The DCASs provided with this manual DO NOT contain data. New users will need to input data, after which additional menu options (e.g., automated report generation) can be selected.

Practice Before Actual Use

New users can practice with actual data, or create data sets for practice. Trying out the DCASs is an excellent way to become familiar with the systems. It is recommended that, until the new user is familiar with the DCASs, only practice data, rather than actual data, be used.

Modifying Data Screens and Reports to Fit User Needs

The epidemiological reasons for making modifications are discussed in this chapter, while the computer aspects of making these and other changes are described in Chapter 3, "Using Epi Info EPED as a general word processor" and "The Epi Info CHECK Program."

Possible modifications are always referenced in parentheses to the appropriate section in Chapter 3. Familiarity with the Epi Info software enhances use of the DCASs. The sooner the user is able to create and modify data entry screens (questionnaires, which are .QES files) and use the ANALYSIS and CHECK programs, the sooner the system can meet the user's specific surveillance needs.

Modifications that are more complicated than those discussed here, or the development of your own DCAS programs, may require assistance from a person with more computer or Epi Info programming experience.

Running DCAS Applications: General Rules

Always press the "ENTER" key after typing a command from the prompt line.

If you do not press ENTER, the computer will not process the command.

(Examples of the prompt line are: C:\>, or C:\, or C:\epi5>.)

Enter commands using either UPPER CASE or lower case letters.

Make back-up copies of data. Data loss is prevented when data are copied from the hard disk to a diskette. More information on making back-up data disks is included under "Data Entry and Protection" in the DCAS examples later in this chapter.

12

Installation of DCASs

System Requirements

The DCASs require the following hardware and software:

IBM PC/AT or any equivalent or more advanced IBM-compatible computer with at least:
MS DOS 3.0 or higher
640 KB of RAM (Random Access Memory)
40MB Hard Disk storage
One High Density 3.5" or 5.25" disk drive
One Dot Matrix or Laser Printer
Epi-Info ver. 5.01b (included in package)

Epi Info Ver. 5.01b Required

Before installing any of the DCASs included with this manual, install Epi Info ver 5.01b. The necessary diskettes and an Epi Info manual are included with this package. Installation instructions appear in Chapter 3, Section A.

If an earlier version of Epi Info is already installed, update it with version 5.01b. Instructions appear in Chapter 3, Section A.8. After installing or updating the Epi Info package, turn the computer off and then on.

NOTE: In order for the DCASs to work, two files located in the ROOT directory must contain certain specific statements. Users can either allow Epi Info to insert these statements during the installation process, or they can be altered manually using DOS COMMANDS. These two files are:

1) The CONFIG.SYS file found in the ROOT directory. The two following lines must appear somewhere in this file:

```
FILES=50  
BUFFERS=30
```

2) The AUTOEXEC.BAT file found in the ROOT directory must show that the directory, C:\EPI5, is in the PATH statement:

```
PATH=C:\C:\DOS;C:\EPI5; .....etc.
```

To check the contents of the CONFIG.SYS file, enter the following command at the C:\> prompt:

```
type CONFIG.SYS      (press ENTER)
```

To check the contents of the AUTOEXEC.BAT file, enter the following command at the C:\> prompt:

```
type AUTOEXEC.BAT    (press ENTER)
```

The contents of these files will then be displayed on the screen. Check the contents for the statements listed above. If there is a problem, consult someone with DOS experience to edit the files.

Choosing Automated or Manual Installation

Automated installation of the DCASs is recommended for users with limited computer knowledge. The process requires little user input, and installs all files completely.

Manual installation can be completed by more advanced computer users.

Both methods are described below.

Automated Installation

Remember: Always press the "ENTER" key after typing a command from the prompt line. If you do not press ENTER, the computer will not process the command. (Examples of the prompt line are: C:\>, or C:\, or C:\epi5>.)

Before installing the DCASs, install Epi Info ver. 5.01b as previously explained. After installing Epi Info, turn the computer off and then back on. The install program for the DCASs will not function unless Epi Info has first been installed.

Place the DCASs disk labelled DCAS SYSTEMS in the appropriate drive. At the C:\ prompt type:

A:SYSTEMS

and press ENTER. If your diskette is in Drive B or D, type either:

B:SYSTEMS or D:SYSTEMS instead of A:SYSTEMS <press ENTER>.

Instructions will appear on the screen and the program will do ALL that is necessary for these DCASs to be functional.

Included with these DCASs are two files that will be placed in the ROOT directory of the computer: BURHOP.BAT and BEXTER.BAT. These files will allow the user to execute the DCASs. BURHOP.BAT will execute the Hospital-Based Morbidity and Mortality Reporting System and BEXTER.BAT will allow execution of the Health Center-Based Morbidity Reporting System.

The names BURHOP and BEXTER derive from French words for "HOSPITAL" and "AMBULATORY CARE." The "HOSPITAL" system, BURHOP, is the Hospital-Based Morbidity and Mortality Reporting System, and the "AMBULATORY CARE" system, BEXTER, is the Health Center-Based Morbidity Reporting System. These will become operational only after the installation of Epi Info and DCASs. Instructions for starting each of the DCASs are included later in this chapter.

14

Manual Installation (for Experienced Computer Users)

The manual system of installing the DCASs is only for users familiar with computer DOS COMMANDS. This method also requires the installation of Epi Info ver. 5.01b prior to any DCAS becoming functional. For each DCAS, create a sub-directory under the previously created C:\EPI5 directory; name each directory with the same name as the directory on the supplied DCAS SYSTEMS disk. For example, C:\EPI5 is the location of Epi Info on the computer hard disk. To create a sub-directory and go to the new sub-directory, under the C:\EPI5, issue the following DOS commands from the C:\ prompt:

```
CD EPI5          (press ENTER)
MD BURHOP        (press ENTER)
MD SAVEBUR       (press ENTER)
CD BURHOP        (press ENTER)
```

You have created the sub-directory needed to COPY all the BURHOP files on the DCAS SYSTEM disk into the BURHOP sub-directory on the computer's hard disk.

COPY the files from the directory named BURHOP on the DCAS SYSTEMS disk into the sub-directory BURHOP on the computer hard disk.

Install the BEXTER directory files in the same manner.

```
CD EPI5          (press ENTER)
MD BEXTER        (press ENTER)
MD SAVE          (press ENTER)
CD BEXTER        (press ENTER)
```

Copy the two .BAT files (BURHOP.BAT and BEXTER.BAT) on the DCAS SYSTEMS disk to the ROOT directory of the C: drive.

If the user has computer knowledge and understands the functions of the AUTOEXEC.BAT file, then he or she may alter the AUTOEXEC.BAT file to write to the screen a menu of DCASs from which to choose. Batch and text files to invoke any of the DCASs from this menu will need to be constructed.

If no MAINMENU has been created to display the available software selections, copy BURHOP.BAT and BEXTER.BAT to the root directory (C:\). These files are activated by typing BURHOP for the Hospital-Based Reporting System (or typing BEXTER for the Health Center-Based Reporting System) from the C:\ prompt, and pressing ENTER. These commands will:

- Place the user in the BURHOP (or BEXTER) subdirectory under EPI5
- Display the Hospital-Based Morbidity and Mortality Reporting System menu (or the Health Center-Based Morbidity Reporting System menu).

The user can then select data entry, analysis, and data management choices in the appropriate DCAS from the menu.

15

2.B Hospital-Based Morbidity and Mortality Reporting System: Example

Before using this DCAS, read "Important Information," presented earlier in this chapter.

The DCASs examples were developed to meet different data collection and analysis needs of several countries. The names of countries have been removed from titles and replaced with "****". If one of these DCASs is chosen for use, it is expected that names, diseases, etc. will be entered or modified by the new user.

This DCAS uses an individual case data storage method. When data are organized as individual cases, all the data for one case are stored in a single record. Each data item in the record describes the value of a particular variable or characteristic (e.g., "male" or "female" sex, "treated" or "not treated" with a drug) for that case. Individual case data should be entered if studying the characteristics of individuals is important. Individual case information may not be needed at the regional or national level.

If this DCAS has been chosen for use, consult the Hospital-Based Morbidity and Mortality REFERENCE MANUAL FOR DATA ENTRY (Appendix I) for assistance in following the data entry process used by this system.

In each discussion of the DCASs, some Epi Info COMMANDS for data manipulation are presented. These are being used as though data are present and the user is in the process of using the ANALYSIS functions of Epi Info. (Reference Chapter 3, Section F.)

Data Entry and Protection Against Data Loss

Data Entry

Users may access the Hospital-Based Morbidity and Mortality Reporting System menu in two ways:

1) From a MAIN MENU, if one has been created, select desired reporting system,

or

2) At the C:\ prompt type:

BURHOP (press ENTER)

This will display the Hospital-Based Morbidity and Mortality Reporting System menu, shown below. This menu should correspond with Page 1 of the Reference Manual for Data Entry (Appendix I).

The user can then select data entry, analysis, and data management choices.

16

REPUBLIC OF *****
MINISTRY OF PUBLIC HEALTH
MONTHLY HOSPITAL VISITS BY INDIVIDUALS

- 1B. ENTER INDIVIDUAL PATIENT DATA FOR EACH HOSPITAL 12B. BACKUP DATA BURHOP.REC ON B:
13B. RESTORE DATA FROM B:
14B. RETURN TO DOS C:\> PROMPT
16B. PRODUCE NATIONAL REPORTS AUTOMATICALLY

C:\EPI5\BURHOP

To enter data, type 1B at the C:\EPI5\BURHOP> prompt at the bottom of the menu and press ENTER.

The data entry screen supplied with the DCAS should appear and look like the one shown below. After becoming familiar with the DCAS, the user will create new screens which contain variables matching the user's needs. (See "Considerations for Modification and/or Creation of New Data Entry Screens," later in this section.) The data entry screen that appears should correspond with Page 2 of the Reference Manual for Data Entry (Appendix I).

REPUBLIC OF *****
MINISTRY OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT (HOSPITALIZATIONS): INDIVIDUAL INFORMATION

{HOSPITAL}: < _____ > {SECTOR}: < _____ >
{PROVINCE}: < _____ > {SERVICE}: ## {ICDCODE}: ###.##
{ILLNESS}: < _____ > {SEX}: #
AGE UNKNOWN ? {PATIE}: <N>
AGE LESS THAN 1 YEAR ? {PAT}: <Y>
AGE LESS THAN 1 MONTH ? {PATI}: <Y>
AGE IN DAYS (1-31) {AGEJ}: ##
AGE IN MONTHS (1-11) {AGEM}: ##
AGE IN YEARS (1-99) {AGEA}: ##
DATE {ENTERED}: <MM/DD/YY> DATE {DEPART}ED: <MM/DD/YY>
DISCHARGE {STATUS}: #

C:\EPI5\BURHOP>

17

Having all the information for an individual case at the time of initial data entry is preferable. However, all DCASs allow the user to return to an individual's record at a later time to enter data that were not available during the initial data entry process.

Enter all available data for the first case. The Reference Manual for Data Entry (Appendix I) contains detailed explanations of each field on the data entry screen. Refer to it as needed.

Data entry is validated by the BURHOP.CHK file. The program will not allow data such as impossible dates to be entered. While the cursor is paused at a data entry location, the possible values for that data item can be viewed by pressing the F9 key. An example of this feature is provided as part of this DCAS and can be viewed using a computer editor. (Reference Chapter 3, Section D.)

When the last data item on a record has been entered, the question, "Write data to disk?" will appear at the bottom left of the screen. Check the data entry screen for errors. If errors are detected, respond by entering 'n'.

Correct any errors and press the ENTER key. Again, "Write data to disk?" will appear. A 'y' response will save the record to the hard disk, and the data entry screen will display a new record for continuation of data entry.

Repeat this step until all available data have been entered.

When data entry has been completed, press the <F10> key. This will exit the data entry portion of the DCAS and return to the Hospital-Based Morbidity and Mortality Reporting System menu.

Protecting Against Data Loss

At the end of each day, create a copy of your data files on diskette (a "back-up" copy). To do this from the Hospital-Based Morbidity and Mortality Reporting System menu, type "12B" and press ENTER. This option is using DOS BACKUP COMMAND. Edit this file if DOS ver. 6.0 or later is being used. It is recommended that new users seek alternative backup software, e.g., PKZIP.EXE, to avoid compatibility problems.

This backs up (saves) the data from the hard disk to a diskette in drive B. (If diskettes are in a drive other than B, the 12B.BAT file must be modified. Reference Chapter 3, Section B.) **This is the only option available that can prevent the loss of data.** If the hard disk becomes defective and data cannot be retrieved, the only source of recovery will be the diskette; otherwise, data will have to be re-entered.

18

Restoring Lost Data from Back-Up Disks

After repairing or replacing a defective hard disk, place the backup disk in drive B. To restore previously saved data and DCAS programs to the hard disk, type 13B from the Hospital-Based Morbidity and Mortality Reporting System menu and press ENTER. If data have been saved on diskettes, this option will restore the data and DCAS programs to the hard disk. (If the back-up diskette is in a drive other than B, the 13B.BAT file must be modified. Reference Chapter 3, Section B.)

This option is using DOS RESTORE COMMAND. Edit this file if DOS ver. 6.0 or later is being used. It is recommended that new users seek alternative backup software, e.g., PKUNZIP.EXE, to avoid compatibility problems.

Exiting the DCAS Program

Type 14B and press ENTER to return to the C:\ prompt from the Hospital-Based Morbidity and Mortality Reporting System menu.

Data Analysis and Reports

Reports cannot be generated until some data records are entered.

Epidemiological uses of the application

This DCAS is designed to help tabulate and analyze morbidity and mortality data that have been entered for individual cases. The analysis can be done for all sources, individual reporting units (e.g., hospitals), or for each service within a hospital for specific problems and diseases. Data on hospital location, patient characteristics, and disease identification, severity, and outcome have been entered for each hospital discharge. Individual case data have been entered because each data item must be clearly linked with an individual case.

To analyze data

Type 16B from the Hospital-Based Morbidity and Mortality Reporting System menu, and press ENTER. A report consisting of 12 tables will be generated and printed automatically.

THE REPORTS: Examples of some of the tables are presented here, using data that were entered for practice. Additional reports can and should be developed. (Reference Chapter 3, Sections B and F.)

The 12 Tables Produced by 16B Option of the Hospital-Based Morbidity and Mortality Reporting System

1. Number of Days of Hospitalization by Illness by Month
2. Number of Hospitalizations by Illness by Age Group
3. Number of Hospitalizations by Illness by Month
4. Number of Hospitalizations by Illness by Discharge Status
5. Frequency of Each Illness for All Hospitals
6. Number of Hospitalizations by Illness by Service
7. Number of Hospitalizations by Illness by Sex
8. Frequency of Reports Received for Each Hospital by Month
9. Number of Deaths by Illness for All Hospitals by Month
10. Number of Deaths by Illness for All Hospitals by Age Group
11. Number of Deaths by Illness for All Hospitals
12. Number of Deaths by Illness for All Hospitals by Sex

The tables can help meet two major needs: 1) to assist in hospital administration and 2) to improve understanding of the patterns of morbidity and mortality within the patient population.

EPIDEMIOLOGICAL TABLES: Hospital-based surveillance data can be tabulated to provide summaries of the distribution of death and illness in a given location by person, place, and time.

Person characteristics included in the reports are age and sex.

Place is described by hospital, district, and region.

Time of disease occurrence is described by hospital entry and discharge dates.

Mortality levels: Tables 10 and 12 show number of deaths, by age group (Table 10) and sex (Table 12), for each case of a particular disease seen at the hospitals.

Example of Table 12:

Number of Hospital Deaths by Illness and Sex

DISEASE	SEX		TOTAL
	FEMALE	MALE	
AMEBIASIS	2	2	4
CHOLERA	8	10	18
OTHER SALMONELLA	1	0	1
TYPHOID FEVER	0	3	3
Total	11	15	26

20

Separate tables of deaths for each sector or province can be created with the following Epi Info statements (Reference Chapter 3, Section F.6):

```
SELECT STATUS = 4      (DEAD AT DISCHARGE)
TABLES ILLNESS SEX PROVINCE
```

Case fatality rate: Table 2 shows the distribution of all hospital diagnoses by age group of the patients, and Table 10 shows the distribution of all causes of death by age group. Data from these two tables can be combined to obtain a hospital-based age-specific case fatality rate (CFR) for each cause of death. Table 7 shows causes of hospitalization by sex. These data can be combined with those in Table 12 to find hospital-based sex-specific CFRs, using the following formula.

$$\frac{\text{Number of deaths from a disease}}{\text{Total number of cases of this disease}} \times 100 = \text{CFR (\%)}$$

For example:

$$\frac{12 \text{ cholera deaths}}{60 \text{ cholera cases}} \times 100 = 20\%$$

Mortality trends: Table 9 shows deaths by time. These data can describe mortality trends.

Example of Table 9:

Number of Hospital Deaths by Illness and Month

DISEASE	MONTH				TOTAL
	01	02	03	04	
AMEBIASIS	1	0	1	2	4
CHOLERA	0	2	5	11	18
OTHER SALMONELLA	0	1	0	0	1
TYPHOID FEVER	0	1	2	0	3
Total	1	4	8	13	26

Combining data from Table 9 with the data in Table 3 (all hospitalizations by time) allows one to examine the trend in CFRs.

ADMINISTRATIVE TABLES: Tables 1, 3, 4, 6 and 8 provide data useful for administrative purposes. These tables show hospital use, from which future needs can be estimated. The tables can also help in studying the effectiveness of treatment at hospitals. However, these data are rough and

may only hint at the answers to such questions. For example, the data may reveal differences in length of treatment at different hospitals, and more information may be needed to determine why this occurs.

Estimating service needs: Table 1 shows each diagnosis by the number of hospital days by month. Table 3 shows how many people (case patients) were hospitalized for each illness by month. These data can be combined to calculate the average length of hospital stay for each disease, using the following formula:

$$\text{Average \# of hospital days (e.g., cholera)} = \frac{\text{\# hospital days for cholera}}{\text{\# people hospitalized for cholera}}$$

Example:

$$\frac{40 \text{ hospital days for cholera}}{6 \text{ people hospitalized for cholera}} = 6.7 \text{ days average per case}$$

These data can help determine the minimum number of hospital beds needed:

$$\text{Minimum hospital beds needed} = \frac{\text{Hospital days per year}}{365}$$

Length of stay: The average length of stay for each diagnosis can be compared among individual hospitals.

Allocation of resources: Table 6 shows the number of hospitalizations on each medical service for each diagnosis. Table 8 shows the number of reports per month for each hospital. These data can be used to determine the resource needs of each service and hospital.

Considerations in Modification and/or Creation of New Data Entry Screens

The variables on the data entry screen (option 1B from main menu) were chosen because they provide information to monitor various aspects of hospital and patient status. These data are usually available for all patients.

New users who have gained sufficient understanding of Epi Info and are ready to modify the data entry screens for the DCASs should consult the Epi Info Manual, Chapter 8. That chapter provides simple step-by-step procedures for altering data entry screens. In addition, Chapter 18 describes another method which is a little more complicated, using the MERGE functions. BEFORE making any attempt to change any of the data entry screens, analysis programs, .CHK files, etc., copy all of the files to a safe location (e.g., a diskette). Once modifications have been made, it is often difficult or impossible to return to the original form. To do so usually requires reinstalling the DCAS.

This screen is used to enter data for individual patients. Each patient's data are stored as a single record.

REPUBLIC OF *****
MINISTRY OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT (HOSPITALIZATIONS): INDIVIDUAL INFORMATION

{HOSPITAL}: < _____ > {SECTOR}: < _____ >

{PROVINCE}: < _____ > {SERVICE}: ## {ICDCODE}: ###.##

{ILLNESS}: < _____ > {SEX}: #

AGE UNKNOWN ? {PATIE}: <N>

AGE LESS THAN 1 YEAR ? {PAT}: <Y>

AGE LESS THAN 1 MONTH ? {PATI}: <Y>

AGE IN DAYS (1-31) {AGEJ}: ##

AGE IN MONTHS (1-11) {AGEM}: ##

AGE IN YEARS (1-99) {AGEA}: ##

DATE {ENTERED}: <MM/DD/YY> DATE {DEPART}ED: <MM/DD/YY>

DISCHARGE {STATUS}: #

C:\EPI5\BURHOP>

Note that various symbols appear in each data entry field, e.g., #, < >, etc. These are special symbols that indicate to the Epi Info software the type and length of data that can be entered in a given field. A complete listing and discussion of the field types used in the Epi Info software can be found in Chapter 3, Section C.4. Also, a sample questionnaire (.QES data entry file) can be found in Chapter 3, Section C.6. It will be necessary to understand the use of these symbols to modify or create new data entry questionnaires and analysis programs.

On the screen, starting at the top left, the names of the variables and the type of information they contain are:

- 1) HOSPITAL = name of the hospital reporting the case
- 2) SECTOR = the sector or district of the hospital
- 3) PROVINCE = the province, region, or state of the hospital
- 4) SERVICE = the hospital service that treated the patient
- 5) ICDCODE = a code number for the name of the patient's illness; these should be International Classification of Disease (ICD) Codes from WHO
- 6) ILLNESS = the name of the patient's illness
- 7) SEX = the patient's gender
- 8) PATIE = was the patient's age unknown?
- 9) PAT = was the patient less than one year of age?
- 10) PATI = was the patient less than one month of age?
- 11) AGEJ = the patient's age in days (if age is less than one month)
- 12) AGEM = the patient's age in months (if age is less than one year)
- 13) AGEA = the patient's age in years (if age is greater than or equal to one year)
- 14) ENTERED = the date the patient entered the hospital
- 15) DEPART = the date of discharge from the hospital
- 16) STATUS = the patient's condition at the time of discharge

Deleting or modifying the commands within the BURHOP.CHK file for one or more of the variables may make the program more appropriate for different locations (Reference Chapter 3, Secs. B, D, and E). For example, the hospital names and locations need to be modified. The disease codes in "ICDCODE," may also need to be changed from those listed in the .CHK file.

Addition or deletion of certain variables from the data entry screen may also be necessary (Reference Chapter 3, Sections B, D, and E). If a data item is not collected by a hospital, it is not necessary to have it on the data entry screen. On the other hand, data that will be collected and are not on the data entry screen will need to be added.

2.C Health Center-Based Morbidity Reporting System: Example

Before using this DCAS, read "Important Information," presented earlier in this chapter.

All DCAS examples were developed to meet data collection and analysis needs of several countries. If one of these DCASs is chosen for use, it is expected that names, diseases, etc. will be modified by the new user.

This DCAS uses an AGGREGATE DATA storage method. This method records and analyzes data on groups of individuals from the same place during a particular time period.

Information on groups of people by time, place, and condition are entered and organized. To look at these data (e.g., in a table of diseases by age groups) a conversion program must be used. Aggregate data management may be practical if: 1) plans call for few variables for each site (or disease or condition), and 2) the main need is to tabulate cases by sites.

As data 'move' from the site of data collection to higher levels in the system (e.g., district, region, or national level), it may be desirable to convert individual case data into aggregate data. For example, district level data can be combined into one (aggregate) data set for the distributions of particular diseases among the districts within a particular regional office.

Aggregate data can serve many routine HIS needs; they usually decrease the time required for data entry and limit the space needed for computer files.

If this DCAS has been chosen for use, consult the Health Center-Based Morbidity Reporting System REFERENCE MANUAL FOR DATA ENTRY (Appendix II) for assistance with data entry.

Data Entry and Protection Against Data Loss

Data Entry

Users may access the Health Center-Based Morbidity Reporting System menu in one of two ways:

- 1) From a MAIN MENU, if one has been created, select desired reporting system,
- or
- 2) From the C:\ prompt type

BEXTER (press ENTER)

The Health Center-Based Morbidity Reporting System menu will be displayed, as shown below. This menu should correspond with Page 1 of the Reference Manual for Data Entry (Appendix II).

25

The user can then select data entry, analysis, and data management choices.

REPUBLIC OF (*****)
 MINISTRY OF PUBLIC HEALTH
 MONTHLY HEALTH CENTER VISITS REPORT

- 1E. ENTER MONTHLY MORBIDITY HEALTH CENTER
- 12E. BACKUP DATA FILE TO DRIVE B:
- 13E. RESTORE DATA FROM DRIVE B: TO C:
- 14E. RETURN TO DOS C:\> PROMPT
- 16E. SELECT 16E BEFORE OTHER OPTIONS LISTED BELOW
 (16E CREATES A DATA FILE WITH AGE GROUPS)
- 17E. TOTAL VISITS MALE+FEMALE, DISEASE BY AGE GROUP
- 18E. ALL FEMALES DISEASE BY AGE GROUP FOR (SOME COUNTRY)
- 19E. ALL MALES DISEASE BY AGE GROUP FOR (SOME COUNTRY)
- 6E. TOTAL M+F BY DISEASE BY MONTH
- 7E. TOTAL M+F BY PROVINCE BY AGE GROUP
- 8E. TOTAL M+F BY CENTER BY MONTH

To enter data, type 1E at the C:\EPI5\BEXTER> prompt at the bottom of the menu, and press ENTER. The data entry screen should appear and look like this:

REPUBLIC OF *****
 MINISTRY OF PUBLIC HEALTH
 MONTHLY HEALTH CENTER VISITS

HEALTH {CENTER}: _____ {PROVINCE}: _____

{MONTH}: ## {YEAR}: 19##

{CODE}: #### {ILLNESS}: _____

	0-4 YRS	5-14 YRS	15 + YRS	TOTALS
SEX MALE: {M1}: ####	{M2}: ####	{M3}: ####	{TM}: #####	
SEX FEMALE: {F1}: ####	{F2}: ####	{F3}: ####	{TF}: #####	
TOTAL GRPE: {MF1}: #####	{MF2}: #####	{MF3}: #####	{TMF}: #####	

C:\EPI5\BEXTER>

26

All DCASs allow the user to return to an individual record at a later time and enter data that were not available during initial data entry. Read each line of the screen from left to right. Then read the next line. Ideally, the data entry screen should look like the paper form.

Enter all available data for the first report. The Reference Manual for Data Entry (Appendix II) contains detailed explanations of each field on the data entry screen. Refer to it as needed.

Data are validated during the data entry process by the BEXTER.CHK file. The program will not allow data such as impossible dates to be entered. While the cursor is paused at a data entry location, the possible values for that data item can be viewed by pressing the F9 key. All data items for which information exists in the .CHK file can use the F9 key to display their values. BEXTER.CHK is provided as part of this DCAS and can be viewed using a word processing program such as EPED. (Reference Chapter 3, Sections B and D.)

When the last data item on a record has been entered, the question, "Write data to disk?" is displayed at the bottom left corner of the screen. Check the data entry screen for errors. If there are errors, respond by entering 'n.'

Correct the errors and press the ENTER key. Again "Write data to disk?" will appear. Type 'y' and the data will be saved to the hard disk. The data entry screen will display a new record for continuation of data entry.

Repeat this step until all data have been entered.

When data entry has been completed, Press the F10 key. This will exit the data entry portion of the DCAS and return to the Health Center-Based Morbidity Reporting System menu.

As this DCAS is for aggregate data, there are a limited number of variables and only one data entry screen will appear. All of the cases are entered on one record in the data file.

Protecting Against Data Loss

At the end of each day, create a copy of your data files on diskette (a "back-up" copy). From the Health Center-Based Morbidity Reporting System menu, type in 12E and press ENTER. This option is using DOS BACKUP COMMAND. Edit this file if DOS ver. 6.0 or later is being used. It is recommended that new users seek alternative backup software, e.g., PKZIP.EXE, to avoid compatibility problems.

This saves the data from the hard disk to a diskette in drive B. (If diskettes are in a drive other than B, the 12E.BAT file must be modified. Reference Chapter 3, Section B.) **This is the only option available that can prevent the loss of data.** If the hard disk becomes defective and data cannot be retrieved, the only source of recovery will be the diskette; otherwise data will have to be re-entered.

27

Restoring Lost Data from Back-Up Disks

After repairing or replacing a defective hard disk, place the backup disk in drive B. To restore previously saved data and DCAS programs to the hard disk, type in 13E from the Health Center-Based Morbidity Reporting System menu and press ENTER. (If diskettes are in a drive other than B, the 13E.BAT file must be modified. Reference Chapter 3, Section B, for editing files.) This option is using DOS RESTORE COMMAND. Edit this file if DOS ver. 6.0 or later is being used. It is recommended that new users seek alternative backup software e.g., PKUNZIP.EXE to avoid compatibility problems.

If the hard disk has become defective, this option will restore previously saved data and DCAS programs to the repaired or replaced hard disk.

Exiting the DCAS Program

Type in 14E and press ENTER to return to the C:\ prompt from the Health Center-Based Morbidity Reporting System menu.

Data Analysis and Reports

The new user is reminded that to produce reports, data must first be entered.

Epidemiological uses of the application

This DCAS is designed to tabulate and summarize causes of morbidity in persons seen at health centers.

Do not collect data for an excessive number of diseases. If at all possible limit data collection to diseases that are essential for monitoring and evaluating health events for which there is a control program.

To analyze data

Type in 16E from the Health Center-Based Morbidity Reporting System menu, and press ENTER. This executes the program, AGEEXT.PGM, which reads the original data collection file and changes it to a form that can be easily analyzed, and creates a data file called TEMP.REC. TEMP.REC is considerably larger than the original data file. The length of time necessary for this program to run is directly related to the size of the original data file.

After running AGEEXT.PGM, you can select 6E, 7E, 8E, 17E, 18E, or 19E.

28

THE REPORTS: Each report produces a different table which displays illnesses by different variables. For example, Table 17E displays each illness by age group. Table 6E displays the number of cases of each illness during each month.

**Tables Produced by Menu Options Available
in the Health Center-Based Morbidity Reporting System**

Option:

- 6E. Total Number of Males and Females by Disease by Month
- 7E. Total Number of Males and Females By Province by Age Group
- 8E. Total Number of Males and Females by Health Center by Month
- 17E. Total Number of Visits by Disease by Age Group
- 18E. Total Number of Females by Disease by Age Group
- 19E. Total Number of Males by Disease by Age Group

Twelve tables are available with this DCAS. The six shown above appear on the menu. Additional tables can be found in the C:\EPI5\BEXTER sub-directory as .BAT files. Some of those are identical to menu options and others contain the names of .PGM files that produce the additional reports. Using the Epi Info wordprocessor, EPED, these can be viewed.

Each report is based on data for several of the variables entered through the data entry screen. (If no data have been entered, enter data for 20 or 30 records so you can use the report generation options. You will have to erase the resulting data file, BEXTER.REC, before real data are entered.)

Reports 17E to 19E show the distribution of each disease by person characteristics (age and sex) for the country for one (1) year. Report 7E shows these same data separately by place (for each province). Report 6E shows the distribution of each disease by time (during each month of a year) for the country. Report 8E shows the distribution of all diseases combined, by time (during each month of a year) and place (in each center). Other reports can be developed (Reference Chapter 3, Sections B and F).

Reports By Person Characteristics And Place:

Report 17E is a table showing the number of cases of each reportable disease within each of three age groups. Total cases for an entire year in the country are shown. Report 18E is the same table for females only and Report 19E is the same table for males only.

Use the text editor, EPED (Chapter 3, Section B), to look at the files ENS.TXT, FEM.TXT and MAS.TXT. These are text files included in the sub-directory C:\EPI\BEXTER that are examples of tables 17E, 18E, and 19E with many reportable diseases. Compare the numbers of cases *within each age group* since the denominator within an age group is the same for all diseases. Remember that many cases are not reported and that the percentage of unreported cases may be different for various diseases.

The tables suggest that malaria, diarrhea and other intestinal infections, and respiratory infections are the most common diseases, while measles seems to be relatively uncommon. (This could be due to an effective measles control program, not seeking care for measles, under-reporting of cases that are seen, poor diagnosis of measles, or reporting of measles as another disease such as pneumonia or diarrhea. Some diseases are almost certainly under-reported in a health center-based system, and interpretation of these data should consider disease trends and the effect of relevant control programs.)

Health center patients (count = 1) referred to hospitals (count = 1) may create a counting problem for the same disease. Duplicate reporting can affect the management and measurement of the disease.

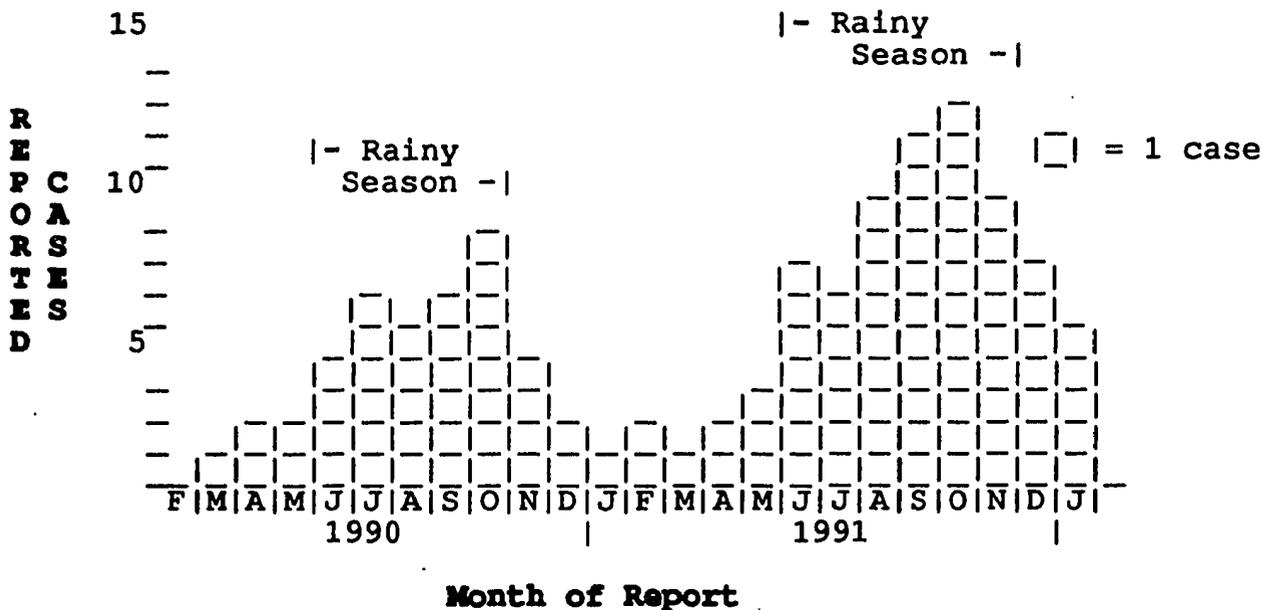
Tables 18E and 19E show *disease counts in females and males*.

Report 7E shows the same data as report 17E, using separate tables for each province. Rates can be used to *make comparisons between provinces*. For example, comparing malaria levels of children aged 0 to 4 years in two provinces requires knowing the population of children aged 0-4 years in each province. Other factors, e.g., access to care in the two provinces, may also be different and must be considered.

Reports By Time And Place: The distribution of reported cases by the time and place of occurrence provides information on disease trends in the various locations.

Tables or graphs are useful in making such comparisons. The following graph is a histogram used for this purpose. (Reference Chapter 3, Section F.7.)

Reported Malaria Cases in Under-5s, 2/90-1/92, Center "M"

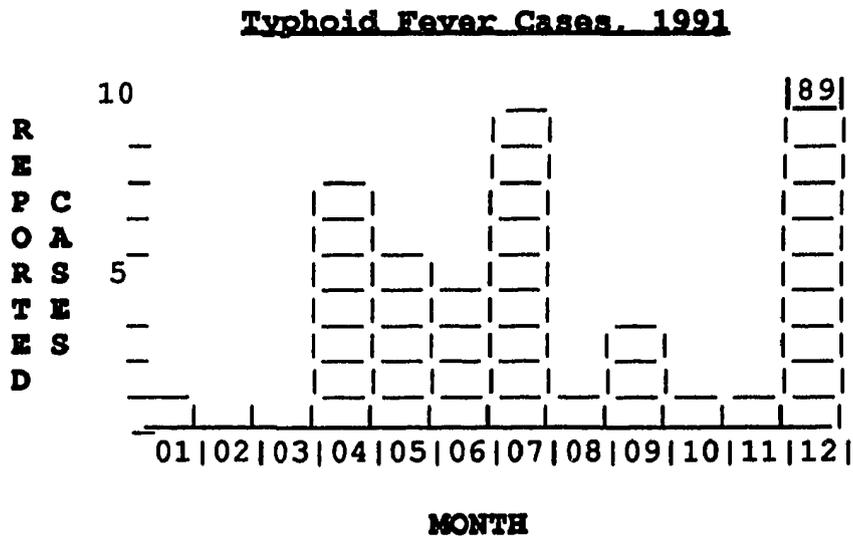


30

Use the text editor, EPED, in Epi Info (Chapter 3, Section B) to look at the files MAL.TXT and SECT.TXT. These are examples of Tables 6E and 8E from a system with many reportable diseases. Table 6E shows the distribution of each disease by month for the entire country.

Epi Info statements can be written to produce graphs of these data, and add them to the report (Chapter 3, Section F.7). For example, if the database contained multiple years of data, the following Epi Info instructions would select year (YEAR), disease (CODE), and use SUM functions to produce a histogram:

```
SELECT YEAR=91
SELECT CODE=102
HISTOGRAM MONTH /SUM=COUNT
```



The /SUM=COUNT command is necessary to make a histogram of aggregate data. All the cases during each month are added.

Table 8E shows the distribution of all diseases combined by time (month of report) and place (center). This report may also be useful in detecting reporting problems within a center. For example, large changes in case numbers from month to month may indicate erratic reporting practices.

Considerations in Modification and/or Creation of New Data Entry Screens

The variables on the data entry screen (option 1E on the main menu) were chosen because they provide information on various aspects of health center-based reporting sites.

31

New users who have gained sufficient understanding of Epi Info and are ready to modify the data entry screens for the DCASs should consult the Epi Info Manual, Chapter 8. That chapter provides simple step-by-step procedures for altering data entry screens. In addition, Chapter 18 describes another method which is a little more complicated, using the MERGE functions. BEFORE making any attempt to change any of the data entry screens, analysis programs, .CHK files, etc., copy all of the files to a safe location (e.g., a diskette). Once modifications have been made, it may be difficult or impossible to return to the original form. To do so usually requires reinstalling the DCAS.

REPUBLIC OF *****
 MINISTRY OF PUBLIC HEALTH
 MONTHLY HEALTH CENTER VISITS

HEALTH {CENTER}: < _____ > {PROVINCE}: < _____ >

{MONTH}: ## {YEAR}: 19##

{CODE}: #### {ILLNESS}: < _____ >

0-4 YRS 5-14 YRS 15 + YRS TOTALS

SEX MALE: {M1}: #### {M2}: #### {M3}: #### {TM}: #####

SEX FEMALE: {F1}: #### {F2}: #### {F3}: #### {TF}: #####

TOTAL GRPE: {MF1}: ##### {MF2}: ##### {MF3}: ##### {TMF}: #####

C:\EPI5\BEXTER>

Note that various symbols appear in each data entry field, e.g., #, < >, etc. These are special symbols that indicate to the Epi Info software the type and length of data that can be entered in a given field. A complete listing and discussion of the field types used in the Epi Info software can be found in Chapter 3, Section C.4. Also, a sample questionnaire (.QES data entry file) can be found in Chapter 3, Section C.6. It will be necessary to understand the use of these symbols to modify or create new data entry questionnaires and analysis programs.

32

In the order on the screen, the definitions of the variables are:

- 1) CENTER = reporting site name
- 2) PROVINCE = province (e.g., a region or town) where the reported cases were seen
- 3) MONTH = the month in which the reported cases were seen
- 4) YEAR = the year in which the reported cases were seen
- 5) CODE = a numeric code for the disease being reported
- 6) ILLNESS = the name of the disease being reported
- 7) M1 = the number of reported cases of the disease in males 0-4 years of age
- 8) M2 = the number of reported cases of the disease in males 5-14 years of age
- 9) M3 = the number of reported cases of the disease in males 15 years of age and older
- 10) TM = the total number of reported cases of the disease in all males
- 11) F1 = the number of reported cases of the disease in females 0-4 years of age
- 12) F2 = the number of reported cases of the disease in females 5-14 years of age
- 13) F3 = the number of reported cases of the disease in females 15 years of age and older
- 14) TF = the total number of reported cases of the disease in all females
- 15) MF1 = the total number of reported cases of the disease in males and females 0-4 years of age
- 16) MF2 = the total number of reported cases of the disease in males and females 5-14 years of age
- 17) MF3 = the total number of reported cases of the disease in males and females 15 years of age and older
- 18) TMF = the total number of reported cases of the disease in all males and all females

It may be necessary to delete or modify the commands within the BEXTER.CHK program for one or more of the variables to make the program more appropriate for your situation (Reference Chapter 3, Sections B, D, and E). For example, the numbers in CODE may need to be changed to the ICD (International Classification of Disease) codes. The number and names of the diseases listed in ILLNESS may also need to be changed. Adding, deleting, or changing other variables on the data entry screen may also be desirable. For example, the age category, "less than 1 year," or a sex category, "unknown," may need to be added (Reference Chapter 3, Sections B, D, and E).

CHAPTER 3

General Instructions for Installation, Use of Tools, and Modification Capabilities of the Epi Info Software Package ¹

A. INSTALLING EPI INFO

TUTORIAL SUMMARY OF INSTALLATION

Place the Epi Info System disk in drive A or B or D.

TYPE A:INSTALL press ENTER
OR
TYPE B:INSTALL press ENTER
OR
TYPE D:INSTALL press ENTER

and follow the directions given by the program. A choice will be available for either **INSTALLING** or **COPYING** the EPI INFO System disk.

A.1 OVERVIEW OF INSTALL

The programs on the Epi Info distribution disks are in compressed format and they must be expanded before the programs are run. A program called **INSTALL** is provided on the Epi Info disk and this program should always be used for installing the system. **INSTALL** will perform either of two functions:

1. It will install Epi Info for use on either hard or floppy disks.
2. It will make copies for distribution in the compressed format on any size disk.

If you have a computer with a hard (fixed) disk, installation of Epi Info is as simple as the instructions given in the Tutorial section above. Epi Info can also be run from 720 K or 1.44 megabyte 3 1/2-inch disks often used with laptop computers. If you have a computer equipped with two 360 K floppy disks and no hard drive, you should probably consider buying a hard drive or using Epi Info, Version 3, although with some disk swapping, Version 5 can be used on 360 K floppy disk machines.

¹ Excerpted from Epi Info, Version 5: A word processing, database, and statistics program for epidemiology on microcomputers. A.G. Dean, J.A. Dean, A.H. Burton, R.C. Dicker. USD Incorporated, Stone Mountain, Georgia, USA, 1990.

A.2 INSTALLATION QUESTIONS

The INSTALL program will ask for the following information:

What drive is the SOURCE drive--the one where you will insert the original Epi Info system disk?

Usually this will be Drive A or it could be B or D, where you have inserted the Epi Info distribution disk.

Which drive is the DESTINATION drive for installing or copying--the one to receive the files?

If you are installing the system on a hard disk, this will be the correct letter for the hard drive, usually C. To install on floppy disks for use in a computer without a hard drive, such as a laptop computer for field use, give the letter of another floppy disk drive, usually Drive B.

Does this (the DESTINATION) drive have removable (usually floppy) disks (Y/N)?

You should answer "Y" if the destination disk is removable, particularly if you intend to use the installed system on a computer other than the one you are using for installation. But, in this case the answer is "N" because we are installing Epi Info on the C: drive.

Would you like to INSTALL the system for use, or COPY it for further distribution (enter "I" or "C")?

You should answer "I" unless you are making disks for further distribution. If you answer "C", the resulting disks will contain compressed files that cannot be run until they are installed.

What kind of video board is in the computer that will use the installed system?

Choices are presented for CGA or MCGA, EGA or VGA, CGA, IBM8514, IBM 3270 PC, AT&T 6300, Hercules Monochrome, and "Unknown" or "Install all." If you are not sure, choose "0" (zero) for "Unknown." The only problem with this is that the entire set of graphics drivers, contained in files labelled .BGI, takes up more disk space (about 30 K) than a single driver. If the computer is a laptop, it probably has either a CGA or EGA/VGA graphics adapter. You should be able to find this information in the manual for the computer. It is recommended that you select ALL unless you are absolutely certain of the answer to this question.

With which distribution group number should installation begin?

The Epi Info files are divided into groups on the disks. If you are installing Version 5 for the first time, answer "1". If you have previously installed part of Version 5 and wish to install an additional part of the system or were interrupted during a previous installation, choose the number of the first group you wish to install. Installation will proceed in numeric order by group, and you will have a chance to omit any group by pressing <Esc> as you proceed.

A.3 CREATION OR EDITING OF AUTOEXEC.BAT AND CONFIG.SYS FILES

Your computer system may already contain special files called AUTOEXEC.BAT and CONFIG.SYS that tell DOS to perform operations automatically whenever the computer is first "booted." Several statements need to be added to these files for proper operation of Epi Info, particularly if you have a hard disk.

The necessary statements are:

In the AUTOEXEC.BAT file:

There must be a PATH statement that includes a path to \EPI5 on the disk where the Epi Info system resides. Previous paths must remain in effect.

In the CONFIG.SYS file:

There should be the statements "FILES = 50" and "BUFFERS = 30". These numbers can be larger than 20, if DOS and your other programs have already inserted these statements.

During installation, INSTALL may announce that these statements will be inserted automatically. If you type "Y" to signal your agreement, the previous files, if any, will be changed to "AUTOEXEC.OLD" and "CONFIG.OLD."

New AUTOEXEC.BAT and CONFIG.SYS files will be created containing the necessary additions as described above. This automatic creation of the two files occurs only if you are installing Epi Info on a hard disk; on floppy disks the PATH statement is not necessary and you must add the necessary statements to CONFIG.SYS with an editor such as EPED if you intend to have more than four files open at one time.

A.4 SETTING PRINTER AND STANDARD DISK DIRECTORY OPTIONS

Most Epi Info results can be printed on any standard IBM- or Epson-compatible printer. If yours is a dot-matrix printer, no further setup is necessary to print graphs produced by ANALYSIS. If you have a laser printer or plotter, however, you should create a file called CONFIG.EPI that contains a command of the following type:

SET PRINTER = EPSON (for Epson/IBM-compatible dot-matrix printers)

SET PRINTER = LQ1500 (for Epson LQ1500-compatible printers)

SET PRINTER = HP (for Hewlett Packard-compatible laser printers)

SET PRINTER = PLOTTER (for Hewlett Packard-compatible plotters)

Note: In addition to the standard plotter driver, which is for the Hewlett Packard 7470 and compatible plotters, drivers are also provided for the HP 7475 and the HP 7550 plotters. If you have one of these plotters, the proper setup command in ANALYSIS is: SET PRINTER=HP7475 or SET PRINTER=HP7550, rather than SET PRINTER = PLOTTER which is for the HP7470 only.

36

Many laser printers require output in 60 lines rather than the normal 66 lines. If you have a laser printer, you should add to your CONFIG.EPI file the command `PLINES = 60`. Plotters also require commands for `PORT`, `BAUD` rate, and `PMODE` as described in Chapter 36 of the Epi Info Manual in the section on the `SET` command.

In the `EPED` program, you should also set the page length in the `SET` menu to 60 for laser printers. If you `SAVE` the setting using the `SAVE SETTINGS` option in the `SET` menu, the setting will be permanent.

A.5 FORMATTING FLOPPY DISKS

Before running the `INSTALL` program to copy or install Epi Info onto floppy disks, you should first format the required number of disks. Usually this is done with a DOS program called `FORMAT.COM`, but you may have other methods if your computer has been customized for easier use. Instructions for using the standard DOS `FORMAT` command are given here in case you do not have convenient access to the DOS manual or other information.

To format a blank disk using the `FORMAT` command in DOS start your computer in the usual way until the operating system prompt is seen: `C:>`

Place a new unformatted disk in drive A: or B: or D:. Use the DOS command `FORMAT` to format the disk and copy the operating system:

```
C:>FORMAT A: or B: or D:
```

Now, make a backup copy of all disk provided with this manual.

```
C:>COPY A:*. * B:
```

or

```
C:>COPY C:\EPI5\BURHOP\*. * A:
```

Continue this process until all DCAS disks have been copied.

A.6 SOLVING INSTALLATION PROBLEMS

If problems occur during installation, be sure that there is room on your hard disk for the new programs and that any floppy `DESTINATION` disks have been properly formatted for the drive in which they are placed.

The installation programs check each file as it is expanded from the compressed format, and report any files that have been corrupted. If this happens, try the installation again, and if the problem occurs again, call or write to the source of your disks for a replacement.

A.7 A NOTE ON FLOPPY DISK DRIVE COMPATIBILITY

If you have an IBM PC/AT-compatible computer, at least one floppy disk drive, usually the A drive, is a high-density (1.2 megabyte) drive. This drive can read standard (360 K) disks, but the recording head of the high-density drive is narrower than that in the standard drive, and writing (recording) on standard disks alternately with 360 K and 1.2 megabyte drives can result in unreadable files. To be safe, do not write (record) on anything but a high-density disk in a high-density drive. It is safe to use either drive to read a standard disk.

A.8 UPDATING AN EARLIER VERSION OF EPI INFO WITH VERSION 5.01b

If you do not have a previous Version 5.XX installed, installation of Version 5.01b may be done as described in the Epi Info manual in Chapter 4 and BRIEFLY ABOVE. If you do have Version 5.XX installed in a directory called \EPI5, however, the following tips will make installation easier.

If you have about 2.3 megabytes of disk space free and want to rename your old directory to, for example, EPI50, then simply give the new name when asked in the INSTALL program and proceed with the installation.

If you prefer to replace your existing Version 5.XX with the new system, first run the batch file WIPE_E5.BAT on Epi Info System disk as follows:

Place Disk in Drive A:(BD). From the \EPI5 directory containing Version 5.XX, give the command:
A:WIPE_E5 (press ENTER).

This will erase many of the files in Version 5, but will leave all data and .QES files intact.

Run the INSTALL program as described in Chapter 4 of the Epi Info manual. When asked for the name of the directory, press <Enter>. This will select the \EPI5 directory.

During the installation, you will be asked many times is you want to "Overwrite (Y/N)." Unless the file is one you wish to keep in its Version 5.XX form, reply "Y." The Y key can be pressed a number of times in advance if you are sure you want to overwrite all of the files. New files that you have created since receiving Version 5.XX will not be harmed; the only hazard is to files with the same name as files distributed with the system.

If you have enhanced HOUSE.REC to become your standard household survey form and have not changed its name, be careful not to let it be overwritten by the HOUSE.REC that comes with Version 5.01b.

When you have finished installation, the new system and your old datafiles should peacefully coexist. If you chose the first option of the two given above, you may decide to copy the data files out of the \EPI50 directory and into the new \EPI5 directory and, when everything is working well, erase the files in the \EPI50 directory.

B. USING EPED AS A GENERAL WORD PROCESSOR

TUTORIAL

Select EPED from the EPI MAIN MENU.

When you see a blank screen with commands listed at the top, press the <F3> function key to run the EPIAID function. A menu will appear. Choose the "Word Processing" tutorial from this menu by moving the cursor with the arrow keys until the bar is over the right choice. Then press the <Enter> key to run the tutorial.

Follow the instructions for a complete tour of EPED's functions.

B.1 OVERVIEW OF EPED EDITOR

This section concentrates on processing text documents such as letters, memos, and scientific articles. The following section tells how to make a questionnaire for use in entering data into Epi Info. If you are familiar with another word processor and are eager to enter and analyze data, you may want to skim this section quickly and go on to the next, where the process of constructing questionnaires in EPED is described.

We will introduce the basic concepts of word processing, and demonstrate the functions and commands of EPED, the word processor provided in Epi Info. Most of the same concepts are presented in the interactive tutorial that accompanies EPED. Instructions for running the tutorial are given above.

The features of EPED include:

- Full screen entry and editing of text
- Help screens and pop-up menus available at any time
- A complete interactive tutorial system
- Automatic formatting of text during entry (Word Wrap)
- Cutting and pasting of blocks of text via Block commands
- FIND and FIND-and-REPLACE commands
- Flexible Tab settings, with automatic setting of tabs from column headings within a table
- Top, Bottom, Right, and Left margin settings
- Screen colors that can be set by the user
- Access to DOS commands and other programs from within EPED
- Response to most Wordstar commands. These are not easy to remember, but once learned, greatly speed up the process of editing.
- The ability to have up to four files open at one time and to switch rapidly from file to file.

The use of EPIAID for producing questionnaires is described in the next section of this manual and for other purposes in Chapters 20 and 21 of the Epi Info Manual.

B.2 THE EPED SCREEN

Across the top of the screen is a command prompt line listing the 10 function keys that perform major functions in EPED. Each one either performs a command directly or causes a menu to pop up in the middle of the screen. Pressing <F2>, for example, shows the menu of commands affecting files.

At the bottom of the screen is the STATUS LINE. From left to right, it shows:

- √ The number of the currently active window if more than one file is open
- √ The name of the current file, if any
- √ The amount of memory (RAM) available for holding the document (EPED keeps the document temporarily in Random Access Memory for greater speed in processing, but this will generally accommodate about 70,000 words in a computer having 640 k of RAM)
- √ The current page number in the document
- √ The function you are carrying out: EPED for general word processing; EPIAID for programmed assistance with word processing
- √ The line and column numbers occupied by the cursor
- √ A series of letters that indicate the status of important settings:
 - WW for Word Wrap ON
 - INS for Insert mode ON
 - OVR for Overwrite mode ON
 - IND for AutoIndent mode ON
 - JST for Right/Left Justification ON

B.3 THE CURSOR AND SOME IMPORTANT KEYS

The cursor is the small bar or box that moves around when you type on the EPED screen. It indicates the location where the next character typed will be inserted, and also serves as a marker for the location where many commands will take effect. For example, the command to mark the beginning of a block of text places the mark at the current cursor location. As you move the cursor, the numbers indicating line and column at the bottom of the screen change to reflect the new position.

Several keys on the keyboard in addition to the letters and numbers are important in EPED.

Holding down the <Shift> key and pressing any letter produces the capital or uppercase letter. Pressing <CapsLock> causes all letters to be in uppercase until <CapsLock> is pressed again.

The or Delete key removes the character at the cursor position; <Backspace> removes the one immediately to the left.

The <Enter> key is the equivalent of the Carriage Return key on a typewriter. It is used throughout Epi Info to finalize and execute a command, as well as to terminate a line of text in EPED. When Word Wrap is on, each paragraph, but not each line of text, ends in <Enter>.

4/0

The <Ctrl> or Control key, like the shift key, is used in combination with other keys. The command <Ctrl-J> means hold down the control key and press "J" once. Many commands have two parts; <Ctrl-K B> to mark the beginning of a block means <Ctrl-K> followed by the letter "B".

The <Alt> key is another way of giving different meanings to the letter keys. <Alt-K> is produced by holding down the <Alt> key and then pressing <K> once.

The function keys used by Epi Info are those labelled <F1> through <F10>. They have special meanings for important commands or menus as indicated at the top of the EPED screen.

Other important keys used for moving the cursor around are described in the following section.

B.4 ENTERING TEXT AND MOVING AROUND ON THE SCREEN

To see the effect of the keys that move the cursor, type a few paragraphs of text on the screen. This is done exactly as on a typewriter, except that with Word Wrap ON (WW displayed at the bottom of the screen), you should avoid pressing the <Enter> key except at the end of a paragraph. Do not press <Enter> after every line.

The cursor may be moved to any part of the text with the following commands:

The arrow keys, sometimes called the cursor keys, move the cursor right, left, up, or down.

The <PgUp> and <PgDn> move up and down one entire screen (22 or 23 lines).

The <Home> key moves to the beginning of the current line.

The <End> key moves to the end of the current line.

Note that the cursor will not move past the end of the document unless you insert more blank lines with the <Enter> key.

B.5 POP-UP MENUS, THE <ESC> KEY, AND GIVING COMMANDS

Pressing a function key indicated on the command prompt line at the top of the screen will often cause a menu to pop up in the middle of the screen.

To choose one of the commands on the menu, move the cursor bar to the choice with the down or up arrows and press <Enter>. Alternatively you can enter the highlighted letter in the command to execute the command directly.

To remove a menu from the screen, press the <Esc> (Escape) key. This key will remove any of the menus or help windows and is a good one to press experimentally if you have trouble deciding how to move around the menu system.

41

Note as you move the cursor bar up and down that a series of command keys is shown in the top left corner of the screen. These keystrokes are alternative commands for the current menu choice. Pressing these keys will call the command when you are in the middle of text processing without using the pop-up menu. To center a line, for example, you can choose Center Current Line from the <F4> Text menu with the cursor bar, press C to choose this command from the menu, or press <Ctrl-O C> without popping up the menu.

At first, you will probably use the menus, but later you may find the <Ctrl> key sequences faster for some often-repeated operations.

B.6 HANDLING FILES

The documents in EPED are stored as files on the computer's floppy or hard disk. The File menu that pops up when you press <F2> provides commands for opening new or existing files and for saving material on the screen in files. It also gives access to file directories, information on the current file, and a command for moving from window to window when more than one file is open.

File names are important in EPED, as they are in any program that runs on IBM-compatible microcomputers. A file name contains a name of eight or fewer letters, followed by an optional period and extension name of three or fewer letters.

Examples of correct file names are:

DOC1	
DOC1.TXT	
BURRI.LET	
burri.let	
BURHOP.QES	(An Epi Info questionnaire file)
BEXTER.REC	(An Epi Info data file)
BEXTER.CHK	(An Epi Info CHECK file)
BURHOP.PGM	(An Epi Info ANALYSIS program)

Punctuation (other than the single period), spaces, and other unusual characters are not allowed. Note that upper and lower case are the same, as DOS converts all file names to upper case.

A file name may be preceded by a drive letter and a colon and may also have a "directory" indicated. Thus the more complete file names:

```
A:Jones.let
C:\Epi5\Jones.let
```

These more complete names containing drive letters and directories are called "path" names.

When you open a file or save one that has not been named, you will be asked to type the file name in a special window that pops up on the screen. If you try to leave EPED without saving the current file, you will be reminded to save it if desired before the program exits to the EPI menu or to DOS.

During a thunderstorm, or in areas where electricity is unstable, the use of a backup battery system and frequent saves of your document are in order!

B.7 CREATING A DOCUMENT

Creating a document in EPED is easy. Simply type the document on the screen as you would like it to appear. At any point, you may press the "save" or <F9> key. A window will appear, asking for a file name, and after this is given, the file will be saved on the current or the designated disk. At the end of the document, press <F10> to leave EPED. The program will remind you if any portion of the file has not been saved, and then exit to the EPI menu or to DOS. The completed document will be on the disk, waiting to be called up for viewing, editing, or printing.

B.8 EDITING A DOCUMENT

To edit a document, use the "Open file this window" command in the <F2> (File) menu. When the file name window appears, give the name of the file you would like to edit. If you have spelled it correctly, and the disk letter and directory are correct, the file will appear on the screen ready for editing.

If you are not sure of the spelling or location of the file, use a "wildcard" file name, like "*.LET" for all file names ending in ".LET" or "jones.*" for all files beginning with JONES, or "*.*" for all files. If you wish to see files on another disk, the name might be "A: *.*" or "D:\DATA*.LET", for example. The names of files matching the description will be displayed. Move the cursor bar to the one desired and press <Enter> to bring the file into EPED for editing.

Now use the cursor keys to move to a point where you would like to insert or delete text. If the letters INS are not at the lower right corner of the screen, press the <Ins> key to turn INSERT on. Inserting is easy; just type the material for insertion and it will be inserted at the cursor location.

Deleting a few letters is done with the backspace or delete keys. An entire line can be deleted by pressing <Ctrl-Y>.

Sometimes it is useful to turn off the insert feature so that characters typed "write over" the ones on the screen rather than pushing them to the right. Pressing the <Ins> or Insert key will turn off the Insert mode and turn on Overwrite mode; pressing it again will reverse the process.

When you have finished editing, press the <F9> (Save) key and then <F10> (Quit) to return to the menu. You may prefer to use <F10> alone and be prompted to save any new material.

B.9 PRINTING

The final product of most word processing is a printed document. To print a document from EPED, bring down the Print menu by pressing <F5>. If the file currently on the screen is the one you wish to print, just select "Print file now" and press <Enter>. Otherwise, move to "Name of File" and type the name of the desired file and press <Enter>. Then return to "Print file now" and press <Enter>. If the document is long and you would like to print only a portion, designate the first and last pages to be printed in the appropriate menu locations before printing.

If this is the first time you have used EPED with a particular printer, you may need to set up margins in the <F6> (Set) menu. Laser printers often require a page length of 60 lines rather than 66, for example. To adapt printing to extract the most from your printer, you may choose another printer file from "Which printer?" in the Print menu and insert special instructions to the printer for different type styles, ends of pages, etc., by editing the printer codes. For instructions on how to do this, see Chapter 33 of the Epi Info manual, "EPED Commands," in combination with the manual for your printer. Advice from an expert and some trial and error are usually required before a given printer is completely happy with any word processor.

The making of questionnaires is described in the next section, and the use of the EPIAID system, a complete facility for interactive text generation, is described in chapters 20, 21, 28, and 34 of the Epi Info manual. The tutorial that accompanies EPED is an example of one kind of EPIAID program.

C. CREATING QUESTIONNAIRES USING THE EPED EDITOR AND EPIAID

TUTORIAL

Run EPED from the main menu. Press <F3> to see the EPIAID menu, and choose "Make Epi Info Questionnaire" by moving the cursor bar with the down arrow key and pressing <Enter> to make the choice.

Follow the instructions in the tutorial carefully and make a questionnaire. When you are asked for a file name, use the first eight letters of your first name followed by a period and .QES, as in MARY.QES

C.1 OVERVIEW: CREATING A QUESTIONNAIRE

Before beginning to enter data, you must provide Epi Info with a questionnaire. The ENTER program described in Chapter 8 of the Epi Info manual uses the questionnaire to construct a data file, called a .REC file, automatically.

44

To do this, ENTER reads a questionnaire that has been produced on a word processor in ordinary text format. It constructs variable names from the text in your questionnaire and derives data types and lengths of variables from the blanks you have inserted in the questionnaire. After creating the data file, ENTER presents the questionnaire on the computer screen and allows entry of data within a few seconds.

The word processor, EPED, is provided for convenience in constructing questionnaires. EPED can also be used for correspondence, reports, and other purposes, as described in the preceding section. This section tells how to make a questionnaire in EPED. If you have another favorite word processor that can produce a simple text (ASCII) file, the instructions that follow will tell how to produce the questionnaire, but you must rely on other sources for information about the word processor itself.

C.2 SETTING UP EPED TO MAKE A QUESTIONNAIRE

Run EPED from the EPI menu. Now press <F2> for the file menu and find "Open File This Window." Move to this option with the arrow keys if necessary and press the Enter key. EPED will ask for the name of the file. Respond with a file name having eight or fewer letters, followed by ".QES". If the questionnaire already exists, it will be presented on the screen for editing. From the <F6> or Set menu, you should also set the right margin to 80 and turn word wrap OFF.

C.3 INDICATING DATA ENTRY LOCATIONS IN THE QUESTIONNAIRE

When a questionnaire is being developed for use in ENTER, a few simple conventions are necessary to tell the program where to create data entry fields or variables and what kind of data to accept at these locations. ENTER will give names to these fields, and they will become the variables which can be manipulated in the ANALYSIS program. The field formats are described below.

There is a special command in EPED to make it easy to insert fields in your questionnaire. To see it in action, type <Ctrl-Q Q> (hold down the control key, type Q once, and then let go of the control key and type a single Q).

It can also be accessed from the Text menu, but <Ctrl-Q Q> is easy to remember. A menu of field types will appear on the screen. To insert one in your questionnaire, move the bar cursor to the choice and press <Enter>. For some field types, EPED may ask about the length of the field or the number of digits. After you have provided this information, the field will be inserted in the questionnaire at the current position of the cursor.

If you are using a word processor other than EPED or find it easier, simply type the proper letters for the field into your questionnaire without using the <Ctrl-Q Q> command. The field types are shown below, with information about their meaning.

C.4 FIELD TYPES IN EPI INFO

-

Text or "underline" fields, indicated by continuous underline characters. Any printable character can be entered in this field. Blank fields (spaces) are interpreted as missing data in ANALYSIS. The length of the variable or field will be the number of underline characters used. The maximum length of a text field is 80 characters.

##.#
etc.

Numeric fields. Only numbers or spaces will be accepted. If nothing is entered, the result will be a blank, which is interpreted as a missing value and displayed as a period (.) in ANALYSIS. The number of digits is indicated by the number of "#"'s. If a decimal point is given, the field will be in "fixed decimal" format, allowing exactly the indicated number of digits to the right of the decimal point. For monetary amounts from 000.00 to 999.99, for example, ###.## would be the appropriate field. A number field can be up to 14 characters long, counting the decimal point as 1 character.

<A>
<A >

Upper-case fields. These are similar to general-purpose or "underline" fields, but entries will be converted to upper case. The length is indicated by the number of characters between the "less-than" and "greater-than" symbols.

<Y>

A "Yes/No" field. Only Y, N, and SPACE or <Enter> are accepted. Spaces or the <Enter> key are interpreted as missing data in ANALYSIS. Entries are converted to upper case after they are entered.

<mm/dd/yy>
<mm/dd>
<dd/mm/yy>
<dd/mm>

U.S. and European Date fields. Dates will be checked when entered to be sure they are valid. When entering data, you type only the numbers in the date; the program provides the separating slash marks.

46

<phonenum>

A local phone number, entered as xxx-xxxx where the x's are digits.

<long distance>

A long-distance phone number, entered as (xxx)xxx-xxxx, where the x's are digits.

<today>
<today/yy>
<today/yyyy>

Today's-date or date-of-last-change field, which will automatically enter the date when the computer record was last saved. If the record is later edited and saved again, the contents of the field will be the latest date on which the record was saved. The three forms allow the field to contain month and day only, or month, day, and two-digit year, or month, day, and four-digit year.

The date which automatically appears in this field is the "system date" from the computer. Be sure to enter today's date each time when turning the computer on, unless your computer automatically restores the correct date on powering up. Within Epi Info, the date in this field is supplied automatically, and you will not be able to enter anything but a carriage return (<Enter>).

<IDNUM>
<IDNUM >

This is a special-purpose field that maintains sequential identification numbers. The first number in the file will be number 1, and each succeeding record will have an IDNUM one higher than the previous record. This field is used to maintain unique identification numbers automatically.

Since IDNUM fields are filled automatically, the cursor skips them during data entry. If you wish to set the value of an <IDNUM> field to a number other than 1 in the first record of a file, use the up arrow key to enter the field and type the desired number before saving the record.

You should not use the underline, number (#) sign, or less-than or greater-than characters in the questionnaire except in the formats shown above, as the program will think you are trying to create an incorrect field. Specifically, < > and unpaired ">" or "<" signs are not allowed.

The fields with special words such as <today/yy> must be exactly the length shown to contain the date or telephone number information correctly.

C.5 HELPING EPI INFO TO CREATE USEFUL VARIABLE NAMES

Unlike most data entry programs, Epi Info creates variable or field names automatically from the original questionnaire. When it encounters an underline or other special character, it looks for text on the same line which can be the basis for a variable name. The first 10 non-punctuation characters become the name. This name is used in the ANALYSIS program to refer to the data entered in this field. If the line is

Name _____

the field will be called NAME. If it is

What is your name? _____

the field will be called ISYOURNAME, since selected words like "what" are discarded automatically, along with spaces and punctuation. It is wise to put significant words within the first 10 characters of the text preceding the blank, or to mark them with curly brackets { } as described below.

If there is more than one blank on a line, Epi Info begins the search for a useful field name after the preceding blank. Thus

Name _____ Age ____ Sex _

produces three fields entitled NAME, AGE, and SEX. Now comes the tricky part; suppose that there is no preceding text on the same line, as in

Address _____

Epi Info will call these two fields ADDRESS and ADDRESS2. The program also detects duplications, such as the occurrence of another

Address _____

many lines removed from the first two. Rather than making a duplicate field name, the program will call this one ADDRESS3. ENTER can handle up to 99 such duplications of a single field name.

If you wish to number your fields, this can be done as

1. Name _____

To prevent trouble in programs requiring that a field name start with a letter, Epi Info places an "N" in front of numbers if they are the first item in a variable name. You may prefer to avoid this and use:

Name 1. _____

48

Field names surrounded by curly brackets { } will be used in preference to those normally generated, so that you can control the process. Thus, What is your {name} will result in the field name NAME rather than WHATISYOUR. More than one set of curly brackets can be used to form a field name if they are on the same line, as in {What} is your {name}, giving the field name WHATNAME.

It is also possible to change field names after the data file has been created, as described in the section on the CHECK program.

C.6 A SAMPLE QUESTIONNAIRE

The following questionnaire might be used to summarize the results collected by an interviewer. Questionnaires may be up to 500 lines long and have more extensive comments or questions, but this is a good example of a form used to abstract data from a longer, written questionnaire.

Questionnaire for Church Supper -- Oswego

Name _____ Case ID <IDNUM>
Telephone <phonenum>

Age: ### Sex: <A> Time of Supper (24 hour):####

Ill? <Y> Diarrhea? <Y> Vomiting? <Y>
Onset Date (MM/DD): <mm/dd> Onset Time (24 hour):####

Food History (Mark Y or N):

Baked Ham:	<Y>
Spinach:	<Y>
Mashed Potatoes:	<Y>
Cabbage Salad:	<Y>
Jello:	<Y>
Rolls:	<Y>
Brown Bread:	<Y>
Milk:	<Y>
Coffee:	<Y>
Water:	<Y>
Cakes:	<Y>
Ice Cream:	{Vanilla}: <Y> Chocolate: <Y>
Fruit Salad:	<Y>

Note the curly brackets around "Vanilla," so that the field name will be VANILLA rather than ICECREAMVA.

When you have finished typing this or another questionnaire, press the <F9> key to save the file, give it a name like TEST.QES, and then press <F10> to leave EPED.

49

C.7 MAKING A QUESTIONNAIRE AND OBTAINING ADVICE IN EPIAID

In addition to word processing facilities, EPED contains a system called EPIAID that provides tutorials and assistance with text composition. One of the programs in EPIAID is designed to assist in making questionnaires. To run EPIAID from EPED, press the <F3> or EPIAID key. A menu of choices appears. Move the cursor bar to "Make a Questionnaire" and press <Enter>. Then follow the instructions to make a questionnaire. You may choose the "Foodborne Questionnaire" or less specific but flexible guidance for questionnaires on other topics. Advice on questionnaire composition is provided if you desire, but can be skipped if you are already expert or have run this program.

D. THE CHECK PROGRAM: OPTIONAL ERROR CHECKING, CODING AND SKIP PATTERNS DURING DATA ENTRY

TUTORIAL

Run the CHECK program from the EPI menu.

Enter the file name OSWEGO and respond that you are "Ready" by typing "Y" and pressing <Enter>.

You will see the OSWEGO questionnaire on a screen that looks like the ENTER screen but that has a different series of prompts at the bottom.

Enter "1" in the AGE field. Now press <F1> to make this the minimum age allowed in the field. Note the change in the line just above the function key prompts. Now enter "90" in this field and press <F2> to define the maximum of the range.

Move the cursor to the field labelled SEX. Enter "M" and press <F6> to make this a "legal value." Do the same for "F" and for "U" (Unknown). Press <F4> to make this a "Must Enter" field. The result is that only M, F, and U will be accepted in this field, and a missing value is not allowed, since we have decided to use U for this purpose.

Now let's install a conditional jump or skip pattern so that date and time of onset are skipped if there is no illness. Place the cursor in the ILL field, enter "N", and press <F7>. Following the instructions on the screen move the cursor to BAKED HAM and press <F7> again. The cursor will now jump automatically to BAKED HAM when N is entered for ILL. If Y or blank is entered, the cursor will proceed normally to Date of Onset.

Press <F10> and affirm that you wish to save the results. The EPI menu will appear.

Run the ENTER program with the file OSWEGO. Enter a record to verify that the range, legal values, and jump work properly. Do not save the results, but press <F10> and "N" to return to the menu.

50

Other features of CHECK that were not demonstrated include automatic coding, repeat fields, file indexing, and changing the names of variables. These are described in this section or in Chapters 22 and 23 of the Epi Info manual.

D.1 OVERVIEW OF CHECK PROGRAM ERROR CHECKING

Often it is useful to have the computer check for errors during the data entry process, to do automatic coding of entries, and to skip over parts of the questionnaire if certain conditions are met. The CHECK program makes it possible to instruct ENTER to perform such operations automatically. By using CHECK and investing a little extra time in setting up conditions, you can protect your data against many common types of error and also make data entry easier and more automatic. This is particularly helpful if several people or those with minimal computer experience will be entering the data.

CHECK makes a file with a name ending in .CHK. The .CHK file contains instructions for ENTER to restrict the data entered in specified fields. When ENTER is run, it automatically looks for a file with the same name as the .REC file but ending in .CHK. Using CHECK is optional, and the ENTER program will function just as well if you decide not to make a .CHK file.

D.2 RUNNING CHECK

Before running CHECK, a .REC file must already exist for the questionnaire you wish to enhance. Use ENTER to make a .REC file from the .QES file if necessary before running CHECK. Do not enter any data items, but exit immediately from ENTER with <F10> to make an empty .REC file; then run CHECK from the main menu. Enter the name of the .REC file in the data file space in CHECK and answer "Y" in the "Ready?" blank.

CHECK presents the questionnaire on the screen with the following function keys indicated on the bottom line:

F1/F2-Min/Max	F5-Link fields	Legal: F6-Add	Shift-F6-Display	Ctrl-F6- Delete
F3-Repeat	F9-Edit field	Jump : F7-Add	Shift-F7-Display	Ctrl-F7- Delete
F4-MustEnter	F10-Quit	Codes: F8-Add	Shift-F8-Display	Ctrl-F8- Delete

Information on the status of functions set up for the field in which the cursor rests will be displayed just above this series of function key prompts.

The function keys act on the field in which the cursor is currently located. Pressing a function key once sets the condition, and in some cases, pressing it a second time will remove the condition. Thus, if you wish to make CITY a Repeat field, as described below, place the cursor in CITY, and press the <F3> key. To remove the Repeat condition, press <F3> again. The condition currently in effect is shown on the line above the function key information. Several different conditions may be entered for one field.

51

D.3 EXAMPLES OF CHECK PROGRAM COMMANDS

1. RANGE CHECKING (MIN/MAX) <F1><F2>

When a minimum and maximum are specified, the value entered in a field must be greater than or equal to a specified lower bound and less than or equal to a given upper bound. Any field type may have a range, although the meaning is somewhat different if the field is non-numeric. In this case, the name must lie within the two bounds when sorted in alphabetic order.

To enter a lower or upper range, enter a value in the appropriate field and then press <F1> or <F2>. Additional values can be entered as "Legal", using the <F6> key so that "1-3, 9" can be the final result.

Examples:

Lower range 1, Upper range 3, will accept only values of 1, 2, or 3.

Lower range Smith, Upper range Thompkins, will accept "Smith", "Smithson", and "Thomas", but reject "Thompson".

2. LEGAL VALUES <F6>

Legal values are those that will be accepted as entries in a field. When a list of legal values is specified, an entry must match one of a specified list of values, or it will be rejected. Pressing <Enter> for a missing (blank) value is accepted unless "Must Enter" is also specified as discussed below.

To enter a legal value, type the value in the appropriate field and press <F6>. The value will be added to the list of legal values. To remove an existing legal value, place the value in the field and then press <Ctrl-F6>, i.e., hold down the <Ctrl> key and press <F6>.

Pressing <Shift-F6> will display current legal values for the field if there are more than will fit on the line at the bottom of the screen.

3. MUST ENTER <F4>

When Must Enter is specified, missing (blank) values are not allowed. The value entered must be another valid entry.

To specify Must Enter for a field, place the cursor in the proper field and press <F4>. Pressing <F4> again removes the Must-Enter condition.

4. REPEAT <F3>

During entry, the value of the field will be set automatically to the value in the last record entered or displayed. This is useful when a series of questionnaires all contain the same name, for city or state, for example. The few that do not can be changed during entry.

52

To designate a repeat field, place the cursor in this field and press <F3>. Pressing <F3> again removes the Repeat condition.

5. CONDITIONAL JUMPS (SKIP PATTERNS) <F7>

Frequently questionnaires contain sections that are to be skipped, depending on the answer to a prior question. If no illness occurred, for example, the cursor should jump over the section on symptoms and proceed to the next useful item. It is also useful at times to have the cursor jump to an entirely different part of the questionnaire containing special-purpose questions. If "Rabies" is entered for DISEASE, the cursor could jump to a series of questions specific for animal rabies, and then after the last question, jump back to the question following DISEASE.

To set up conditional jumps, enter a value in the appropriate field, e.g., N for ILL, and press <F7>. You will be asked to indicate the destination field for the jump. Put the cursor in this field, and press <F7> again. In the example given if ILL is entered as N, the ENTER program will automatically jump to the designated field, skipping over questions pertaining to illness. Any other answer, such as Y, will cause the cursor to move on to the next field as usual.

You can specify several values with different conditional jumps for a field if desired. To specify a jump regardless of the entry in the field, press <F7> while the field is blank. Such unconditional jumps are useful for changing the order in which fields are entered on a questionnaire.

To jump to one field on "1" and to another on all other entries, you would create one general jump with a blank field and then a different jump for the "1" value. Entry of values for which a jump is not specified will, of course, cause the cursor to go to the next field as usual.

To display all current jumps for a field, press <Shift-F7>. A jump may be removed with <Ctrl-F7>.

6. LINKING OF FIELDS AND AUTOMATIC CODING <F5> AND <F8>

If automatic coding is specified, an entry will be compared with a table consisting of pairs of codes, words, or phrases, and converted to the value of the other member of the pair. The result will be placed in the same field, or, if another field has been specified with the link command, in the linked field.

Suppose that you link two fields called DISEASE and DISEASECOD and set up codes for DISEASE. When you enter "Hepatitis B" in a field called DISEASE, the corresponding code (say, 10) will be found automatically and placed in a field called DISEASECOD. If you enter 10 in DISEASECOD, "Hepatitis B" will be placed in DISEASE.

Unless you wish the entries to be recoded to the same field, you must set up the Link between fields before setting up the coding. To do this, place the cursor in the first field and press <F5>. Then following the directions on the screen, move the cursor to the field to be linked and press <F5> again.

The fields are now linked and you can proceed with setting up the codes.

Suppose again that there fields for DISEASE and DISEASECOD and these have been linked as described above. When you enter a value in DISEASE, like "Hep A", and then press <F8>, the cursor will jump to DISEASECOD, the linked field. You then enter the code, in this case 10, and press <F8> again. The cursor will jump back to DISEASE, and you are ready to enter as many other codes as you wish, using the same method.

Coding restricts the entries allowed, as though the values had been designated LEGAL. The ENTER program treats upper and lower case alike in coded fields so that "Hepatitis B", "HEPATITIS B", and "hepatitis b" are all treated as the same value for DISEASE.

During data entry, if you must enter a value which is not a valid code or legal value, this can be done using the down-arrow key instead of <Enter> to record the value. You can use the coding facility to accept several synonyms and recode them to a single uniform entry. To do this, OMIT the linking step, thereby linking the field to itself. Then enter the synonyms, such as "Hepatitis B", "Hep B", and "B", giving "HEPATITIS B" as the code for each. This will have the effect of coding all three entries to the same final data item.

Codes can be removed by pressing <Ctrl-F8> with the code to be removed and the cursor in one of the two relevant fields. <Shift- F8> will display all codes for a field.

7. THE EDIT FIELD COMMAND <F9>

The .CHK file contains a series of instructions to the ENTER program. The Edit Field function allows you to see and edit the commands that are inserted automatically in the file by CHECK. It confines the view to commands for the current field--the one containing the cursor.

Try entering one or more CHECK commands and then examine the CHECK file by pressing <F9> with the cursor in the same field. In the example given above for the coding function, if there are many disease codes, you may prefer to use the Edit function to type them directly into the .CHK file.

To do this, press <F9> with the cursor in DISEASE. An editing window appears with the portion of the .CHK file for DISEASE displayed. You will note code pairs in the section called "Codes", terminated by the word END.

The first would be "HEP A" 10. You may type in other code pairs, taking care to put quotation marks around any codes that contain spaces. To leave the editing window, press <ESC>.

Editing the file directly is more likely to result in errors than working through the automatic coding process, but if you are careful not to disrupt the structure of the .CHK file, it should be more efficient for large code sets like all the counties in a state or a series of diseases. Several hundred codes can be handled this way, if desired.

54

8. COMMENT LEGAL CODES

Sometimes it is useful to be able to display codes with comments on their meaning, but without automatic recoding. Using the Edit Field function, a LEGAL statement may be changed to COMMENT LEGAL to display descriptions of legal values. Suppose that a LEGAL statement appears in the .CHK file as:

```
SEX
    Legal
        M
        F
        U
    END
END
```

Pressing <F9> from the main CHECK screen when the cursor is in the SEX field will display these statements.

Add the word COMMENT and the comments or labels, as follows:

```
SEX
    Comment Legal
        M Male
        F Female
        U Unknown
    END
END
```

Now the ENTER program will display the codes in a pop-up window if the <F9> or SEE CODES key is pressed during data entry. This is useful if there are a number of codes and you do not wish to have the longer versions actually entered into the data file, as would occur if you set up codes in CHECK.

The indentation to the left of the items in .CHK files is helpful to understanding the file, but is ignored by the ENTER program and is optional if you wish to enter more items.

D.4 GENERAL FEATURES OF CHECK PROGRAMS

.CHK files are arranged in blocks. Each block begins with a field name and ends with the word END. All commands must be within a field-name block.

55

Commands in a block are activated either before or after an entry is made in the field. The usual case is that the commands are performed after an entry has been made and after <Enter> has been pressed or the cursor has left the field automatically. When the ENTER command is inserted in the block, however, all the commands before ENTER are executed as soon as the cursor moves to the field, and those after ENTER are performed after data entry.

The general format for a .CHK file is:

```
<Field name>
  <Command>
  <Command>
  etc.
END
```

```
<Field name>
  <Command>
  <Command>
  etc.
END
```

The simpler commands (AUTOJUMP, CODEFIELD, CODES, JUMPS, LEGAL, MUSTENTER, RANGE, REPEAT) are inserted in .CHK files automatically by the CHECK program when function keys are pressed. Others must be inserted with a text editor such as EPED or the editor that appears in CHECK when <F9> is pressed.

These commands include CALL, CLEAR, COMMENTLEGAL, COLOR, ENTER, GOTO, HELP, IF, LET, LOAD, TYPE, UNLOAD, and UPDATE. It is often helpful to use CHECK to insert a few commands or a few codes or jumps and then to edit the resulting file by adding additional codes, jumps, or legal values. This is the easiest way to handle large numbers of codes for diseases or counties, for example.

.CHK files are optional, and only a few fields may have blocks of commands within a .CHK file. The order in which fields appear in the .CHK file is not important. Indentation is useful for clarity but is ignored by the program. Every field name must have a corresponding END marker, as must every command requiring an END.

D.5 CHANGING VARIABLE NAMES

The variable names that Epi Info constructs automatically from text preceding the entry blank are not always the best representation of the meaning of the variable. These names can be changed in the data file from the Editor in the CHECK program. To change a variable name, place the cursor in the corresponding field and press <F9>. Then press <F1> for "Change name" as indicated at the bottom of the screen and enter the new name for the field. The variable name will be changed in both the .CHK file and the .REC file.

56

D.6 CHECK FEATURES COVERED ELSEWHERE

ENTER can be programmed to do many interesting and complex operations not discussed in this section, including mathematical and logical operations with more than one field, changing the colors on the screen, popping up help windows, and calling Pascal or Assembly language programs that act on the contents of fields during data entry. These functions are described in Chapters 22 and 23 of the Epi Info manual.

E. MATHEMATICAL, LOGICAL, AND MULTIFIELD OPERATIONS DURING DATA ENTRY

Chapter 10 of the Epi Info manual and section D above describe the function of the CHECK program in making a file with the suffix .CHK. The .CHK file, if present, guides the data entry process to produce range checking, automatic skip patterns, coding of variables, legal values, and repeat fields. CHECK inserts these instructions into the .CHK file automatically, and most users do not need to know what is in the file.

For many kinds of studies it is useful to be able to perform more complex functions during data entry, such as mathematical or logical operations, checking of one field against one or more other fields, placing text on the screen or removing text, changing the color of parts of the screen, displaying help windows or error messages, and even calling procedures written in Pascal or Assembly language. These operations can all be performed by adding instructions directly to the .CHK file. The instructions are most easily added by using the editor that is contained within the CHECK program, although EPED can also be used to edit the .CHK file. In effect, .CHK files are programs that direct data entry.

To use the CHECK editor, place the cursor in a field and press <F9>. The editor will appear on the screen showing any instructions for that field that are already in the .CHK file. The editor works in similar fashion to EPED for basic text manipulation, responding to Wordstar-like commands. To leave the editor, press <Esc>. The command to abandon the new material is <Ctrl-K Q>.

To add commands to the .CHK file, type them into the text in the CHECK editor. The commands will be inserted automatically into the check file in the correct location. If you prefer to use another text editor instead of the CHECK program to edit the .CHK file, be sure that the editor produces plain text (ASCII) files; if this is true, any editor can be used.

E.1 EXAMPLES OF OPERATIONS THAT CAN BE PROGRAMMED IN CHECK FILES INCLUDE:

1. Changing the screen colors or displaying messages that appear to be part of the questionnaire
2. Calculated fields resulting from mathematical operations on one or more other fields

57

3. Checking one or more fields for relationships, such as one date's being later than another, or inconsistencies, such as male pregnancies
4. Help or error messages resulting from improper entries in a field
5. Complex statistics or other operations that are written in Pascal or Assembly language
6. Automatic indexing of fields for fast searching
7. Automatic searches during data entry

An operation can be performed each time a field is entered or conditionally when a certain value is entered. IF statements similar to those in ANALYSIS (but with a different format) can be used to produce complex operations. In many ways, an Epi Info .REC file with its associated .CHK file can be made to perform many of the functions of a spreadsheet, in which formulas or "macros" are also associated with each entry location and can direct results to any other entry location. In Epi Info, the format of the screen can be much more flexibly determined, since entry locations do not have to be contiguous as in a spreadsheet.

To display a confirmatory message on the screen after a coded item is entered, you would use the TYPE command, giving the location where the message should appear relative to the current field:

```

STATUS
  if status = "1" then
    type "SUSPECTED " +1 +0 31
  ELSE
    IF STATUS = "2" THEN
      TYPE "PROVISIONAL" +1 +0 31
    ELSE
      IF STATUS = "3" THEN
        TYPE "CONFIRMED " +1 +0 31
      ELSE
        TYPE "          " +1 +0 31
      ENDIF
    ENDIF
  ENDIF
ENDIF
END

```

This example is in the file GEPI89.CHK in the \RSURV system. It displays the messages one character to the right of the first character of the field and on the same line (+0 lines). The color of the message is 31, or white on blue, as shown on the setup screen for the main menu. IF statements in .CHK files differ from those in ANALYSIS in being on several lines and requiring the word ENDIF at the end. Each ENDIF in this example is under the corresponding IF statement, but indenting is not required, and all statements could have been on the left margin. The commands can be in either upper or lower case. The proper syntax and further details about each .CHK command are given in Chapter 35 of the Epi Info manual.

58

E.2 MATHEMATICAL CALCULATIONS IN CHECK PROGRAMS

To perform mathematical calculations on a data item in a field and place the results in a second field, a .CHK program like the following might be used:

```
VISITDATE
  IF BIRTHDATE = .
  THEN
    GOTO AGE
  ELSE
    LET AGE = (VISITDATE - BIRTHDATE) / 30.44
  ENDIF
END
```

This says, "If BIRTHDATE is missing then move the cursor to AGE so that the user can enter an age; otherwise, calculate age from the VISITDATE and BIRTHDATE in average-length months and put the result in the AGE field."

Any of the mathematical operators used in ANALYSIS are available in .CHK programs. There are no defined variables in CHECK, however, and intermediate calculations have to be stored in a questionnaire variable.

E.3 CROSS FIELD VERIFICATION

To compare two dates and issue an error message if they are in the wrong sequence, the following program might be used:

```
INVESTREPO
  IF INVESTREPO > " / / " AND INVESTREPO < INVESTSENT
  THEN
    HELP "SOMETHING WRONG\N PLEASE CHANGE THE DATES" 40 19
    CLEAR INVESTREPO
    GOTO INVESTREPO
  ENDIF
END
```

This example is in the file GEPI89.CHK in the \RSURV system. Here INVESTREPO is the date a report of an investigation is submitted. If INVESTSENT, the date an investigator was sent, is after the report date, then the report was inappropriately submitted before the investigation was begun, and a help window is displayed calling attention to the error.

Two other instructions, the CLEAR and GOTO, erase the incorrect data item and place the cursor in the same field again so that the error can be corrected.

The IF statement in the first line says, "If INVESTREPO is not blank and INVESTREPO is before INVESTSENT, then put a HELP window 40 characters from the left and 19 lines from the top of the screen, clear the field, and repeat the entry." Note that the multiline IF statement allows several consequences to be executed for a single IF clause, in this case, three separate actions.

E.4 HELP WINDOWS

As illustrated above, HELP windows containing text can be put on the screen with the HELP statement. Messages can be more than one line if the Newline symbol \N is included to show where a new line should begin. Choosing the proper location for the HELP window may take some experimentation to place it out of the way of important data items and other messages. HELP windows are automatically erased from the screen when the user presses the <Esc> key.

E.5 AUTOMATIC SEARCHING: THE AUTOSEARCH COMMAND

If the command AUTOSEARCH is included in the .CHK file for a field, ENTER will automatically search for an existing record that matches whatever values have been entered and notify the user if one is present. A choice is then offered between editing the matching record or continuing with data entry in the new record. Duplicate records are thus detected during data entry and, if the user desires, prevented.

AUTOSEARCH performs the search after entry of data in the field where the command appears. The search looks for a match on all fields that have been entered except <IDNUM> and <Today> fields. You should thus set up the questionnaire so that only the fields to be used for searching precede the field in which AUTOSEARCH is declared. This can be accomplished through changing the order of entry of the fields with the JUMP command or by designing the actual questionnaire appropriately.

E.6 RELATED TOPICS

Examples of .CHK files containing program statements, including many of those shown as examples in this section, are found in Chapters 23 and 26 of the Epi Info Manual.

Details of each of the commands, such as CLEAR, COMMENT LEGAL, COLOR, CODEFIELD, ENTER, GOTO, HELP, IF, JUMPS, AUTOJUMP, LEGAL, LET, RANGE, TYPE, UPDATE, KEY, and AUTOSEARCH are given in Chapter 35 of the Epi Info manual. The use of the KEY and ENTER statements for setting up relational databases and of KEY for indexing files are described in Chapter 25 of the Epi Info Manual.

60

F. ANALYSIS: PRODUCING LISTS, FREQUENCIES, TABLES, STATISTICS, AND GRAPHS FROM EPI INFO FILES

TUTORIAL

Run the ANALYSIS program from the main menu.

When the prompt "EPI>" appears, type:

RUN TUTOR1

Enjoy the tutorial.

To leave the program at any time, press <F10>

F.1 OVERVIEW

ANALYSIS produces lists, frequencies, tables, statistics, and graphs from Epi Info or dBASE files. Simple commands will cause ANALYSIS to select records using specified criteria, sort or list records, do frequencies or cross tabulations, do logical or mathematical operations on a variable, put the results in a new variable, and direct the results to the screen, a printer, or a disk file.

The commands form a mini programming language, and they may be entered one by one from the keyboard or placed in a program file that is then "run" from ANALYSIS. In this section, we will describe only the simpler operations -- those that might be used during a field investigation for preliminary analysis of a questionnaire. The writing of programs to "clean" data sets and for permanent disease surveillance systems is described more fully in the Epi Info manual.

F.2 GETTING ACQUAINTED

By running ANALYSIS from the EPI menu, you will see a lower window for entering commands and a larger one above where the results of the commands will appear. At the bottom of the screen some key commands are indicated, and information about data files and available memory is displayed at the top.

Whenever the cursor is at the EPI> prompt, commands may be entered from the keyboard. If you make a mistake or want to change part of the line being entered, use the <Backspace> or <Left arrow> key to return to the correct position and then enter the new material. The and <Ins> keys work as in EPED, deleting characters and turning the Insert mode on and off. The <Home> and <End> keys skip to the beginning or end of the current line.

The function keys at the bottom of the screen allow selecting help topics, commands, and variable

61

names from lists that appear on the screen when the key is pressed. After pressing one of the function keys, choose an item by moving the highlight bar with the up- and down-arrow keys and pressing <Enter>.

As results appear in the upper window, those that have scrolled out of sight at the top of the screen may be reviewed by pressing the <PgUp> and <PgDn> keys to move up and down one screen at a time. For finer movements, <Ctrl-PgUp> and <Ctrl-PgDn> will move one line at a time.

We suggest that you run the tutorial as instructed above. It covers most of the material in this section interactively. Chapters 11, 13, 25, and many other chapters of the Epi Info manual contain further information about ANALYSIS. For particular commands used with ANALYSIS, Chapter 36 provides much more detail about additional uses and options than can be given in this introductory section. Here we describe the basic commands used to analyze a questionnaire and produce line lists, frequencies, cross tabulations, means, and graphs.

F.3 THE HELP SYSTEM

To see a list of the commands in ANALYSIS, press <F2>, the Commands key. A list of commands will appear in a window on the screen. Moving the cursor to a command and pressing <Enter> will place that command next to the prompt, although, of course, you may also type commands from the keyboard.

Whenever a command has been entered--READ, for example--pressing <F1> will bring up further information about that command, including the format in which field names and other information must be supplied. If no command has been entered, <F1> brings up a list of topics; choosing a topic then produces information on that topic.

For many commands, such as READ, typing the command and then <Enter> will bring up a menu of appropriate choices--in this case, the files that can be read. Choosing a file then carries out the command with the appropriate file or variable.

To summarize, help is never more than one keystroke away:

- √ For general information on a topic, press <F1> without a command on the EPI> line, and then choose a topic from the list.
- √ For command information, press <F2> for commands.
- √ For more information about a command, enter the command and then press <F1>.
- √ For file information, type READ <Enter>, and then choose the file from the menu that appears.
- √ For a list of variables in the current file, press <F3> for variables and choose from the list. Several variables can be "tagged" with the <+> key or "untagged" with the <-> key before pressing <Enter> to finalize the choice(s).

The help system is intelligent enough to change the order of words in a command; if you choose a variable and then a command from the menus, their order is automatically reversed.

62

F.4 READING A FILE: THE FIRST STEP IN THE ANALYSIS PROCESS

Analysis must be performed on the records in a file. The file may be either an Epi Info file, produced by entering data with the ENTER program, or a dBASE file from another source. Epi Info files can be produced from many other formats by the IMPORT program (Chapter 17, Epi Info manual), and the resulting file can be used in ANALYSIS.

The command that tells ANALYSIS what file to use is READ <file name>, and this is usually the first command given in ANALYSIS.

To see a list of available files, type

```
EPI> READ
```

and press <Enter>. To see the files in another directory, such as c:\Data\, you would first type READ c:\Data\ before pressing <Enter>. To see all dBASE files, type READ *.dbf. A directory of files will appear in a window. Move the cursor bar with the arrow keys and choose a file by pressing <Enter>.

Whether you use the file directory or simply type READ and the file name, ANALYSIS will use this file for all subsequent operations until another READ is performed. It has become the "active data set."

ANALYSIS will also read and process files made in the dBASE format. To use a dBASE file rather than an Epi Info file, simply type the file name followed by .DBF. The only operation in ANALYSIS that cannot be performed with a dBASE file is an UPDATE of records, described in a later section.

Allowable READ commands include the following:

```
READ OSWEGO (OSWEGO.REC is understood)
READ OSWEGO.REC
READ OSWEGO.DBF (A dBASE file)
READ OSWEGO1 OSWEGO2 OSWEGO3
(Three files with similar formats that you wish to analyze as a single unit)
```

For the rest of this section, we will assume that you have chosen the file OSWEGO.REC, supplied with the Epi Info system, by giving the command:

```
EPI>READ OSWEGO
```

OSWEGO.REC contains interview information from a foodborne outbreak often used as a teaching exercise. The file contains 75 questionnaires obtained from attendees at a church supper that was followed by a gastroenteritis outbreak.

63

F.5 PRODUCING A LINE LISTING

To produce a listing of the records in the file, type:

```
EPI>LIST
```

The result is:

REC	AGE	SEX	TIMESUPPER	ILL	ONSETDATE	ONSETTIME	BAKEDHAM	SPINACH
1	11	M	9999	N		0	N	N
2	52	F	1500	Y	04/19	30	Y	Y
					---	ETC.	---	

The command LIST will display only as many variables as will fit across the current screen width. If you would like to list all variables, use

```
EPI>LIST *
```

The "*" is shorthand for "all fields." LIST followed by one or more variable names lists only those variables, a handy way to produce a list of names and addresses of persons to be interviewed, or to omit the names and addresses from a data listing.

LIST * NOT NAME ADDRESS will list all fields except NAME and ADDRESS.

F.6 OTHER USEFUL ANALYSIS COMMANDS

1. FREQUENCIES

The frequencies command (FREQ) will count each category for a specified variable and give the absolute and relative frequencies for each category.

```
EPI>FREQ SEX
```

produces this result:

SEX	Freq	Percent	Cum.
F	44	58.7%	58.7%
M	31	41.3%	100.0%
Total	75	100.0%	

64

The number (frequency) in each category is given first, followed by the percentage of the total and the cumulative percentage. If statistics is SET to ON (see the SET command) and the field types are numeric, the sum, mean, and standard deviation are also printed.

The command `FREQ *` will produce frequencies for all the variables in your questionnaire, a convenient way to begin the analysis of a new data set.

`FREQ` with a series of variable names following, separated by spaces, will do separate frequencies for each of the variables listed.

2. CROSS TABULATIONS

The `TABLES` command will count the records in which the values fulfill criteria for two fields at the same time. Thus, the command

```
EPI>TABLES SEX ILL
```

will result in:

SEX	ILL		Total
	+	-	
F	30	14	44
M	16	15	31
Total	46	29	75

Single Table Analysis

Odds ratio 2.01
Cornfield 95% confidence limits for OR 0.70 < OR < 5.85

Relative risk of (ILL=+) for (SEX=F) 1.32
Greenland, Robins 95% conf. limits for RR 0.89 < RR < 1.96
(Biometrics 1985;41:55-68)

Ignore relative risk if case control study.

	Chi-Squares	P-values
	-----	-----
Uncorrected:	2.11	0.14679237
Mantel-Haenszel:	2.08	0.14951418
Yates corrected:	1.46	0.22620244

Note that the interpretation of relative risk (risk ratio) depends on the orientation of the table, and that not all relative risks will be meaningful. The relative risk given is the rate of the first factor on the first line compared with the rate of the first factor on the second line or $(a/a+b)/(c/c+d)$ as defined

65

in Chapter 32 of the Epi Info manual. An interpretation is printed with the relative risk value. If risk factors are on the left side of the table and disease across the top, with presence indicated first in each case, the relative risk represents the risk of disease for persons with the first factor relative to those with the second factor. As indicated in the note, relative risk should be ignored in a case-control study, since it cannot be interpreted meaningfully.

3. STRATIFIED ANALYSES

Series of stratified tables can be produced by listing more than two variables in the TABLES command. The variables after the first two serve as the basis for dividing the tables into levels or strata, one for each combination of variables after the second. For a quick preview, try

```
EPI>TABLES VANILLA ILL SEX
```

(Tables of VANILLA consumption by ILLness, stratified by SEX)

This will result in separate tables for male and female cases. A Mantel-Haenszel stratified analysis will follow the two tables. The summary of the statistical combination of the two strata appears as follows for VANILLA ILL SEX:

```
** Summary of 2 Tables With Non-Zero Margins **
      N for sets w/ discordant results = 75
```

SUMMARY ODDS RATIOS

```
Crude OR for sets with discordant results      23.45
Mantel-Haenszel Weighted Odds Ratio           37.64
95% confidence limits for M-H OR              7.19 < OR < 197.01
      (Robins, Greenland, Breslow/ AJE 1986; 124:719-23)
```

SUMMARY RELATIVE RISKS

(Ignore if Case-Control Study)

```
Crude RR                                       5.57
Summary RR of (ILL=+) for (Vanilla=+)        5.73
95% confidence limits for summary RR         1.99 < RR < 16.51
      (Greenland, Robins Biometrics 1985;41:55-68)
```

```
M-H Summary Chi Square      25.28
```

```
P value                      0.00000050
```

Unable to do Woolf's Test due to zero cell values

** End of Stratified Analysis **

66

The very large odds ratio indicates a strong association between eating vanilla ice cream and the occurrence of illness. The Mantel-Haenszel weighted odds ratio, summarizing the results of stratification by sex, is even larger. Both the confidence limits and the extremely small p value indicate that the Mantel-Haenszel weighted odds ratio is significantly different from 1.0, the value indicating no association.

Both the crude and stratified relative risks are also significantly greater than 1.0. In this outbreak of staphylococcal food poisoning in Oswego, New York, the vanilla ice cream was indeed identified as the cause, through both statistical and microbiologic evidence.

An asterisk or star (*) may be used in the TABLES command to indicate all variables. Thus, TABLES ILL * would produce tables of illness status against each variable in the questionnaire. This is a quick way to obtain preliminary analysis of a questionnaire for which comparison of two groups is the key feature.

Woolf's test, when available, indicates differences in the odds ratios between strata, if the p value is small. Such differences suggest that the Mantel-Haenszel weighted odds ratio, while still valid as a summary of all strata, does not necessarily reflect the value for one of the strata.

4. THE MEANS COMMAND

The TABLES command is for data items that are arranged in categories and counted. There is another whole world of statistics for numbers that are continuous, such as height, weight, and age. The MEANS command produces a table that displays continuous or ordinal data and then performs appropriate statistics.

The MEANS command requires two items of information--the variable containing data to be analyzed and the variable that indicates how groups will be distinguished. The command is:

MEANS [Numeric variable to be analyzed] [Variable for Grouping]

If you prefer not to display the table of values, append "/N" to the command to indicate "No tables."

Using the OSWEGO.REC file, MEANS AGE ILL will compare ages for persons in whom ILL = "Y" with those for whom ILL = "N".

Using the MEANS AGE ILL example, you should obtain the following results:

67

ILL	Obs	Total	Mean	Variance	Std Dev
+	46	1806	39.261	477.264	21.846
-	29	955	32.931	423.709	20.584
Difference			6.330		

ILL	Minimum	25%ile	Median	75%ile	Maximum	Mode
+	3.000	17.000	38.500	59.000	77.000	15.000
-	7.000	14.000	35.000	50.000	69.000	11.000

ANOVA

(For normally distributed data only)
The p value is equivalent to that for the Student's T Test, since there are only 2 samples.

Variation	SS	df	MS	F statistic	p-value
Between	712.655	1	712.655	1.560	0.213137
Within	33340.732	73	456.722		
Total	34053.387	74			

Bartlett's test for homogeneity of variance
Bartlett's chi square = 0.119 deg freedom = 1 p-value = 0.729786

The variances are homogeneous with 95% confidence. If samples are also normally distributed, ANOVA results can be used.

Mann-Whitney or Wilcoxon Two-Sample Test (Kruskal-Wallis test for two groups).

Kruskal-Wallis H (equivalent to Chi square) = 1.161
Degrees of freedom = 1
p value = 0.281226

At first this may be more numbers than you ever wanted, but the overall results can be quickly understood. The means of the two sets of ages are 39 and 33. Now look at the p values under the ANOVA and Kruskal-Wallis tests. Since both are more than 0.05, we can conclude that the difference in mean age between the ILL and NOT ILL groups is not "significant." Bartlett's test helps you decide which one of the two methods to choose, but in this case, both tests lead to the same conclusion. Further details are given in the Epi Info Manual, Chapter 32, "Statistics."

Note on missing values: In the MEANS, TABLES, and FREQ procedures, missing values will be ignored if they were entered by pressing <Enter> in the ENTER program and if SET IGNORE is ON (normally it is; see the SET command in Chapter 36 of the Epi Info manual). If, however, you have used another code, such as 99, for missing values, be sure to select only the non-missing values before using the means procedure. This can be done by using SELECT AGE <> 99, for example. Be particularly aware of this point if the data have been imported from another system in which missing values may be coded differently.

68

5. TITLES

The **TITLE** command allows you to specify up to five lines of text that will appear at the top of a table, frequency, chart, or graph. **TITLE** can be used before the **TABLES**, **FREQ**, and graphics commands to produce an appropriate title for the results. To cancel the effect after the command has been executed, **TITLE** can be used again with blank entries or new text for the next command. The following commands will define a two-line title for subsequent commands:

```
TITLE 1  Number of Cases by Date of Onset
TITLE 2  North Chicago, January 1990
```

To remove this title for later commands use:

```
TITLE 1
```

All titles with numbers 1 or greater are removed.

F.7 CHARTS AND GRAPHS

ANALYSIS produces histograms, scatter plots, pie charts, and bar and line graphs directly from data files. Making a graph requires a single command; the following examples will give the idea:

```
HISTOGRAM ONSETDATE
PIE RACE
BAR AGEGROUP
LINE DAY
SCATTER SYSBP BODYMASS
```

If **/R** is placed after the **SCATTER** command, a least squares regression line will be drawn through the data points, as in:

```
SCATTER SYSBP BODYMASS /R
```

Sometimes it is important to compare two graphs and to make the scales on the vertical axes the same for this purpose. Adding a slash (forward slash, not backslash) to the command and specifying the maximum value of the **Y** axis will accomplish this, as in:

```
EPI>Bar ROLLS /Y=0-75
```

(The lower value must be 0.) For scatter plots, the maximum and minimum numbers on the **X** (horizontal) and **Y** (vertical) axes can be made more extreme by specifying new numbers:

```
EPI>Scatter age BP /X=0-300 /Y=0-100
```

The minimum cannot be increased nor the maximum decreased from the values chosen automatically.

69

F.8 SENDING RESULTS TO THE PRINTER OR TO A FILE

Before using the print commands, be sure that a printer is connected to the computer, turned on, and supplied with paper. Pressing the Printer On key <F5> will send all subsequent output to the printer. It does not print results already on the screen. The best way to do this is to turn the printer on with <F5> and then press the up arrow to recall the previous command. Pressing <Enter> will run the command again, and this time the results will be printed. To turn the printer off, press <F5> again.

Note that when you press <F5>, the command ROUTE PRINTER or ROUTE SCREEN appears. This key provides a shortcut to these commands, but you can also type them on the command line to control printing.

The ROUTE command will also direct the results to a file by the name of your choice.

```
EPI>ROUTE C:RESULTS.TXT
```

will send all results to the file RESULTS.TXT on drive C, until another ROUTE command sends results to the SCREEN, PRINTER, or another file, or files are closed by leaving ANALYSIS with <F10>.

When a graph or chart is requested as in the preceding section and printing is on, the graph will be printed; otherwise, it will appear only on the screen. Printing of graphs and charts can be done on Hewlett-Packard Laserjet compatible printers and plotters and on IBM and Epson compatible dot-matrix printers, although other printers will usually work for tables and lists. Graphs may print with other printers but graphics are more subject to incompatibility problems than plain text. See the section in Chapter 36 (Epi Info manual) on the SET command for methods of setting up ANALYSIS for laser printers and plotters.

F.9 RECALLING ANALYSIS COMMANDS

As commands are entered, ANALYSIS saves each line for possible reuse. When the cursor is at the EPI> prompt, pressing the <up arrow> key will bring back previous commands and allow you to correct errors or change the commands.

Once a line has been recalled, it may be edited. When the <Enter> key is pressed, the command will be executed just as though it had just been typed.

Previous commands are stored in a space called the Command Stack. ANALYSIS normally saves the last 20 commands, but this can be increased by resetting the size of the Command Stack. This is described in Chapter 11 of the Epi Info manual, under the SET command.

70

F.10 RELATED TOPICS IN OTHER CHAPTERS IN THE EPI INFO MANUAL

The commands we have described so far will produce results from a questionnaire, but we have not yet discussed how to omit selected records from the ANALYSIS, how to group or recode data items, take action only if certain conditions are met, reorganize and write new files, and many other operations that are essential to complete analysis of a data set. As commands become more complex, it is useful to save them for repeated use in a program file. These and other procedures are discussed in Chapter 11, which should be consulted as soon as you have mastered the elementary operations in ANALYSIS and need to begin serious data analysis.

ANALYSIS also contains features useful in setting up permanent systems such as those used in U.S. state health departments for maintaining communicable disease reports. Two examples of such systems are included on the Epi Info disks and described in Chapters 14 and 26. Commands of interest to those programming such systems are described in Chapters 13, 22, 24, 25, and 33-36.

G. PRACTICAL ASPECTS OF DATA ENTRY ACCURACY USING EPI INFO

1. Use field types and lengths that are consistent with the type of data reported.
2. Use coding schemes that allow the data reported to be properly entered into the database.
3. Design the database to facilitate the production of reports (e.g., normalize data sets).
4. Use range checking for all continuous type data to verify occurrence within expected range.
5. Use predefined acceptable values for all categorical type data to prevent the entry of misspelled or illegal values.
6. Use automatic coding for all fields linked by common meaning to another field.
7. Use conditional skip patterns in the data entry process to avoid addressing variables that are not applicable to the current record (e.g., skip admit date if NO is entered for Hospitalized).
8. When data are collated by information in a field, make that field automatically repeat, to avoid entering data that can be carried over from a previous record.
9. Force data to be entered into critical fields. If DIAGNOSIS is a critical element of a report, prevent the cursor from leaving the field until a valid diagnosis is entered.
10. Make fields such as AGE or CASE DEFINITION automatically calculate whenever possible.

71

11. Check across fields to prevent entry errors that are dependent on multiple fields (e.g., SEX = Male PREGNANT = Yes).
12. Display information windows to the user before any unusual entry fields to avoid errors.
13. Display information windows to the user after any outlier or unlikely data are entered, explaining the possible problems.
14. Control the movement of the cursor through the data entry process, returning the user to any fields that may have problems.
15. Send reports summarizing the entered data back to the source of these data for verification.

CHAPTER 4

Other Software That Can Be Used In Collecting, Validating, Managing, Analyzing, and Graphing Health-Related Data

1. EPI INFO: A Word Processing, Database, and Statistics System for Epidemiologists

Epi Info is a series of microcomputer programs for handling epidemiologic data in questionnaire format and for organizing study designs and results into text that may form part of written reports. A questionnaire can be set up and processed in a few minutes. Epi Info can also be the basis for a disease surveillance system database with a variety of files and record types. It includes the features most used by epidemiologists in statistical and database programs, combined in a single system that may be freely copied and given to friends and colleagues.

There are three levels of facilities in Epi Info for processing questionnaire or other structured data. Using Epi Info on the simplest level, a questionnaire or investigation form can be computerized in a few minutes by:

- √ Running the main menu.
- √ Typing the questionnaire or data entry form with EPED (the word processor) or another word processing program.
- √ Entering data in the questionnaire using the ENTER program.
- √ Analyzing the data using the ANALYSIS program to produce lists, frequencies, cross tabulations, means, graphs, and accompanying statistics.

With increasing knowledge of the program, additional features can be used to shape data entry and analysis to individual needs. It is possible to:

- √ Insert error checking, skip patterns, and automatic coding using the CHECK program.
- √ Select records, create new variables, recode data, manipulate dates, and carry out conditional operations with IF statements during ANALYSIS.
- √ Incorporate operations into program files so that they can be performed repeatedly, even by persons unfamiliar with programming.
- √ Import and export files from other systems like SAS, SPSS, dBASE, and Lotus 1-2-3.
- √ Change the names of variables in the data file using the CHECK program.

The third level of features is important in setting up a permanent database system or a large study, or to customize Epi Info's operations to suit special needs. For such purposes, it is possible to:

- √ Program the data entry process to include mathematical operations, logical checks, color changes, pop-up boxes, and custom routines written in other languages.
- √ Specify the format of reports from ANALYSIS to produce customized tables.
- √ Enter data into more than one file during the same session, moving automatically among several questionnaires within ENTER.
- √ Link several different types of files together in ANALYSIS so that questions can be answered that require data from more than one file.
- √ Compare duplicate files entered by different operators to detect data entry errors.

EPED, the editor included with Version 5, contains a programming system for text called EPIAID. Programs are included as a guide to the creation of questionnaires and the design of an epidemic investigation. The text produced can be used as part of an investigation report. EPIAID programs can be written to assist in letter writing or production of reports for other purposes.

Version 5 of Epi Info contains a host of new features such as handling of several related files at one time, easy revision of data file formats, browsing and updating of files during analysis, ability to analyze dBASE files directly, missing value indicators, programming languages for data entry and for text editing, ability to call Pascal or assembly language programs from the data-entry program, fixed decimal points, European dates, and many others. Files created by previous versions of Epi Info can be used in Version 5. With a few revisions, programs written for Version 3 can be run in Version 5.

The programs included in Epi Info are:

EPI -- The main menu that allows access to other programs.

EPED -- A word processor for creating questionnaires or for general use.

A special facility called EPIAID in EPED runs programs that assist in text preparation and the design of epidemiologic investigations.

ENTER -- Produces a data file automatically from a questionnaire created in EPED or another word processor. Manages entry of data from a questionnaire into a disk file. Allows revision of file format even after records have been entered.

ANALYSIS -- Produces lists, frequencies, cross tabulations, and a variety of other results from Epi Info or dBASE files. Appropriate epidemiologic statistics, such as odds ratios, relative risk, confidence limits, the Fisher exact test, and chi square tests accompany the tables. Stratified analyses with the Mantel-Haenszel technique, one-way ANOVA and Kruskal-Wallis tests, linear regression, and analysis of matched case-control studies are also offered. Records may be selected or sorted using defined variables, "if" statements, and mathematical and logical operations. Graphing, complex report formatting, generation of new data sets for testing, and a programming language are included in ANALYSIS. Data items spread over several files can be linked and analyzed as a single unit.

CHECK -- Sets up ranges, legal values, automatic coding, and skip patterns for the ENTER program, if desired. Mathematical and logical operations between fields, complex jump patterns, access to several files in the same entry process, and use of custom programs provided by the user are also supported by CHECK.

STATCALC -- Calculates statistics for values entered from the keyboard. STATCALC performs calculations for single and stratified 2-by-2 tables, sample size, and single and stratified trend analysis.

CONVERT -- Converts data files from Epi Info into 12 other formats for several database and statistics programs.

IMPORT -- Brings in files from other systems so that they can be used in Epi Info.

MERGE -- Merges files produced from questionnaires with the same or different formats. This allows combining data files entered on different computers, and updating of previous records using data from new entries.

VALIDATE -- Compares two Epi Info files entered by different operators and reports any differences.

Help files -- Much of the material in the reference section of this manual is available in help files accessed by pressing <F1> from within Epi Info programs.

Sample Programs -- Two complete sample surveillance systems, examples of two epidemic investigations, and a system for anthropometric calculations in nutritional surveys, are provided. There are numerous other small data files, and many programming examples are provided in the manual.

Tutorials -- Complete interactive tutorials are provided to introduce the features of EPED and ANALYSIS.

Address:

Reproduced and distributed by:

USD, Inc.
2075A West Park Place
Stone Mountain, Georgia 30087
USA
Ph. 404-469-4098 FAX 404-469-0681

French version can be obtained from:

I'Ensp
Avenue du Professeur Leon Bernard
35043 Rennes Cedex
Paris, France
995-490-98

75

2. COSAS - Coverage Survey and Analysis Software

Manages and provides analysis of data collected from immunization coverage surveys which use the WHO EPI 30 cluster survey methodology. Data collected from pediatric coverage surveys and surveys of child-bearing-age women for coverage with tetanus toxoid are both managed.

COSAS provides calculations of immunization coverage and of important indicators of immunization program performance including: 1) Immunization program access; 2) Immunization program continuity as measured by drop out rates; 3) Immunization program quality as measured by the proportion of doses administered according to the immunization schedule, the proportion of doses administered to infants before one year of age, the number of missed opportunities for immunization; and 4) A profile of immunization program providers.

The software and a user's manual are available from WHO/EPI headquarters in Geneva.

Address:

Expanded Programme on Immunization
World Health Organization
1211 Geneva 27, Switzerland
Telephone: 41 22 791-4798

3. EPICOST

A package of Lotus spreadsheets that can assist the user in managing and analyzing data on immunization program costs. The software facilitates the calculation of total immunization program costs and the calculation of the cost effectiveness of different immunization program strategies. EPICOST and a user's manual are available from WHO/EPI headquarters in Geneva. See COSAS entry for address.

4. CEIS

Manages immunization program service delivery, disease surveillance and basic demographic data required to make immunization coverage and disease incidence calculations. The software manages routinely reported data on the number of doses of each antigen administered and uses those data to calculate coverage estimates. The software also manages aggregate totals of the number cases and deaths of disease and calculates disease incidence rates using basic demographic data as demonstrations.

CEIS is a user friendly, menu driven program that offers the user a high degree of flexibility in installing and using the software to meet the specific information needs of different immunization programs and of different levels of immunization program management. For example, the user can specify which antigens are monitored and for which age groups information on the number of doses

76

administered is entered, based on the country's specific immunization policy. Users can also specify for which diseases surveillance data are to be managed, and whether they include only the EPI target diseases or all of the diseases which are the subject of communicable disease surveillance. The age groups for which disease surveillance data will be monitored can also be specified.

Denominators required to calculate age-specific coverage and disease incidence rates can also be specified, in addition to growth rates, crude birth rates, and specific population data collected from a national or local census.

Finally, CEIS offers the user a high degree of flexibility in defining specific formats for reports and graphs which summarize immunization program data and facilitate the use of data in program planning, monitoring, and management.

The software and a user's manual are available from WHO/EPI headquarters in Geneva. See COSAS entry for address.

5. IMPACT SOFTWARE

Manages and analyzes data collected from studies of the quality and maintenance of the immunization cold chain at different levels within a country. The software specifically manages data collected during studies in which 3-M cold chain monitor cards are placed at different levels within the cold chain of a country to measure whether or not the cold chain is maintained from original shipment point to vaccine administration.

The software and a user's manual are available from WHO/EPI headquarters in Geneva. See COSAS entry for address.

6. POLIO ERADICATION SURVEILLANCE SOFTWARE (PESS)

PESS is software developed to manage and analyze data on individual cases of polio, to meet the information needs of immunization program managers for planning, implementing, and managing national polio eradication programs. PESS facilitates the calculation of important indicators of polio eradication program performance, including the proportion of suspect cases of polio that are first investigated less than 48 hours after reported and the proportion of suspect cases for which case investigation and containment efforts are completed.

PESS was developed and distributed to countries in Latin America by the Pan American Health Organization (the World Health Organization's regional office for the Americas) in Washington, D.C. Copies of the software are available from PAHO; however PAHO does not provide any support to users outside the region of the Americas.

47

7. PHLIS: Public Health Laboratory Information System

Features:

Data Entry Menu:

- Data entry
- Display records
- Print records
- Modify records
- Values are validated when entered
- Item selection available through "picklist"

Listings:

- Display Masterfile
- Display Transaction File
- Selection criteria by:
 - entry date
 - case ID
 - county
 - disease-specific variables

Analysis:

- Means
- Frequencies
- Cross-tabulations
- Graphics

Utilities:

- Manage Masterfile data by:
 - copying
 - moving
 - deleting
 - restoring
 - exporting
 - importing

Communications:

- Used to transmit data to Centers for Disease Control and Prevention
- Access bulletin boards
- Access selected CDC computer resources

Address:

Centers for Disease Control and Prevention
Information Resources Management
PHLIS
MS C14
Atlanta, Georgia 30333
USA

8. CLM (Commodity and Logistics Management) - in development

Features: Management of vaccine, cold chain commodities, drugs, family planning supplies, or other goods under management by public health programs. Monitors purchase orders, present stocks, and enables forecasting of commodity needs. In-program report writer and graphic capability without need for additional software. A collaborative project of the International Health Program Office, Centers for Disease Control and Prevention, World Health Organization, and Management Sciences for Health. The program originated within the CCCD Project, Nigeria, and is currently under development for use in other countries.

For information contact:

Management Sciences for Health
(Attn: Mr. Graziano)
400 Centre Street
Newton Corner, MA. 02158-2076
USA
Tel. 617-527-9202.

Expanded Programme on Immunization
(Attn: Mr. Lloyd)
World Health Organization
Geneva, Switzerland
Ph. 41 22 791 2111 FAX 41 22 791 0746

9. EGRET

Features:

Intuitive, Screen-Oriented User Interface
Context-Sensitive Help
Runs on DOS Micros
Analysis Models
Logistic Regression
Cox Proportional Hazards Covariates with Time-Dependence
Conditional Regression
Poisson Regression
Logistic Regression with Random Effects
Weibull and Exponential Regression Kaplan-Meier
Graphics (*Graphics option priced separately)
 Device-Independent Graphics
 On-Line and Off-Line Plotting
 Scatter Plots
 Kaplan-Meier and Cox Survival Plots
 Delta Beta and Fitted Value Plots
 Annotation of Plots Available

Address:

Statistics and Epidemiology Research Corp.
909 43rd St, NE
Suite 202
Seattle, WA. 98105
USA
Tel. 206-632-3014 FAX 206-547-4140

79

10. LogXact

Features:

- Does Exact Logistic Regression**
- Ensures Validity of Odds Ratio Estimates**
- Essential for Small Binary Data Sets with Covariates**
- Handles clustered Binary Data**
- Handles Binary Data from Cross-over Clinical Trials**
- Handles Matched Sets Under General M:N Matching**
- Yields Exact Inferences even where Maximum Likelihood fails**

Address:

CYTEL Software Corp.
675 Massachusetts Av.
Cambridge, MA 02139
USA
Tel. 617-661-2011 FAX. 617-661-4405

11. EPITABLE

Features:

Performs statistical calculations used by epidemiologists, for tables of data entered using the keyboard.

Includes:

- Sample size calculation, power calculation,**
- Poisson, binomial, normal, chi2 and t distribution probabilities**
- Exact binomial confidence intervals of a proportion**
- Fisher's exact test, chi square**
- Relative risk, odds ratio, attributable risk + confidence intervals**
- French and English supported, context sensitive help, graphical display of results.**

Address:

Epicentre
8, Rue St Sabin
75011 Paris
France

80

12. EPINUT: Calculates design effect, confidence interval of various malnutrition indicators.

Features:

Adds National Center for Health Statistics nutritional indexes to an Epi Info file containing Weight, Height, Age, and Sex variables.

Builds distribution of indexes through graphs and tables.

Graphics, also available, can be exported to Harvard Graphics through the use of templates.

Address:

Epicentre
8, Rue St Sabin
75011 Paris
France

13. EPISTATS: A series of Lotus 1-2-3 programs for epidemiologic analysis.

Features:

Calculate a p -value for chi-square

Probabilities for binomial and poisson distributions

Crude and pooled values for odds, risk, and rate ratios with confidence intervals and significance tests

Tests for interaction

Odds ratios for pair-matched case-control studies

Mantel extension test for trend

Power and sample size estimates

Address:

Epidemiology Monitor
2560 Whisper Wind Court
Roswell, GA. 30076
USA
Tel. 404-594-1613

81

14. ANTHRO: Provides anthropometric calculations and analyses

Features:

**Calculates anthropometry
Uses International Growth Reference
Import fixed-column and comma-delimited files into a dBase format
Standard anthropometric analyses are provided
Compiled dBase III Plus using Clipper**

Address:

**Division of Nutrition, Mailstop K25
Centers for Disease Control and Prevention
Atlanta, GA. 30333
USA**

(or contact a World Health Organization Regional Office)

15. PHC MAP (Primary Health Care Management Advancement Program)

PHC MAP is a set of modules which contain practical tools to help PHC management teams collect, analyze, and use management information and thereby improve the effectiveness of their respective programs. PHC MAP modules can assist managers in:

- Systematically assessing their information needs**
- Determining the quality of management of their programs**
- Identifying program areas that need strengthening**
- Monitoring program implementation and the impact of program changes**

PHC MAP modules are available from:

**Center for Human Services
7200 Wisconsin Avenue, Suite 600
Bethesda, MD 20814
USA
Tel. (301) 654-8338**

16. EPI MAP: An Epi Info and dBase-compatible Mapping Program.

A companion program to Epi Info for producing maps.

Features:

- Enter data at keyboard
- Read Epi Info data files
- Read dBase data files
- Different styles of maps:
 - color/pattern
 - dot
 - density maps
 - cartograms
- Creation of maps by:
 - digitizer
 - mouse
 - keyboard
- Boundary file types included:
 - World
 - Country-specific
 - Regions within some countries

Address:

USD Inc.
2075A West Park Place
Stone Mountain, Georgia
USA
Tel: 404-469-4098 Fax: 404-469-0681

17. ICD9CMAT: International Classification of Disease, 9th Revision, Clinical Modification (ICD9CM), Abbrev. Titles

Features:

- ASCII data file
- 18,559 ICD9CM codes included
- Data from National Center for Health Statistics tape files

Address:

Epidemiology Monitor
2560 Whisper Wind Court
Roswell, GA. 30076
USA
Tel. 404-594-1613

83

18. EPISOURCE: A Guide to Resources in Epidemiology

Some of the Topics:

**Advisory Groups
Consultants
Countries
Databases
Funding Sources
Health Departments
Research Centers
Software**

Address:

**Epidemiology Monitor
2560 Whisper Wind Court
Roswell, GA. 30076
USA
Tel. 404-594-1613
FAX 404-594-0997**

84

REFERENCE MANUAL FOR DATA ENTRY

FOR

**HOSPITAL BASED MORBIDITY
AND MORTALITY REPORTING
SYSTEM**

HOSPITAL BASED REPORTING SYSTEM

MAIN MENU

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
MONTHLY HOSPITAL VISITS BY INDIVIDUALS

- 1B. ENTER INDIVIDUAL PATIENT DATA
FOR EACH HOSPITAL
- 16B. PRODUCE NATIONAL REPORTS AUTOMATICALLY
- 12B. BACKUP DATA AND PGMS. (BURHOP.REC) TO DRIVE B:
- 13B. RESTORE DATA FROM DRIVE B: TO C:
- 14B. RETURN TO DOS PROMPT C:\>

C:\EPI5\BURHOP>

At the **C:\epi5\burhop>** prompt, type the number for the selection of your choice. If you want to enter a record, type **1B**, then press **[ENTER]**.

HOSPITAL BASED REPORTING SYSTEM

DATA ENTRY

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT(HOSPITALIZATIONS): Individual Information

HOSPITAL: SECTOR:

PROVINCE: SERVICE: ICDCODE:

ILLNESS: SEX:

AGE UNKNOWN ? PATIE:

AGE LESS THAN 1 YEAR ? PAT:

AGE LESS THAN 1 MONTH ? PATI:

AC IN DAYS (1-31) AGEJ:

AGE MONTHS (1-11) AGEM:

AGE IN YEARS (1-99) AGEA:

DATE ENTERED: / / DATE DEPARTED: / /

DISCHARGE STATUS:

SERVICE: Valid values: 1, 2, 3, 4, 5, 6, 7, 9 Must enter
data <Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete
F9-Choices F10-Done Rec= 1

The cursor appears in the HOSPITAL response field. The system will allow you to type in the name of the hospital. Press [F9] for a pick list of hospital names from which to select.

HOSPITAL BASED REPORTING SYSTEM

HOSPITAL (PICKLIST)

REPUBLIC OF *****
 MINISTER OF PUBLIC HEALTH
 DEPARTMENT OF HEALTH CARE
 UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT (HOSPITALIZATIONS): Individual Information

HOSPITAL: CLINIC RAGASORE SECTOR: BUJA-URBAIN

PROVINCE: BUJU Pick a code CODEOMS: _____

HOP C.N.P.	BUJA-URBAIN	
CHU	BUJA-URBAIN	
ILLN H.P.R.C.	BUJA-URBAIN	X: _
CLINIC RAGASORE	BUJA-URBAIN	
HOP MILITARY	BUJA-URBAIN	
AGE UNK BUBANZA	BUBANZA	
AGE LESS TH BUHIGA	BUHIGA	(1-31) AGEJ: _
AGE LESS THAN BURURI	BURURI	(1-11) AGEM: _
BUTEZI	BUTEZI	(1-99) AGEA: _

DATE ENTERED: ___/___/___ DATE DEPARTED: ___/___/___

DISCHARGE STATUS: _

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
 F10-Done Rec= 1

Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press [ENTER]. The selection is placed in the HOSPITAL field and the coordinating sector and province are automatically placed in the appropriate fields. For subsequent records, these fields are automatically inserted until another HOSPITAL is selected by pressing [F9].

88

APPENDIX I

HOSPITAL BASED REPORTING SYSTEM

ICDCODE (PICKLIST)

REPUBLIC OF *****
 MINISTER OF PUBLIC HEALTH
 DEPARTMENT OF HEALTH CARE
 UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT(HOSPITALIZATIONS): Individual Information

HOSPITAL: CLINIC RAGASORE SECTOR: BUJA-URBAIN
 PROVINCE: BUJUBUJUBUJU SERVICE: 4 ICDCODE:

ILLNESS: _____ SE _____

Pick a code	
1.00	CHOLERA
2.00	TYPHOID FEVER
3.00	OTHER SALMONELL
4.00	DYSENTERY BACIL
5.00	TOXIC INFLAM
6.00	AMIBIASE
7.00	INT.ILL BY PROTOZ
8.00	INT.ILL BY HELMIN
9.00	OTHER INT. INFEC

^Y for more

AGE UNKNOWN ? PATIE: _
 AGE LESS THAN 1 YEAR ? PAT: _
 AGE LESS THAN 1 MONTH? PATI: _
 AGE IN MO
 AGE IN YE

DATE ENTERED: / / DATE DEPARTED: / /
 DISCHARGE STATUS:

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
 F10-Done Rec= 1

The cursor next appears in the ICDCODE field. The system will allow you to type in the ICDCODE code. Press [F9] to display the list of ICDCODE codes. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press [ENTER]. The selection is placed in the ICDCODE field and the corresponding ILLNESS is placed in the ILLNESS field.

92

HOSPITAL BASED REPORTING SYSTEM

SEX (PICKLIST)

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATI
INPATIENT(HOSPITALIZATIONS): Individual In

Legal values	
1	MALE
2	FEMALE
9	UNKNOWN

HOSPITAL: CLINIC RAGASORE SECTOR: BUJA-URBAIN
PROVINCE: BUJUBUJUB SERVICE: 4 ICDCODE: 2.00
ILLNESS: TYPHOID FEVER SEX: _
AGE UNKNOWN ? PATIE: _
AGE LESS THAN 1 YEAR ? PAT: _
AGE LESS THAN 1 MONTH ? PATI: _ AGE IN DAYS (1-31) AGEJ: _
AGE IN MONTHS (1-11) AGEM: _
AGE IN YEARS (1-99) AGEA: _
DATE ENTERED: / / DATE DEPARTED: / /
DISCHARGE STATUS: _
<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 1

The cursor next appears in the SEX field. The system will allow you to type in the SEX code. Press [F9] to display the list of SEX codes. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press [ENTER]. The selection is placed in the SEX field.

94

HOSPITAL BASED REPORTING SYSTEM

AGE UNKNOWN ? PATIE

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT (HOSPITAL Legal v
Y YES NS): Individual Information
N NO

HOSPITAL: CLINIC RAGAS SECTOR: BUJA-URBAIN

PROVINCE: BUJUBUJUB SERVICE: 4 ICDCODE: 2.00

ILLNESS: TYPHOID FEVER SEX: 1

AGE UNKNOWN ? PATIE: N
AGE LESS THAN 1 YEAR ? PAT: -
AGE LESS THAN 1 MONTH ? PATI: - AGE IN DAYS (1-31) AGEJ: -
AGE IN MONTHS (1-11) AGEM: -
AGE IN YEARS (1-99) AGEA: -

DATE ENTERED: / / DATE DEPARTED: / /

DISCHARGE STATUS: -

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 1

The cursor appears in the AGE UNKNOWN ? PATIE field. The system will allow you to type in the AGE UNKNOWN ? PATIE response. Press [F9] to display the list of AGE UNKNOWN ? PATIE responses. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press [ENTER]. The selection is placed in the AGE UNKNOWN ? PATIE field.

If the response to this field is YES, the cursor jumps to the DATE ENTERED field. If the response to this field is NO response, the cursor jumps to AGE LESS THAN A YEAR ? PAT.

95

HOSPITAL BASED REPORTING SYSTEM

AGE LESS THAN 1 YEAR ? PAT

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT(HOSPIT Legal v YES NS): Individual Information
 NO

HOSPITAL: CLINIC RAGAS SECTOR: BUJA-URBAIN

PROVINCE: BUJUBUJUB SERVICE: 4 ICDCODE: 2.00

ILLNESS: TYPHOID FEVER SEX: 1

AGE UNKNOWN ? PATIE: N
AGE LESS THAN 1 YEAR ? PAT:
AGE LESS THAN 1 MONTH ? PATI: AGE IN DAYS (1-31) AGEJ:
AGE IN MONTHS (1-11) AGEM:
AGE IN YEARS (1-99) AGEA:

DATE ENTERED: / / DATE DEPARTED: / /

DISCHARGE STATUS:

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 1

If you selected **NO** as the answer to AGE UNKNOWN ? PATIE, the cursor now appears in the AGE LESS THAN A YEAR ? PAT field. The system will allow you to type in the AGE LESS THAN A YEAR ? PAT response. Press **[F9]** to display the list of AGE LESS THAN A YEAR ? PAT responses. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press **[ENTER]**. The selection is placed in the AGE LESS THAN A YEAR ? PAT field.

If the response to this field is **YES**, the cursor jumps to the AGE LESS THAN A MONTH ? PATI field. If the response to this field is **NO** response, the cursor jumps to AGE IN YEARS. Type in the age, in years, then press **[ENTER]**.

HOSPITAL BASED REPORTING SYSTEM

AGE LESS THAN 1 MONTH ? PATI

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
DEPARTMENT OF HEALTH CARE
UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

INPATIENT(HOSPIT Legal v= YES) (NS): Individual Information
 NO

HOSPITAL: CLINIC RAGAS SECTOR: BUJA-URBAIN

PROVINCE: BUJUBUJUB SERVICE: 4 ICDCODE: 2.00

ILLNESS: TYPHOID FEVER SEX: 1

AGE UNKNOWN ? PATIE: N
AGE LESS THAN 1 YEAR ? PAT: -
AGE LESS THAN 1 MONTH ? PATI: - AGE IN DAYS (1-31) AGEJ: ---
AGE IN MONTHS (1-11) AGEM: ---
AGE IN YEARS (1-99) AGEA: ---

DATE ENTERED: / / DATE DEPARTED: / /

DISCHARGE STATUS: -

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 1

If you selected **YES** as the answer to AGE LESS THAN A YEAR ? PAT, the cursor now appears in the AGE LESS THAN A MONTH ? PATI field. The system will allow you to type in the AGE LESS THAN A MONTH ? PATI response. Press **[F9]** to display the list of AGE LESS THAN A MONTH ? PATI responses. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press **[ENTER]**. The selection is placed in the AGE LESS THAN A MONTH ? PATI field.

If the response to this field is **YES**, the cursor jumps to the AGE IN DAYS field. If the response to this field is **NO** response, the cursor jumps to the AGE IN MONTHS (1-11) AGEM field. Type in the age, in months, then press **[ENTER]**.

HOSPITAL BASED REPORTING SYSTEM

DATE AND STATUS FIELDS:

```

                REPUBLIC OF *****
                MINISTER OF PUBLIC HEALTH
                DEPARTMENT OF HEALTH CARE
                UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

                INPATIENT(HOSPITALIZATIONS): Individual Information

                HOSPITAL: CLINIC RAGASORE          SECTOR: BUJA-URBAIN

                PROVINCE: BUJUBUJUBUJU          SERVICE: 4          ICDCODE: 2.00

                ILLNESS: TYPHOID FEVER

                AGE UNKNOWN ? PATIE: N
                AGE LESS THAN 1 YEAR ? PAT: Y
                AGE LESS THAN 1 MONTH ? PATI: -  AGE
                                                AGE I 5
                                                AGE IN 9

                Legal values
                1 DISCHARGED HEALTHY
                2 TRANSFERRED
                3 DEMANDED TO LEAVE
                4 DIED
                5 ESCAPED
                9 UNKNOWN

                DATE ENTERED: 01/01/92          DATE DEPARTED: 01/01/93

                DISCHARGE STATUS: -

                <Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
                F10-Done Rec= 1

```

The cursor appears in the DATE ENTERED field. This date is in the format (MM/DD/YY). Type in the date, then press **[ENTER]**.

The cursor appears in the DATE DEPARTED field. This date is in the format (MM/DD/YY). Type in the date, then press **[ENTER]**.

The system will check to make sure that the DATE DEPARTED field does not occur prior to the DATE ENTERED field.

The cursor next appears in the DISCHARGE STATUS field. The system will allow you to type in the DISCHARGE STATUS code. Press **[F9]** to display the list of DISCHARGE STATUS codes. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press **[ENTER]**. The selection is placed in the DISCHARGE STATUS field.

HOSPITAL BASED REPORTING SYSTEM

SAVING THE COMPLETED RECORD

```

                REPUBLIC OF *****
                MINISTER OF PUBLIC HEALTH
                DEPARTMENT OF HEALTH CARE
                UNDER DIRECTION OF EPIDEMIOLOGY AND STATISTICS

                INPATIENT(HOSPITALIZATIONS): Individual Information

                HOSPITAL: CLINIC RAGASORE          SECTOR: BUJA-URBAIN

                PROVINCE: BUJUBUJUBUJU          SERVICE: 4    ICDCODE: 2.00

                ILLNESS: TYPHOID FEVER          SEX: 1

                AGE UNKNOWN ? PATIE: N
                AGE LESS THAN 1 YEAR ? PAT: Y
                AGE LESS THAN 1 MONTH ? PATI: N  AGE IN DAYS (1-31) AGEJ:    
                AGE IN MONTHS (1-11) AGEM: 10
                AGE IN YEARS (1-99) AGEA:    

                DATE ENTERED: 01/01/92          DATE DEPARTED: 01/01/93

                DISCHARGE STATUS: 2

                Write Data to disk (Y/N)?
                <Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
                F10-Done Rec= 1

```

After completing a record, a message appears in the bottom left corner of the screen and asks you:

Write data to disk (Y/N)?

If you want to save this record, type **Y**. If you need to make additions or corrections to this record, type **N**, the system will allow you to edit this record.

After you have saved this record, and if you have completed data entry, press **[F10]** to return to the Main Menu.

APPENDIX II

100

REFERENCE MANUAL FOR DATA ENTRY

FOR

**HEALTH CENTER-BASED MORBIDITY
REPORTING SYSTEM**

101

HEALTH CENTER-BASED REPORTING SYSTEM

MAIN MENU

```

                REPUBLIC OF *****
                MINISTER OF PUBLIC HEALTH
                MONTHLY HEALTH CENTER VISITS REPORT

1E.  ENTER MONTHLY MORBIDITY      12E.  BACKUP DATA FILE
      INFORMATION FOR EACH        ON DRIVE B:
      HEALTH CENTER              13E.  RESTORE DATA FROM
                                  DRIVE B: TO C:
                                  14E.  RETURN TO DOS C: PROMPT

16E.  SELECT 16E BEFORE OTHER OPTIONS LISTED BELOW
      (16E CREATES A DATA FILE WITH AGE GROUPS.

17E.  TOTAL VISITS MALE+FEMALE, DISEASE BY AGE GROUP

18E.  ALL FEMALES DISEASE BY AGE GROUP FOR *****

19E.  ALL MALES DISEASE BY AGE GROUP FOR *****

6E.  TOTAL M+F BY DISEASE BY MONTH

7E.  TOTAL M+F BY PROVINCE BY AGE GROUP

8E.  TOTAL M+F BY SECTORS BY MONTH

C:\EPI5\BEXTER>
```

At the **C:\epi5\bexter>** prompt, type the number for the selection of your choice. If you want to enter a record, type **1E**, then press **[ENTER]**.

HEALTH CENTER-BASED REPORTING SYSTEM

DATA ENTRY SCREEN

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
MONTHLY HEALTH CENTER VISITS

HEALTH CENTER: PROVINCE:

MONTH: YEAR:

CODE: ILLNESS:

	0-4 YRS	5-14 YRS	15 + YRS	TOTALS
SEX MALE: M1:	<input type="text"/>	M2: <input type="text"/>	M3: <input type="text"/>	TM: <input type="text"/>
SEX FEMALE: F1:	<input type="text"/>	F2: <input type="text"/>	F3: <input type="text"/>	TF: <input type="text"/>
TOTAL GRPE: MF1:	<input type="text"/>	MF2: <input type="text"/>	MF3: <input type="text"/>	TMF: <input type="text"/>

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 14

The data entry screen is displayed and the cursor appears in the CENTER response field. The system allows you to either type in the name of the CENTER, or to press [F9] for a pick list of center names and provinces from which to select.

HEALTH CENTER-BASED REPORTING SYSTEM

CENTER and PROVINCE (PICKLIST)

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
MONTHLY HEALTH CENTER VISITS REPORT

HEALTH CENTER: BUHIGA PROVINCE: KARUZI

MO BUBANZA BUBANZA
BUHIGA KARUZI
BUJA-RURAL BUJUBUBJB
BUJA-URBAIN BUJUBUJUB
0- BURURI BURURI
BUTEZI RUYIGI
SEX MALE: M1: CANKUZO CANKUZO
CIBITOKÉ CIBITOKÉ
SEX FEMALE: F1: GITEGA GITEGA

^Y for more

TOTAL GRP:MF1: 0 MF2: 0 MF3: 0 TMF: 0

CENTER: Valid values: BUBANZA, BUHIGA, BUJA-RURAL,
BUJA-URBAIN, BURURI, BUTEZI,
<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 14

After moving the highlight bar to the selection of your choice by using the up and down arrow keys, then press [ENTER]. The selection is placed in the CENTER field and the coordinating province is automatically placed in the PROVINCE field. For subsequent records, these fields are automatically inserted until another secteur or province is selected by pressing [F9].

104

HEALTH CENTER-BASED REPORTING SYSTEM

MONTH and YEAR

REPUBLIC OF *****				
MINISTER OF PUBLIC HEALTH				
MONTHLY HEALTH CENTER VISITS REPORT				
HEALTH CENTER: <u>BUHIGA</u>			PROVINCE: <u>KARUZI</u>	
MONTH: <u>12</u>		YEAR: <u>1992</u>		
CODE: _____	ILLNESS: _____			
	0-4 YRS	5-14 YRS	15 + YRS	TOTALS
SEX MALE: M1: _____	M2: _____	M3: _____	TM: _____	0
SEX FEMALE: F1: _____	F2: _____	F3: _____	TF: _____	0
TOTAL GRP: MF1: _____	MF2: _____	MF3: _____	TMF: _____	0
MONTH: Values are 1 - 12				
<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices				
F10-Done Rec= 14				

The cursor appears in the MONTH field. Enter the number of the month for which you are entering data. This number must be between 1 and 12. If the number you entered is less than 10, press [ENTER] to move to the YEAR field. If the number you have entered is 10 or more, the cursor automatically moves to the YEAR field.

The cursor appears in the YEAR field. Enter the last two digits of the year for which you are entering data. This number must be greater than 90. You do not need to press [ENTER] after completing this field.

HEALTH CENTER-BASED REPORTING SYSTEM

CODE and ILLNESS (PICKLIST)

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
MONTHLY HEALTH CENTER VISITS REPORT

HEALTH CENTER: BUHIGA PROVINCE: KARUZI

MONTH: 12 YEAR: 1992

CODE: _____ ILLNESS: _____

Pick a code

		TOTALS
	101 CHOLERA	
	102 TYPHOID FEVER	
SEX M	103 BACILLARY DYSENTERY	TM: _____ 0
	104 AMIBIASIS	
SEX F	105 DIARRHEEA CHRONIC	TF: _____ 0
	107 PULMONARY TUBERCULOIS	
TOT G	108 PLAGUE	TMF: _____ 0
	109 VIRAL ENCEPHALITIS	
	110 ANTHRAX	

^Y for more

ILLNESS: Valid values: CHOLERA, TYPHOID FEVER, DYSENTERY, BACILLAIR, AMIBIASIS
<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 14

The cursor appears in the CODE response field. The system allows you to either type in the disease code, or to press [F9] to display the list of disease codes. Move the highlight bar to the selection of your choice by using the up and down arrow keys, then press [ENTER]. The selection is placed in the CODE field, and the corresponding description is automatically placed in the ILLNESS field.

HEALTH CENTER-BASED REPORTING SYSTEM

SEX/AGE (TABLE)

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
MONTHLY HEALTH CENTER VISITS REPORT

HEALTH CENTER: BUHIGA PROVINCE: KARUZI

MONTH: 12 YEAR: 1992

CODE: 101 ILLNESS: CHOLERA

	0-4 YRS	5-14 YRS	15 + YRS	TOTALS
SEX MALE: M1: <input type="text"/>	M2: <u>0</u>	M3: <u>0</u>	TM: <u>0</u>	
SEX FEMALE: F1: <u>0</u>	F2: <u>0</u>	F3: <u>0</u>	TF: <u>0</u>	
TOTAL GRP: MF1: <u>0</u>	MF2: <u>0</u>	MF3: <u>0</u>	TMF: <u>0</u>	

<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 14

The cursor appears in the M1 field. For each age group listed along the top of this table, type in the number of male cases, then the number of female cases of the disease you identified in the ILLNESS field, during the reporting period you identified in the MONTH and YEAR fields. As you complete each cell of the table, the cursor automatically moves to the next field. The system automatically sums the rows and columns of this table as you enter the data.

HEALTH CENTER-BASED REPORTING SYSTEM

SAVING THE RECORD

REPUBLIC OF *****
MINISTER OF PUBLIC HEALTH
MONTHLY HEALTH CENTER VISITS REPORT

HEALTH CENTER: BUHIGA PROVINCE: KARUZI

MONTH: 12 YEAR: 1992

CODE: 101 ILLNESS: CHOLERA

	0-4 YRS	5-14 YRS	15 + YRS	TOTALS
SEX MALE: M1:	<u>4</u>	M2: <u>5</u>	M3: <u>10</u>	TM: <u>19</u>
SEX FEMALE: F1:	<u>3</u>	F2: <u>2</u>	F3: <u>6</u>	TF: <u>11</u>
TOTAL GRP: MF1:	<u>7</u>	MF2: <u>7</u>	MF3: <u>16</u>	TMF: <u>30</u>

Write data to disk <Y/N>?
<Ctrl-N>-New <Ctrl-F>-Find F5-Print F6-Delete F9-Choices
F10-Done Rec= 14

When you have finished entering this record, a message appears in the bottom left corner of the screen:

Write data to disk (Y/N)?

If you want to save this record, type **Y**. If you need to make additions or corrections to this record, type **N**, the system allows you to edit this record.

After you have saved this record, if you have finished entering records, press **[F10]** to return to the Main Menu.