

ANTHRO

Software for Calculating Anthropometry

Version 1.02, Y2K Compliant

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For the

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National Center for Chronic Disease Prevention and Health Promotion
Centers for Disease Control and Prevention
USA**

and the

**Department of Nutrition for Health and Development
World Health Organization
Geneva, Switzerland**



CDC
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What is ANTHRO?

The ANTHRO software package was developed for calculating the WHO/CDC anthropometric indices with dBase files on IBM-compatible microcomputers. The indices can be calculated in a batch processing or calculator mode. ANTHRO also has the ability to perform some standard data analyses. Data can be imported from or exported from or to either fixed-column or comma-delimited files.

ANTHRO Software and Hardware Requirements

ANTHRO is written in dBASE III Plus and compiled using Clipper (Summer '87 version). The compiled program file is a "stand alone" executable file. Thus, to use ANTHRO, you do not need to have dBASE or Clipper. You do need PC/MS-DOS Version 2.1 or greater or Windows 3.x/95/98/NT/2000. For those not running Windows, you need to assure that there is a CONFIG.SYS file containing certain information. See the "Before You Start" section for details concerning the CONFIG.SYS file. ANTHRO operates on IBM compatible microcomputers with at least 640K of Random Access Memory (RAM).

ANTHRO Files

The files ANTHRO needs to run correctly, which can fit on a single 3.5 inch disk, are below:

- * ANTHRO.EXE DOS executable program
- * ANTHTEMP.TDB File for storing user-specific information
- * ANTHCALC.TDB File for storing user-specific information
- * NUT.DBF Example dBase file
- * SETUP.TDB File for storing user-specific information
- * SNIPPER.COM File for printing screens in DOS

A General Reminder on Backing Up Files

The concept of backup files is not specific to ANTHRO. It is important to back up working files on a regular basis. The method used to back up files depends on the specific hardware and software configuration that you are using (such as tape backup, floppy disk backup, etc.). Because of the large number of hardware and software configurations available for backing up information, we cannot provide a complete discussion here. Consult your DOS or Windows documentation regarding how to backup and restore files.

Getting Started

Backing up ANTHRO disk

We recommend you make a backup of the ANTHRO disk in case you lose or damage the original disk. You will need to have a blank or formatted high-density floppy disk. For the instructions below we assume that you will back up the ANTHRO disk from drive A.

In DOS:

1. Put the ANTHRO disk in drive A and type the following:

```
diskcopy a:*. * a: <ENTER>
```

2. You will be instructed to insert the "source" disk (which in this case is the original ANTHRO disk) in Drive A and to press the enter to continue:

```
<ENTER>
```

3. After a minute or so, you will be instructed to remove the original disk and insert the "target" disk (that is, the blank or formatted disk) into the drive and to press the enter key.

```
<ENTER>
```

4. Label the backup disk. Store the original ANTHRO disk in a safe place.

In Windows:

You could use Windows Explorer to copy the files.

Before you start ANTHRO (DOS-users only)

For those not using Windows, to use ANTHRO you will need to make sure that you have a file called CONFIG.SYS in the root directory of the hard disk, or, if you turn on the computer with a floppy disk in drive A, on the "boot" disk. The contents of this file **must** contain the following statements:

```
FILES=20  
BUFFERS=8
```

If you already have a CONFIG.SYS file, those statements should be added to the file if they are not already present. The number of files and buffers listed above (20 and 8, respectively) are a **minimum** number. For your particular computer system configuration, you may specify more files or buffers, but not fewer. If you already have a CONFIG.SYS file that does not have the appropriate FILES and BUFFERS statement, edit the CONFIG.SYS file and make the appropriate changes. Please consult your DOS manual for further information concerning CONFIG.SYS files and how to edit them.

How can you tell if you have a CONFIG.SYS file? Turn on your computer, and make sure you are in the root directory (assuming you have a hard disk) by entering:

```
CD/ <ENTER>
```

Next, type:

```
DIR CONFIG.SYS
```

If you have a CONFIG.SYS file, you will be shown the size (in kilobytes) and date of the file. To see the contents of the CONFIG.SYS file, type:

```
TYPE CONFIG.SYS <ENTER>
```

If you do not have a CONFIG.SYS file, a message will be displayed on the screen saying "File not found." You will need to create one and place the two commands listed previously above in the file. Consult your DOS manual for further details.

Copying ANTHRO to a hard disk

In DOS or from within a DOS window in Windows:

Follow these steps to copy ANTHRO onto a hard disk. For this example, we are assuming the floppy disk drive is drive A: and the hard disk drive is drive C:.

1. Use the DOS MD command to make a directory for ANTHRO as follows:

```
md\ANTHRO <ENTER>
```

2. Now move to the ANTHRO directory by typing:

```
cd\ANTHRO <ENTER>
```

3. Place the ANTHRO disk in drive A. To copy the files from the floppy to the hard disk, type:

```
COPY A:*. * c:\ANTHRO <ENTER>
```

To return to the root directory from the ANTHRO directory, type:

```
cd\ <ENTER>
```

For Windows users:

You could use the Windows Explorer program to create a new folder on Drive C: called "ANTHRO" and then copy all of the files from the floppy disk to the folder.

Starting ANTHRO from a hard disk

In DOS or from within a DOS window in Windows:

After you have installed the ANTHRO programs onto your hard disk, to start ANTHRO, after you have turned on the computer, type:

```
cd\ANTHRO <ENTER>
```

This will move you to the ANTHRO subdirectory. To start ANTHRO, enter "ANTHRO" at the DOS prompt.

From Windows 95/98/NT/2000:

From Windows Explorer, you can open the ANTHRO folder and then click on ANTHRO.EXE.

How To Use This Handbook

To become proficient in the use of ANTHRO, we recommend that you follow the examples in this documentation. Step-by-step examples are provided for each of the ANTHRO modules so that you can follow along on a computer. Some users will need to use only certain ANTHRO modules.

<p>Also, to exit a module, at most requests for input, entering a '^' (by pressing the shift and the number 6 key located above the regular keys) will return you to the previous menu.</p>
--

Notation

The following notation will be used in this handbook:

<**drive**>: refers to the disk drive where a program or data file can be found. For those with a hard disk, this will usually be:

C :

For those using ANTHRO with floppy disks, this may be:

A : or B :

depending on where the program or data files are located.

<**any key**> means to press any key

<**backspace**> refers to the backspace key

<**Esc**> refers to the Escape key

<**Prt Scr**> refers to the Print Screen key

<**ENTER**> refers to the Return or Enter key. This means to press this key once.

DOS is the abbreviation for Disk Operating System

[] When you see brackets in the handbook, you should type the contents within the bracket. For example, if the handbook says to press [E], you should press only the E key and not the brackets.

For the anthropometric indices, we will use the following abbreviations:

Indices	Z-scores	Percentiles	Percent of Median
Weight-for-Height (W/H)	WHZ	WHP	WHM
Height-for-Age (H/A)	HAZ	HAP	HAM
Weight-for-Age (W/A)	WAZ	WAP	WAM

The terms standard deviation score (SD) and Z-score will be used interchangeably, as will centile and percentile.

Outputting ANTHRO Results

In DOS:

If you have a printer attached to your computer, you can press the <Prt Scr> key to print the screen information. A utility included with ANTHRO allows you to copy screen information to either a printer or disk file. The program, called SNIPPER, is a memory resident program that takes up about 4K of RAM. To use this program, before getting into ANTHRO, move to the ANTHRO subdirectory and enter:

SNIPPER <ENTER>

A message will appear at the top of the screen, which will look like this:

```
SNIPPER 1.2 (c) 1987 Ziff Communications Co.
PC Magazine _ Tom Kihlken
Hotkey is ALT-0
```

This utility will be especially useful in the Standard Analysis module. To use SNIPPER, when you get to a screen that you want to print or save to a file, simultaneously press the <ALT> and 0 (zero) keys. A nonblinking block cursor will appear at the top of the screen. You need to identify the part of the screen to print/save. Use the cursors to move the block to where you would like to begin and press the <ENTER> key. Use the cursor keys to reverse video the area of the screen of interest. Once you are finished, press the <ENTER> key again. A menu will appear in the upper left corner of the screen. The primary options are to send the identified area on the screen to the printer or a file. If you want to send it to a file, you will be requested to provide a file name (the default name is SCREEN.CUT).

In Windows:

To print a screen in ANTHRO from within Windows, it is recommended that you first copy the screen to a Window's program, such as Word or WordPerfect, and then print from that program. To do this, first make sure you have ANTHRO in Window's full screen mode (toggle between the window and full screen mode by pressing <Ctrl><Enter>). Then, press <Shift><PrtScr> to copy the screen. Open the Window's program you will print from, and select Edit -> Paste in that program. The ANTHRO screen image should be pasted into the Windows program. Then print from that program.

Limitations of CDC/WHO Reference

The WHO/CDC International Growth Reference is for the calculation of weight-for-height (W/H), height-for-age (H/A) and weight-for-age (W/A). H/A and W/A indices can be calculated for individuals up to 18 years of age. W/H indices are calculated for male children through 138 months of age and less than 145 cm, and female children through 120 months of age and less than 137 cm. For children less than two years of age, recumbent length measurements are assumed. For children two years of age and older a standing height is assumed. W/H will not be calculated for children less than 49 cm (but the program will calculate H/A).

Setup

One of the first things you will probably want to do is customize ANTHRO for your particular use. There are a number of settings that you can modify. These settings can be found in the SETUP module. To get to the SETUP menu, start ANTHRO and at the main menu select option [13] ("Setup"). The Setup menu will appear. Each of the Setup menu items are discussed below.

Global Configuration: These are settings that affect two or more modules within ANTHRO.

1. *Language.* You can select ANTHRO to run in English (option 1), French (option 2), or Spanish (option 3). After making your selection you will be returned to the Setup menu.
2. *Date Format.* The user can select one of five different date formats: American (mm/dd/yyyy), ANSI (yyyy.mm.dd), British (dd/mm/yyyy), Italian (dd-mm-yyyy), and German (dd.mm.yyyy), which are options 1-5, respectively. Select the date option that best meets your needs. The date format selected will be used in certain screens where the current date is shown, and also in the Anthropometric Calculator, Browse, and Edit modules.
3. *Screen Colors.* You can select one of several different screen colors. The different screen color options are shown by background color and the foreground colors in low intensity and high intensity. For those using monochrome screens, color option '1' would probably be the most suitable.
4. *Path.* You can select the path for ANTHRO to search for dBase files (i.e., files with the .DBF extension). For instance, if you set the path to drive 'A:', when calling up a dBase file, ANTHRO will search the drive/path where ANTHRO is located and also the additional drive/path you have entered in the Setup menu. Please note that in the modules where a listing of the dBase files is provided, only the dBase files on the same drive/path as ANTHRO are shown.
5. *Edit flag criteria.* ANTHRO has an edit flag mechanism to identify records where the data are either incorrect, incomplete, or have extremely low or high weights, heights, or both. Selecting option [5] from the Setup menu will bring up a screen depicting the edit flag criteria. You can select the upper and lower Z-score limits for H/A (HAZ), W/H (WHZ), and W/A

(WAZ). In addition, there are three other flag criteria that are described in more detail in subsequent sections.

The default settings for flagging records based on extreme Z-score values are -6 and +6 for HAZ and WAZ, and -4 and +6 for WHZ. For instance, if a child's record has a WHZ of -6.2, this would be outside the minimum Z-score value for WHZ and the record would be flagged. The flag indicates that the data are either incorrect or, in this example, the child may be extremely "wasted" or "thin."

In most situations you should not need to change the default Z-score limits, although in some extreme situations you may want to select some other limits.

The other three optional flags (all relating to Z-scores) are

HAZ and WAZ > 3.09
 or
 HAZ and WAZ < -3.09

If age is entered incorrectly (e.g. 1 month of age rather than 10 months of age), this error would result in both HAZ and WAZ having moderately to extreme Z-scores in the same direction. The default setting for this flag is [N]o, i.e., records will not be flagged if they meet these criteria.

WHZ and WAZ > 3.09
 or
 WHZ and WAZ < -3.09

If weight is entered incorrectly (e.g., 3.4 kgs entered rather than 4.3 kgs), both WHZ and WAZ could have moderate to extreme Z-scores in the same direction. The default setting for this flag is [N]o.

HAZ >3.09 and WHZ <-3.09
 or
 HAZ <-3.09 and WHZ >3.09

Finally, if height is entered incorrectly, this would effect the HAZ and WHZ measures. For example, if height was entered as 66 cms rather than 56 cms, this error would make HAZ higher and WHZ lower than they should actually be. The default setting is [Y]es, i.e., and records meeting the just stated criterion will be flagged.

The default settings mentioned above are the same as those in the software packages Epi Info Versions 5 and 6 (Dean et al., 1995), and CASP (CDC Anthropometric Software Package). In a more recent publication (Report of a WHO Expert Committee, 1995), two recommendations on exclusion criteria, based on Z-scores, were provided. One, called the *flexible exclusion range*, is where the mean Z-score is first calculated for a population, and then the extremes are ± 4 SD units from the mean. Another criteria called the *fixed exclusion range* was considered suitable when the observed mean Z-score is above -1.5: HAZ < -5 and > +3; WHZ < -4 and >+5; and WAZ <-5 and >+5.

Edit flags are determined in the processing of dBase files and in using the Anthropometric Calculator. They also are used in the Standard Analysis section where flagged records are

excluded from analyses. For more information on edit flags, please see the Description of Edit Flags section on page 28.

Batch Configuration: There are three Setup options that are specific to the dBase file batch/processing modules.

6. *Skip U.S. Measurements:* When processing a dBase file to have the anthropometric calculations performed, you are requested to provide the dBase field numbers for weight and height information. Weight can be provided in metric units (kilograms), U.S. units (pounds, quarter pounds, or ounces), or both. Height information can be provided in metric units (centimeters), U.S. units (feet, inches, or 1/8th inches), or both. If you using exclusively metric measurements for weight and height, you can skip the U.S. measurements by having this option set to [Y], i.e., to skip the requests for the field numbers of the U.S. measurements. This option is also briefly discussed in the Processing dBase files section.

7. *Fast Mode Processing:* In processing dBase files, you can choose two modes, fast or slow. If you select the slow process mode, as each record is processed, the record number, sex, age, weight (in kgs), height (in cms), anthropometry data, and edit flag (if any) are shown on the screen. In the fast mode, only the record number is displayed on the screen. In general, the fast mode processing is only about 5% faster than the slow mode.

8. *Decimal places implied:* Usually when using dBase files, numeric fields include the decimal place. However, occasionally the decimal place is not included, for example, if a child's weight is 3.1 kgs, it may have been entered as 31. If the data have been entered without the decimal place, you must tell ANTHRO this for the program to compute the anthropometry correctly. If age in months, weight in kilograms, or height in centimeters is in the database without decimal places, answer [Y]es to the question "Decimal places implied?". (To determine whether or not your data has decimal places, use the Browse feature in ANTHRO (described on page 16) to look at your data. If in the Browse feature the decimal place is in the field, then you do not need to worry about specifying the number of decimals. If there are no decimal places, then there is a need to specify decimal places.

When this question is set to [Y]es, when processing a file, you will be prompted for the necessary number of decimal places for age in months, weight in kilograms, and height in centimeters. (This version of ANTHRO does not allow for the input of decimal places for any other variables. If you have a need for this option with other variables, please notify either CDC or WHO.) For example, when you are prompted for the field number for weight in kilograms, the next prompt will be for the number of decimal places. The number of decimal places can be zero (which means not to imply any decimal places) to five decimal places (i.e., 345321 would be interpreted as 3.45321).

Anthropometric Calculator Configuration: This section refers to setup options that are specific to the Anthropometric Calculator module. This module is where age, sex, weight, and height values are entered and the anthropometric indices are presented in an interactive manner. The Anthropometric Calculator module is discussed in detail on page 16. In general, you can customize the Calculator module for your own particular application. You can select the use of dates, age in years, age in months, and the units of weight and height. For each option, [Y]es means to present the option to the screen, and [N]o means to not request the information on the screen.

9. *Date of Birth and Visit?* Dates can be entered, and the age will be calculated.

10. *Age in years?* By default, age in years is presented as missing (999.99).
11. *Age in months?* By default, presented as missing (999.99). When both age in years and months are presented, values in these fields are added together to determine age, e.g., one year and six months would be converted to 18 months.
12. *Weight in kilograms?*
13. *Weight in pounds?*
14. *Weight in ounces?* Only displayed if weight in pounds is present. Pounds and ounces are added together to determine weight.
15. *Weight in quarter pounds?* Only displayed if pounds is present. Pounds and quarter pounds are added together. Please note that you have the option of either ounces or quarter pounds, but not both.
16. *Height in centimeters?*
17. *Height in feet?*
18. *Height in inches?*
19. *Height in eighth inches?* Only presented if height in inches is present.

The U.S. height measurements are added together to determine height.

If two dates and age in either year, months, or both are present, the calculated age from the two dates is used. If weight in metric and U.S. is present, the metric measurements will be used. Similarly, if height is present in metric and U.S., the metric will be used.

99. *Exit.* Returns you to the Main Menu.

Main Menu

This section describes each of the options on the main menu and provides an example in several of the options.

Process dBase File

Options 1, 2, and 3 from the Main Menu are for batch processing of dBase files. In general, you have a dBase file that includes information on sex, age (or birth date and date of measurements), weight, and height for a number of children, and you want to have the anthropometric indices (H/A, W/H, and W/A) calculated. Age, weight, and height measurements must be in numeric fields, dates in date fields, and sex in either a numeric or character field. If you do not have a dBase file, you will need to import the file and create a dBase file before you can process it (see the Import section on page 24 for more information).

1. Process dBase file

In this section a step-by-step example is followed by a more detailed discussion of processing dBase files.

Example of Process new file

This example assumes that the "Skip U.S. measurements" from the Setup menu is set to [Y]es. Select option 1 from the Main Menu ("Process new file").

1 <ENTER>

We will use the example database provided with ANTHRO called NUT. When the prompt says "Enter dBase file name ..." enter:

NUT <ENTER>

There are six fields in NUT: SEX, HT_CM, WT_KG, DBIRTH, DSURVEY, and AREA. Also notice the number in front of each field. This is the field number. The letter after the field name is the type of field (N=Numeric, C=Character, or D=Date). You are first requested to enter the field number for the Date of Birth, which is field number 4, DBIRTH. Enter:

4 <ENTER>

For date of visit/measurement:

5 <ENTER>

There are no fields for age in years or age in months, so enter a zero (which means the database does not have these fields, the default setting) by pressing the enter key once for age in years then once again for age in months:

<ENTER>
<ENTER>

Next the field number for sex is requested, which is field number 1:

1 <ENTER>

Sex is a character field and is coded as M=male and F=female, so at the next prompt enter:

C <ENTER>

For weight in kilograms:

3 <ENTER>

and height in centimeters:

2 <ENTER>

Next the Field Descriptions, Field Names, and sex coding scheme selected are presented. If you made a mistake entering the field numbers, when asked if the information is correct, say [N]o by entering:

N <ENTER>

You are then able to make the appropriate changes. If the information is correct, the default answer is [Y]es, so just press the enter key:

<ENTER>

The next screen displays the anthropometry-related fields by whether or not they are (or should be) included in the database and by their default names. For this example, we will want to change one of the default settings. Therefore enter:

N <ENTER>

The fields in screen will become reverse video (dark letters on a lighter colored background). Press the <ENTER> key several times to move the cursor to where AGE_COMP is located (at the bottom of the list). Where it says [N] (do you want to include this in the database) we want to change this to a [Y]:

Y <ENTER>

Then press the <ENTER> key one more time. and you will again be prompted as to whether the information is correct. The default answer is [Y]es, so press the <ENTER> key:

<ENTER>

ANTHRO will check the dBase file NUT to see if it already contains the anthropometry-related fields. Because in this example it does not, these field names will be presented to the screen with a message stating that they are not in the database. You are then asked if you would like to

create a new database that contains all the information from NUT plus the added fields. The default answer is [Y]es, so press the Enter key:

<ENTER>

Enter the new dBase file name, which we will call NUT1:

NUT1 <ENTER>

A new database is created with all of the original information from NUT plus the added fields for the anthropometry calculations. The anthropometry calculations are then performed. When all of the 100 records from the database are processed, you will be asked whether you want to save the template. (Templates are described in the next two sections on page 14.) For this example enter the default selection of [N]o:

<ENTER>

You should now be back at the Main Menu.

More Detailed Discussion of Processing New Files

Getting dBase file name. First you will be requested to enter name of the dBase file that you want to process. A listing of the dBase files located in the same directory as ANTHRO is provided, and you select the dBase file. You can also include a drive or path name if the dBase file is located elsewhere.

Getting field numbers. After the dBase file is identified, the fields from that database are presented on the screen. In the upper left-hand corner of the screen is the dBase file name. For each field, the field number, field name, and field type (N=numeric, C=character, and D=date) are presented. If there are more than 80 fields in the dBase file, the first screen will show the first 80 fields, and a second screen will show the rest of the fields. You will be requested to input the field numbers to identify the fields that contain information on date of birth, age, etc. To see the field numbers for field numbers 80 or greater, you enter an 'N' to see the Next screen of fields.

First you are requested to enter the field number for Date of Birth (DOB). If you have DOB in the dBase file, enter the field number; if not, enter a zero (the default value). (Any time you wish to exit the Process New File, enter a [^].) The field that contains DOB information must be a date field.

Next, the field number for Date of Visit (DOV) is requested. Again, if there is a field for DOV in the dBase file, enter the field number, otherwise enter a zero. The field numbers for DOB and DOV cannot be the same, and the field that contains the DOV information must be a date field.

Other information requested is age in years, age in months, sex, weight, and height. If DOB and DOV are in the database as well as age in years and months, the calculated age from the dates is used for the anthropometric calculations. If one or both of the date fields are empty, the age in years, months, or both, is used. If both age in years and months are in the database, they are added together to determine a child's age. Note that the fields for age, weight, and height must be numeric fields.

If in the Setup Menu you answered yes to option 8 ("Decimal places implied?") and you have identified a field in the database as containing age in months, the next prompt will ask for the number of decimal places. If the age in months field already includes a decimal place or no decimal place is needed, enter a 0 (zero). If a decimal place is implied, enter the number of decimal places (from 1 to 5). For example, an age in months of 101 with one decimal place will be interpreted as 10.1 months. If you are unsure as to whether a decimal place is needed, you can view the dBase file using the Browse feature in ANTHRO (the Browse feature is described on page 23).

There must be a field that contains information on the sex of the child. This field can be either numeric or character. If numeric, sex must be coded a 1=males and 2=females. If a character field, you will be requested to enter the coding scheme for sex: [N]umeric if sex is coded as 1=males and 2=females, or [C]haracter if sex is coded as M or m for males and F or f for females. If you are unsure of the coding scheme for sex, use the Browse feature (see page 23) to view the database to determine the coding scheme.

If the option for skipping U.S. measurements is in the Setup menu is [Y]es, you will be asked for the field number that contains the information on weight in kilograms and then the field number for height in centimeters. If option 8 from the Setup Menu (*Decimal places implied?*) is set to [N]o, the program assumes that if there is a fraction of a kilogram, centimeter, age in years, or age in months, there will be a decimal place in the field. However, if option 8 is set to [Y]es, after you identify the field number for weight in kilograms, the next prompt will ask for the number of decimal places. Enter a [0] (zero) if the decimal place is included or if no decimal place is needed. If a decimal place is implied, enter a 1 to 5 for the number of decimal places. For example, a child's weight in the database is listed as 31 and you inform the program that one decimal place is implied, ANTHRO will interpret the weight as 3.1 kgs. If you are unsure of whether or not a decimal place is included, use the Browse feature. The height in centimeters, age in years, and age in months decimal placement works the same as weight in kilograms.

If the option to skip U.S. measurements is [N]o, you will also be prompted for the field number for pounds. If you provide the field number for pounds, next you will be prompted for the field numbers for quarter pounds and ounces. You will also be prompted for the field numbers for height in feet, height in inches, and if a field number for height in inches is provided, height in eighth inches.

If both metric and U.S. data are present, the metric data will be used for the anthropometric calculation. If the metric fields are empty or zero, then the U.S. measurements are used. With the U.S. measurements, the units are added together and converted to metric for the anthropometric calculations. For instance, height in feet, inches, and eighth inches are added together and then converted to metric. ANTHRO does not change any of the original values in the dBase file for the dates, age, sex, weight, or height fields.

If height information is not present, W/A indices will be calculated. If age is unknown, W/H indices are calculated, and if weight is unknown, H/A indices are calculated.

After all of the field number information is collected, you are presented with a screen that shows the Field Descriptions, Field Names, and the coding scheme for sex. You are asked whether this information is correct. If it is not, answer [N]o and you will be given the opportunity to change any of the field numbers. Otherwise, you will move to the next screen.

Added Fields and Names. Next you are given the opportunity to select which fields you want in the database and the names of these fields. Default field selections and names are provided. If these are all right, answer [Y]es and you will go to the next screen. If these defaults are not correct, answer [N]o and you can make the appropriate changes. If you want to change the field names, the field name must conform to the dBase field naming convention: the first character

must be a letter; the following characters can be either a letter, number, or an underscore [_]; blanks are not allowed within the name (but they may be at the end of the name).

The default added field names use the following naming convention: H/A, W/H, and W/A with a Z for Z-score, P for percentile, and M for percent of median. Other fields are FLAG for edit flags, BMI for body mass index (weight in kgs/height in meters squared), and AGE_COMP for computed age. We strongly recommend that you always keep the FLAG field because it identifies anthropometric indices that may be incorrect and also because the FLAG field must be in the database in order to use the Standard Analyses module in ANTHRO.

Check for Fields. On the basis of the fields selected from the previous section, the current dBase file is checked to see if the added anthropometric indice field names already exist in the file. If the field names already exist, the dBase file processing will begin. If the fields do not exist, the fields that are not in the dBase file are displayed on the screen, and you are given the opportunity to provide a name of a new dBase file that will contain all the information from the original dBase file plus the added anthropometry fields. The new dBase file name must be different from the original dBase file. You can specify a drive/path in the new file name. If the file name already exists, you can choose to overwrite the file or provide a new file name. In addition, there is a check to make sure enough free disk space exists for the new file.

File Processing. There are two file processing modes, fast and slow. These modes can be selected from the Setup menu, option [7]. If the slow mode processing is selected, the record number, age, sex, weight in kgs, height in cms, flag message (if any), and anthropometry data are shown for each record. If the fast mode processing is selected, only the record number is presented. The fast mode processing is about 5% faster than the slow mode.

Saving Template. After processing the file, you can save the information on the dBase file name, field numbers, etc. to a template. Use of the templates is discussed further in the next two sections. You are then returned to the main menu.

A Note about Edit Flags. One of the fields ANTHRO adds and uses is called FLAG (or whatever name you change this to). This field is used to identify anthropometry indices where there is a strong likelihood that some of the data are incorrect or missing data in the record. The limits for the flags are determined in the Setup menu. This FLAG field must be in the dBase file if you plan to use the Standard Analysis module of ANTHRO. For additional information on edit flags, please refer to pages 7 ("Setup" section) and 30.

2. Reprocess file

If you are routinely going to process a particular dBase file, you may want to save the file name, field numbers, and added field selections and names to a template. To do so, the first time you process the dBase file, follow the instructions for option 1 "Process new file" from the Main Menu. After all of the records have been processed, you are asked whether you would like to save the information to a template. Answer [Y]es. You are then asked to enter a name for the template. The next time you want to process the same dBase file, select option 2 "Reprocess file" from the Main Menu. You are then shown the names of the templates and a horizontal menu is at the bottom of the screen with the following options: *Select* (to select a template), *Delete* (delete a template), and *Main menu* (to return to the main menu). To reprocess a file, press the <ENTER> key to *Select* a template, then enter the template number. The screens will flash through the file name, field names, etc., and process the file. When you are done, there will be a message stating that the processing is complete and instructing you to press any key to return to the Main Menu.

A Note about the Template Options

The horizontal menu at the bottom of the Template screen has three choices: Select, Delete, and Main menu. To select a template, use the Select option. You are then prompted to select one of the templates; enter the template number you want to select. You can delete templates by selecting the Delete option. You then enter the number of the template you wish to delete. Up to 40 templates can be saved. To return to the main menu, select the Main menu option.

3. Edit template

Editing templates is a useful option for processing several dBase files that, for example, differ only by dBase file name but the field numbers for age, sex, etc., are the same. Select option 3 from the main menu. The available templates are displayed, and you have the option to select one of them. The only difference between Edit template and Reprocess template is that in Edit template you have the option to change the dBase file name, field numbers, etc.

Additional Notes and Hints on Processing dBase files

If from all of your dBase file processing, you want to save only certain anthropometry fields (e.g., WHZ, HAZ and FLAG), process the file using option 1 from the Main Menu ("Process new file"), determine which anthropometric fields you want to save and their names, then save these options as a template. Any time you wish to process a different dBase file (with different field numbers for age, sex, etc.), select option 3 from the Main Menu (Edit template), and change the field numbers accordingly. The anthropometric fields saved and their names will be the same as those specified in the template.

If within each record more than one weight and height measurement exists (i.e., longitudinal data), each weight and height measurement can be processed. For example, the child's DOB and sex will remain the same, but the DOV, weight, and height will differ for each visit. You can rename the anthropometric indices to reflect the different weight and height measurement visits. For example, the first visit would be the first date of visit to the clinic (e.g., field name DOV1) and the weight and height measurements (e.g., field names WT1 and HT1). Name the anthropometric index fields HAZ1, WHZ1, etc., and for the second visit (DOV2, WT2, HT2) name the anthropometric indices HAZ2, WHZ2, etc.

Standard Analysis

Introduction

Once you have a dBase file that contains anthropometric information, you can execute several standard procedures for analyzing and presenting the data. These follow recommendations that have been promoted by the WHO and several expert groups which allow for the description of population anthropometry status. In addition, these procedures allow for the identification of groups at "increased risk" by different demographic and socioeconomic parameters, including age, sex and other variables.

These standard analyses may be useful for trend assessments within a geographic area, as well as for comparing different populations. The various programs provide the ability to cross-tabulate data to present prevalences and distributions of the three anthropometric indices. In each of these, the user can use default settings or select certain variables and intervals for stratification, i.e. age, sex, geographic location, bottle- or breast-fed, etc.

These procedures can be executed with any dBase file. Data in fixed-column or comma-delimited format can be converted to a .DBF file (see the section on Import, page 24).

The different operations have been designed to send output (in tabular form) to the screen, but these can be printed (see Outputting ANTHRO information on page 5). The three Standard Analyses provided are prevalence of low anthropometry by age, Z-score distribution, and centile distribution. These procedures provide only an initial descriptive analysis of data. Another software package, Epi Info, can be utilized to perform more sophisticated analysis of data is listed on page 33.

4. Prevalence/Age

A widely used method of expressing anthropometric information is as prevalences of children who are considered "at risk" of growth faltering. Prevalences, or the proportion of a population falling below a designated cut-off point for the different indices, are useful for identifying groups at increased risk by comparing their prevalence with the prevalence for the international reference population or with the prevalence within other groups.

In ANTHRO, prevalences can be presented either by using centiles, standard deviations/Z-score, or percent-of-median values; different cut-off points can be used for each. For example, with SD scores, the cut-off point generally used is below -2 standard deviations from the NCHS reference median, or for percentiles, the third or fifth centile of the same reference.

To describe the process of calculating prevalences, we will go through the sample data file provided with the original program disk that was analyzed in an earlier section on processing dBase files, called NUT1.DBF.

Note

For purposes of simplifying the directions, we will assume that the file, NUT1.DBF is located on the hard disk C:, which is the active drive being used, with the various program files and .TDB files. However, if the file were to be on a separate drive, i.e., floppy disk, you would need to indicate the disk drive before the file name (for example A:NUT1 if it was on the A: drive, as well as the subdirectory if applicable). Here, as in all cases throughout the program, you NEED

NOT provide an extension with the file name, as it assumes that it is in a dBase format, and in turn has the extension, .DBF.

Steps

Get into the ANTHRO2 program as described in an earlier section (see the section on Starting ANTHRO from a Hard Disk, page 3) and press the <ENTER> key to invoke the Main Menu. Notice that on the Main Menu the three options (4,5, and 6) for Standard Analysis are located on the left. To initiate the process for Prevalence/Age, type:

4 <ENTER>

At the bottom of the screen notice that the program requests the name of the file with which you will be working. All of the databases in the active subdirectory, including the number of records, date of last update and the file size, are listed. As mentioned previously we will start by using the sample file, NUT1.DBF which should appear in this listing (along with NUT.DBF, the original file to which the anthropometric indices were added). At the bottom of the screen, type:

NUT1 <ENTER>

The screen will clear. The next parameter the program needs to know is the mode for which you will be presenting prevalence data, either centiles (C), SD scores (Z), or percent-of-median (P).

For this exercise, we will use SD scores, so type:

Z <ENTER>

You next have to provide the cut-off point for which the prevalences will be calculated. The prevalences are **below** the cut-off points, **not including the cut-off value itself**. Thus, for the cut-off -2 SD, prevalences are for values ≤ -2.01 SD, and do not include -2.00 SD.

These are the default settings and corresponding possible range of cutoff values for each of the modes:

Unit of Measure	Default	Range	Indices
SD/Z Score	-2	-6, +6	HAZ, WHZ, WAZ
Centiles	3 rd	0-100	HAP, WHP, WAP
Percent-of-Median	80	40-150	WAM
	90	40-150	HAM
	85	40-150	WHM

To select the default setting, press the <ENTER> key, or you can change the cut-off point by typing in a new value and pressing <ENTER>.

For this example, we will change the cut-off point to < -2.5 S.D., so type

-2.5 <ENTER>

The next screen will present the 17 fields that are in the database file and their corresponding (field) numbers, names, and types. Notice that beyond the first six fields which made up the original datafile (sex, ht, wt, dbirth, dsurvey, and area), are 11 other fields which have been added as a result of the processing. These include the nine anthropometric indices, a field for FLAG, and AGE_COMP which contains the ages **in months** that were computed from the birth and survey dates.

From these fields, you will be asked to identify the different variables to be used in the analysis, beginning with the edit flag and then the fields containing the anthropometric values. You should indicate the number for each corresponding field. If you used the default field names of the different variables and included them in the database, the program automatically searches for these names; when the default names are present, the field number will be already listed in the prompt.

The analysis will use indices that are not flagged to eliminate potential errors in the data set. This edit flag field is essential and needs to be included in the database. If the Edit Flag Parameters are changed in the Setup program, any file which was processed before the change was made will contain the previous edit flag limits, and these limits will be reflected in all analyses of that file.

At the bottom of the screen, you are asked to specify the field number for FLAG. If the name was not changed when adding it to the data file, as in this example, the corresponding field number 16 will appear; accept it by pressing the <ENTER> key.

<ENTER>

Next, depending upon whether you will be presenting SD scores, centiles, or percent-of-median values, the fields containing the anthropometric indices need to be identified. For SD scores, you need to identify the three fields for SD (i.e., Z-score) values; WHZ, HAZ, and WAZ. In a similar way, for centiles, only fields presenting centile information (HAP, WAP, and WHP) need to be identified.

Because for this example we have decided to use SD scores, the first field that needs to be identified is for the variable HAZ. You will notice that in the highlighted box at the bottom of the screen the number [7] will appear. Look to the list of fields above, and confirm that field number [7] is HAZ. Again, because the number is already there, you can simply press <ENTER>. If, on the other hand you had a different name you would have to enter the appropriate number and then <ENTER>.

<ENTER>

Following this, you need to repeat the process for WHZ, field number [13], which again will be identified by its field name and number. To confirm this:

<ENTER>

In a similar way, confirm WAZ, field number [10]:

<ENTER>

In this example, all three indices were available because they had been included in the data set, but this might not always be the case. The analysis will continue for any combination of indices, or for that matter, any single indice if other(s) are not in the data file or requested. For example, if height information is not available in the database, then the analysis of weight-for-age can be performed.

The program will next request you to identify the field that contains the age information. Distinct patterns of growth faltering occur at different ages, and the tabulation of age-specific data is important to identify groups (ages) that might be expressing different growth potential than others. In this program, age can be in units of days, months, or years, but **not** combination of these (e.g., age in whole years in one field, and the remaining months in another).

For the present example, the age-in-months was calculated from the birth and survey dates, and this information was stored in the field AGE_COMP, field number [17]. This field number should appear in the highlighted box at the bottom of the screen. Confirm this with

<ENTER>

Once a field that contains the age information is identified, the program needs to know in what units the age is expressed. The default setting for age is [M]onths. Because the field AGE_COMP contains calculated ages in months and meets the default criterion, confirm your choice of the default setting by pressing

<ENTER>

If, on the other hand, data for ages are in different units, you should specify the correct units (e.g., days or years).

Once the field containing ages has been identified, along with the type of units in which ages are presented, you are next requested to state whether the data are to be stratified by Sex. If so, the crosstabulations will be performed twice, one time for each sex, and appropriate tables are presented.

For this example, we will stratify by sex, so change the response to the question to:

Y <ENTER>

The list of fields will appear on the screen again, and you are asked to identify the field in which contains the information on Sex. Again, because we have a field with the default name **sex**, the program has placed the field number [1] in the box. Confirm this with:

<ENTER>

This is a character field which is coded with "M" for males and "F" for females, so we need to respond to the next question concerning the coding scheme for sex with:

C <ENTER>

After you have stated whether (or not) you would like to stratify by Sex, you indicate which age group categorization should be used for the prevalence tabulations.

The next screen shows three preset age categorizations, and there is a fourth option that allows you to specify your own age categories.

Note that two conventions dealing with age that are utilized throughout of the analytical procedures. First, **ages are always expressed in months**. Second, for age ranges, the minimum value is **inclusive**, in that it includes the expressed value, whereas the maximum value is **exclusive**. For example, the age interval 0 - 12 months will include all children whose ages are between 0.00 months and 11.99 MONTHS, but will not include children with ages of 12.00.

One of three different age groupings can be selected. Presenting the results by age may highlight growth patterns, especially for younger children who are especially vulnerable to a number of conditions that may affect growth. For each age categorizations, summary information for all ages are presented at the bottom of the table.

To select one of the preset age categorizations, you need only fill the corresponding number in the box at the top of the screen and press <ENTER>. In addition, if the preset age groupings do not meet your needs, you can choose your own intervals, which is discussed in further detail in the next section.

User-Specified Age Groups:

To demonstrate how this option functions, select [D] in response to the question "For which age group would you like to present prevalences?"

D <ENTER>

1. You will be asked to indicate the number of age categories you would like to create. The smallest number of categories is 1 and the largest number the program will allow is 10 different age categories.

For the present exercise, we will define [5] Categories, so in the box, type:

5 <ENTER>

2. Next, a new screen will appear with the place to indicate the **minimum** and **maximum** values for each of the age categories. To remind you of the conventions mentioned previously, mathematical signs are included on the screen with the values for the ranges. For this example, we will define age into five 12-month age intervals. The first group will be the youngest children with ages from zero months up to 12 months of age. On the screen, for the **minimum** value of level 1, enter:

0 <ENTER>

The cursor will move to the right, to the **maximum** field for the first level. Here, type:

12 <ENTER>

This first level will now accept all records of children between the ages of 0.00-11.99 months.

You will notice that the cursor has moved down to the second level, **minimum** value. For the next entries, type:

	<u>MINIMUM</u>	<u>MAXIMUM</u>
Level 2	12 <ENTER>	24 <ENTER>
Level 3	24 <ENTER>	36 <ENTER>
Level 4	36 <ENTER>	48 <ENTER>
Level 5	48 <ENTER>	60 <ENTER>

After you press the <ENTER> key after the maximum value for the last age category, the screen will clear, and the table for the cross tabulation will appear. Notice that the age groups you have just defined have been displayed at the left side of the table. The record numbers in the data set being processed are displayed in the upper right corner.

When the tabulation is finished (for all one hundred records in the example database), the respective prevalences for each indice and age group will be displayed. The aggregate total for all age groups is displayed at the bottom of the table. Note the "Press any key" message at the bottom of the screen. By pressing any key you will be returned to the main menu.

5. Z Scores

This option displays the distribution of the population by Z-score values. This distribution can be presented either for the entire data set or for any combination of age, sex and, a user-specified variables.

The operations for the Z-score distribution is similar to those for Prevalence/Age. You need to:

- a. Identify a dBase file to analyze.
- b. Provide field numbers for the necessary fields. For the Z-score distribution these fields are: Edit Flag, HAZ, WHZ, and WAZ.
- c. State whether or not to stratify the analyses by age, sex, or a third variable.
 - i. To stratify by age, you must provide the number of age categories and the minimum and maximum values for each category. You also must provide the field number for age and its units of measurement (days, months, or years).
 - ii. To stratify by sex, you must provide the field number, and if sex is in a character field, the coding scheme ("C" for M/F, "N" for 1/2).
 - iii. To stratify by an additional variable, you must provide the field number, the number of categories, and the category values.
- d. The dBase file name and date, and when applicable, selected stratified information (e.g., age, sex) appear at the top of the screen. After the analysis is completed, the number and percentage of children by each Z-score category, for each of the indices, is presented. The distribution of the reference population is also provided.

- e. Press any key and the next screen provides the mean, standard deviation, standard error, minimum, and maximum Z-score values for the three indices. Also, the minimum and maximum Z-score values are displayed at the bottom of the screen. (For more information on the minimum and maximum allowable Z-score values, see the Setup section on page 7.)

6. Centiles

In this module the distribution of individuals is presented by centile groupings. Similar to the steps for calculating the Z-score distribution, you need to:

- a. Identify a dBase file to analyze.
 - b. Provide field numbers for the necessary fields. For the centile distribution these fields are: Edit Flag, HAP, WHP, and WAP.
 - c. State whether or not to stratify the analyses by age, sex, or a third variable.
 - i. To stratify by age, you must provide the number of age categories and the minimum and maximum values for each category. You also must provide the field number for age and its units of measurement (days, months, or years).
 - ii. To stratify by sex, you must provide the field number, and if sex is in a character field, the coding scheme (C for M/F, N for 1/2).
 - iii. To stratify by an additional variable, you must provide the field number, the number of categories, and the category values.
 - d. The dBase file name and date, and when applicable, selected stratified information (e.g., age, sex) appear at the top of the screen. After the analysis is completed, the number and percentage of children by each centile category, for each of the indices, is presented. The distribution of the reference population is also provided.
 - e. Press any key and the next screen provides the median, minimum, and maximum centile values for the three indices.
-

OTHER

7. Browse

The Browse feature provided in ANTHRO is very similar to this feature in dBase. Select option 7 from the Main menu, and then you will be asked to provide a dBase file name. After you have entered a dBase file name, the records from the dBase file will be displayed. The upper part of the screen provides a menu with information on cursor movement, editing records, deleting information, and other miscellaneous instructions. There are some differences from the dBase Browse feature, but reviewing the menu at the top of the ANTHRO Browse screen will familiarize you with the differences. If you are not familiar with dBase Browse feature, review the following description of Browse.

General information. Browse is for reviewing dBase records and making editing changes. In the upper right hand corner is the dBase file number, and in the upper left hand corner is the record number. The dBase file is presented by listing the field names from left to right, and the record information is presented below the field names. In databases with many fields, only the fields that can fit on the screen are shown, although you also view other fields.

Cursor movement. Pressing the right cursor key will move the reverse video area one field to the right. The left cursor key moves the reverse video area one field to the left (if you are at the **first** field, nothing will happen if you press the left cursor key). To move several fields to the right, press the control key and the right cursor (called "pan" in the menu). The menu in Browse represents the control key with a "^". The control key and left cursor key move you several fields to the left (unless you are at the first field in which case pressing these keys will have no effect). To edit a field, move the cursor to the field and press the [F3] key. You can then change the contents of the field. While you are editing a field, use of the cursor keys moves you around within the field and not to other fields.

Pressing the down cursor key moves the reverse video area down one record, and pressing the up cursor key moves the reverse video area up one record (if you are at the first record, it will have no effect). If you want to jump many records to move down the file, press the <PAGE DOWN> key; this key will move you down 12 records. You can also jump up 12 records by pressing the <PAGE UP> key. Another way to move or "jump" to a different record is to press the [F2] key, which prompts for a record number to "jump" to. To move to the top of a database, simultaneously press the <CONTROL> (depicted as "^" on the screen) and <PAGE UP> keys. To go to the bottom or last record of the database, simultaneously press the <CONTROL> and <PAGE DOWN> keys.

Deletion. To delete a record, move the reverse video to the record you wish to delete, and then press the control key and 'U'. This step does not remove the record from the database, but marks the record for deletion (similar to the way dBase deletes records). To actually remove a record, you need to use the Pack command within dBase (please refer to a dBase manual for more information). You can also delete the contents of a field by moving the reverse video area to the field you wish to delete, then press the control key and [Y].

Editing. You can edit a field. Move the reverse video area to the field you want to edit, then press the [F3] key. You can delete the contents of the field by pressing '^Y'. Enter the changes from the keyboard. (You can also move within the field with the left and right cursor keys and use the <Delete> key to delete characters.) Once you have made your changes, press <ESC> to exit the edit mode.

Other information: To leave the Browse mode, press the escape key. You cannot append (i.e., add) records to the data base in the Browse mode.

8. Edit

The Edit feature in ANTHRO is similar to the one in dBase and has many of the same features as Browse. The Browse and Edit modes differ in the way records are presented on the screen. In the Edit mode, only one record is on the screen and the fields are presented vertically direction; in the Browse mode the records are presented horizontally. If there are more fields in a dBase record than can fit on one screen, you can use the <Page Down> key or press the <ENTER> key many times to see the next screen of fields. Another difference between Browse and Edit is that you can edit any field in Edit without pressing the [F3] key. Records cannot be appended (i.e., added) to the database in the Edit mode.

9. Import

ANTHRO was developed primarily for use with dBase files. However, the Import utility allows you to import a fixed-column or comma-delimited ASCII file into a dBase file. Note that the majority of database, statistics, and spreadsheet programs have the ability to read and write dBase files. If you have entered your data into a software package that does not use the dBase file structure or cannot "export" or "output" the data into a dBase file, the software package will most likely be able output the data into a fixed-column or comma-delimited ASCII file format. The definition for these terms is as follows:

ASCII -- ASCII is an acronym for *American Standard Code for Information Interchange*. This is standard format for transferring data between microcomputers. Software programs on microcomputers that can create fixed column or comma-delimited files use the ASCII format.

Fixed-Column -- In dBase terminology, a fixed column file is a *System Data Format (SDF)*. Here is an example of a fixed column file is shown below:

```
M100.514.01978010719820403
F 76.5 8.01980010219820403
M 84.0      1980030719820403
```

In the above example the following fields are listed:

Sex -- in column 1 (coded as "M" or "F")

Height in cms -- columns 2-6

Weight in kgs -- columns 7-10

Date of birth -- columns 11-18 (in year, month, day format)

Date of measurement -- columns 19-26 (in year, month, day format)

It is important to note the column orientation: sex is always in the first column, height is always in columns 2-6, etc.

Comma-delimited -- A file where fields are separated by commas and character fields are enclosed in quotes. This is called a *Printer File* (PRN) in Lotus 123. An example of a comma-delimited file, which uses the same data as in our example of a fixed-column file, follows:

```
"M" , 100.5 , 14.0 , 19780107 , 19820403
"F" , 76.5 , 8.0 , 19800102 , 19820403
"M" , 84.0 , , 19800307 , 19820403
```

What must you know before importing the data? First you need to know if the data are in a fixed format or a comma-delimited format. Then you need the following information for **each** field:

- Field name
- Field type
- Field Width
- Number of Decimal Places

Each of these pieces of information is described next:

Field name -- A name for the field of 10 or fewer characters.

Field type -- The three most frequent types of dBase field are character, numeric, and date.

Character fields -- can contain letters, numbers, or other symbols and are usually used with fields such as name, address, city, etc.

Numeric fields -- must contain a numeric value, usually for fields such as age, height, weight, etc. In dBase (and ANTHRO), a blank numeric field is given the value of zero, therefore it is important to have a missing variable code, such as 9, 99, etc.

Date fields -- contains a date, such as a child's birthdate. The format of the date must be YYYYMMDD, where YYYY is the year, e.g., 1989; MM is the month; and DD is the day. This is the standard format for ASCII dates.

Field width -- The maximum number of characters or numbers needed for the field defines its width. For example, for a field that contains the city, you might want 20 characters. With numeric fields, provide the width for the largest number. If there is a decimal place in the number, you need to include it in the count for width. For example, with height in centimeters, you would probably want a width of 5 for three digits to the left of the decimal place, the decimal place, and one digit to the right of the decimal place. For age in months (without decimal places), you would probably want a width of 3.

Decimal places -- This information is only used with numeric fields and the user provides the number of decimal places. If there are no decimals, then there would be zero decimal places.

You are ready to import a file after you have provided and checked the information for each field just discussed.

Example of Import

Use the Export option to create a file to import. For this example, we will export a fixed-column file. From the main menu in ANTHRO, select option [10], Export. From the Export menu, select option [1] for fixed column. You will then be prompted to provide a dBase file name to export. For this example, export the file NUT.

Next, you are asked to name the exported file, which we will call "TEST". By default, the file "TEST" will have the extension ".TXT". The next screen asks how you would like to have the header information, i.e., information on the field name, type, etc. Select option [1] to send the information to the screen. The information should look like this:

1	SEX	C	1	0
2	HT_CM	N	5	1
3	WT_KG	N	4	1
4	DBIRTH	D	8	0
5	DSURVEY	D	8	0
6	AREA	C	1	0

At this point you have a fixed-column file called "TEST.TXT" and header information for the file. (For more detailed information on Exporting a file, see the Export section on page 27.) Select option [9] from the Export menu to return to the main menu.

From the main menu select option [9], Import File. The first menu in Import File asks the file type to import. For this example, enter [1] for fixed-column. You are provided three choices: to Create a new data structure, Modify an existing structure, or Return to previous menu. For example, to create a new data structure, enter a name for the new dBase file. For this example call the new file "TEST". Do not provide an extension because by default the file will be given a ".DBF" extension. You will then be asked whether you want to copy a data structure from an existing dBase file. For this example, select the [N]o option.

At this point the screen will change. On the left side of the screen will be a window where information on the fields is located and instructions in a window on the right. The instructions show how to add/insert, edit, and delete a field.

Enter option [A] to insert or add a field. Notice that the right side of the screen changes to allow for entering the field name, type, width, and decimal places. From the example, enter the appropriate data for the first field. Enter "SEX" for field name, "C" for field type (because it is a character field), and "1" for the field width. You cannot enter a value for decimal places in a character field. Once you have the data entered correctly, press the <F10> key to save the information. Notice that the right side of the screen has the instructions within it again and the information you entered is now on the left side of the screen.

Continuing with the example, press the [A] key to insert the next field and enter the following information:

```
HT_CM
N
5
1
```

Press the <F10> key to save the results, which will appear on the left side of the screen. You may notice that you cannot see the previous field information for sex on the left side of the screen. Press the <up arrow> key and you will be able to see both fields.

Enter the information for WT_KG, DBIRTH, DSURVEY, and AREA. If you should make a mistake, delete the entry and reenter the appropriate information.

After you have entered all the field information, press <F10> to save the information. You will be prompted with a message asking whether you would like to continue; answer [Y]es.

Next you will be prompted for the name of the fixed-column file. For this example, enter "TEST.TXT". The records from the fixed-column file TEST.TXT will be read into (or in dBase jargon, "appended to") the dBase file named TEST.DBF.

More Detailed Information on Import

You can accomplish other tasks with the Import module:

- * When creating a dBase file, you can copy the structure (that is, the field names, types, etc.) from an existing dBase file.
- * You can modify an existing data structure by deleting fields, adding fields, and changing information within a field. Such capabilities would be useful when, after creating a new dBase file structure, you realized there was a mistake. You could then "modify" the existing structure and make the appropriate changes. Be cautious when changing an existing dBase file. You should have a backup copy of the dBase file in case there is an error.

There are checks to assure that you will not overwrite an existing file without first being warned.

10. Export

dBase files can be exported to fixed-column or comma-delimited files. To export a file, you must first select the type of file to export to (fixed-column or comma-delimited). You are then asked to choose a dBase file. Next, the name of the export file is requested; you can specify a drive and path in the file name. The default is the same name as the dBase file except the file will have a .TXT rather than a .DBF field name extension. Next, you are requested to determine the type of output you want for the file header information. File header information consists of the field number, field type (N=Numeric, C=Character, D=Date, etc.), field width, and the number of decimal places (if the field type is numeric). If you choose to see the header information, it is always sent to the screen, but can also be sent to a printer or a disk file.

A check assures that there is enough free disk space available for the exported file(s).

Example of Export

An example of exporting a file was provided in the "Example of Import" section on page 26.

11. Anthropometric Calculator

The organization for this section will be to first provide an example and then a more detailed discussion of the anthropometric calculator.

Example of Anthropometric Calculator

This example is based on the following configuration from the Setup menu (See the Setup section for details, page 6): use of the British date format; date of birth and visit; age in months; weight in kilograms; and height in centimeters. Select option [11] from the Main menu ("Anthropometric Calculator"). The Anthropometric calculator screen will appear. The first field is labeled ID. We will not enter anything in this field so press the enter key:

<ENTER>

The cursor will move to the Sex field. For this example enter a [1] for male:

1 <ENTER>

The cursor next moves to the *Date of Birth* field. When entering a date, you do not need the delimiters between the day, month, and year (the slash mark '/' is the delimiter in this case). Enter the date for the First of February, 1989:

01021989 <ENTER>

The date will look like "01/02/1989" on the screen. You **must** enter both day and month as two digits, e.g., 01, 02, ..., 10, etc. Next enter the date of visit (i.e., the date the height and weight measurements were obtained), which is 01 Mar 1989:

01031989 <ENTER>

The calculated age in biologic months (0.92) and calendar months (1.00) are presented on the lower right portion of the screen. The distinction between these is described in detail in the next section, *More Detailed Information on the Anthropometric Calculator*. The cursor will be at the field for age in months, which by default has the value 999.99, the code for missing or unknown age in months. Because the dates of birth and visit are known, just leave age in months with its default value:

<ENTER>

Now enter the child's weight in kilograms, which, for this example, is 3 kilograms:

3 <ENTER>

Enter the height in centimeters (54.5 cms):

54.5 <ENTER>

The anthropometric indices are displayed as follows:

	PERCENTILE	Z-SCORE	% MEDIAN
HT. FOR AGE	53.9	0.10	100.4
WT. FOR AGE	3.4	-1.82	71.2
WT. FOR HT.	1.1	-2.30	71.1

Also displayed at the bottom left of the screen is a horizontal menu. You can enter *Another* record, *Edit* the current record, or return to the *Main menu*. For this example, use the cursor keys to move the light bar to Main menu and press:

<ENTER>

This step completes the example.

More Detailed Information on the Anthropometric Calculator.

The anthropometric calculator allows you to enter information on a child (age, sex, weight, and height), and the anthropometric indices are provided in an interactive mode. The data are not saved to a database.

There are several options available in customizing the Anthropometric calculator for your use. As described in the Setup Menu section, you can specify the use of several different variables: Date of birth and visit; age in years, months, or both; weight in kilograms, pounds, quarter pounds, ounces, or a combination of these; and height in centimeters, feet, inches, eighth inches, or a combination of these. See the Setup menu section for information on how to select these options on page 6.

The first field in the Anthropometric calculator is a field for ID which is completely optional. The next field is for sex and either '1' or '2' can be entered (1=male, 2=female), or M or F can be entered.

If dates of birth and visit are present and you enter dates into the fields, the calculated biologic and calendar age in months are provided. The difference between biologic and calendar age in months is that biologic age divides the year into 12 equal segments as opposed to calendar age in which some months have 28 days and others have 31 days. The anthropometry calculations are based on biologic age. The difference between biologic and calendar age are most important during a child's first year of life.

If age in years or months are selected, the default age is always set to missing (999.99). If both age in years and months are selected, the child's age is determined by adding the two together. For example, if you enter 1 year and 6 months, the program will add the two together (18 months). If date of birth and visit are selected as well and age in years, months, or both, the age calculated from the two dates (if present) is used for the anthropometric calculations. If one or the other date fields are blank, then the age in years, months, or both are used. If an implausible date is entered (such as 31 February 1989), the cursor will not leave the date field. The date field must either contain a plausible date or be left blank.

Weight can be entered in metric units (kilograms), U.S. units (pounds, quarter pounds, or ounces) or both. If both metric and U.S. units are provided, the metric units are used. U.S. units are added together to determine a child's weight and then converted to metric for anthropometric calculations (if the metric units are not present). If you select to have pounds on the calculator, you can select to have either quarter pounds or ounces, but not both. (Also note that tenths of a pound can be entered.) The field for quarter pounds will only accept the values 0, 1, 2, or 3. The

field for ounces will only accept the values 0 through 15. Blank fields are treated as missing and are ignored.

Height can be entered in metric units (centimeters), U.S. units (feet, inches, or eighth inches), or both. If both metric and U.S. units are provided, the metric units are used. U.S. units are added together to determine a child's height and converted to metric for anthropometric calculations (if the metric information is not provided). The field for eighth inches will only accept the values 0 through 7. Blank fields are treated as missing and are ignored.

You can have height in metric and weight in U.S. units or vice versa. Also you are free to change the Anthropometric Calculator configuration at any time.

After you enter the last weight field and press the <Enter> key, the anthropometry calculations are displayed on the screen and a horizontal menu at the bottom left of the screen appears. From the horizontal menu, you can enter another record, edit the information on the screen, or return to the main menu.

If one or more of the Z-score values falls outside the edit flags specified in the Setup menu (see Setup section for more information on edit flags, pages 7 and 14), the word "FLAG" will flash on the screen and a flashing asterisk ("*") will be next to the indice(s) that may erroneous.

If age is unknown, W/H indices are calculated; if height is unknown, W/A indices are calculated; and if weight is unknown, H/A indices are calculated.

An additional index calculated is BMI (Body Mass Index: weight in kilograms divided by height in meters squared). Although BMI is provided, there are currently no accepted BMI reference curves available for children or adolescents.

12. DOS Shell

You can temporarily exit ANTHRO to run other programs or commands. This option does not work in Windows. After you have "shelled" out to DOS, to return to ANTHRO, type EXIT at the DOS prompt. This option will work properly only when your computer has enough free RAM. If your computer does not have enough free RAM available, you will see a "RUN" error and the program will return to DOS.

13. Setup

The Setup section has been described earlier starting on page 6.

14. Description of Edit Flags

The edit flag coding scheme can be viewed using this option. Records flagged most likely have an error in one or more of the following: age, sex, weight, and height. Occasionally, records are flagged for individuals who are extremely short, tall, thin, or heavy, even though the measurements are correct. To view the criteria by which records are flagged, see the Setup Menu section (page 7**page number**).

More Detailed Description of Edit Flags.

Records are flagged to identify records that have extreme values (i.e., individuals with extremely low or high anthropometry), missing or out-of-range values, or incorrect values for age, sex, weight, or height. The coding scheme for flags is shown below.

Flag Code	Index Flagged			Notes
	H/A	W/H	W/A	
0				No indices flagged
1	Y			H/A flagged only
2		Y		W/H flagged only
3	Y	Y		Both H/A and W/H flagged
4			Y	W/A flagged only
5	Y		Y	Both H/A and W/A flagged
6		Y	Y	Both W/H and W/A flagged
7	Y	Y	Y	All three indices flagged

Y=index flagged, blank means index not flagged

The reference curves have age and height limitations. The limitations are shown in Table 1. Age and height values outside of the limits in Table 1 should be treated as missing values. A more detailed description of the possible reasons for flagging a record follows.

Table 1. Age and height limitations for CDC/WHO international growth reference curves.*

Indice	Sex	Age Limitations (years)		Height Limitations (cms)	
		Minimum	Maximum	Minimum	Maximum
W/H	Males	Birth	11.49	49	145
	Females	Birth	9.99	49	137
H/A	Both	Birth	17.99	-	-
W/A	Birth	Birth	17.99	-	-

*There are no weight limitations; “-“ means no limitation

Extreme Values

Extreme values are those that fall beyond some value that is extremely unlikely to occur. The cutoff values that can be used in ANTHRO are discussed on page 7. Rarely, some children will have values outside these limits, but in most instances there will be either missing or incorrect information. Accurate weight and height information is very important. The weight and/or height information can be incorrect for the following reasons: 1) incorrect measurements; 2) faulty equipment; 3) inaccurate reading of measurements; 4) incorrect recording of measurements; 5) incorrect units of measurement used in the calculations (e.g., use of pounds when the unit of measure was kilograms); and 6) data entry error. The collection of correct age information is critical for the accurate calculation of the H/A and W/A indices. Ideally age information is calculated from the date of birth and the date of visit. When collecting the data, in

addition to obtaining the date of birth and measurements, obtain the age in months or years because the year of birth is a frequent source of error.

At this point, each of the flags are discussed.

Flag 0: This means that none of the indices were flagged. However, the information is could be incorrect, but the age, sex, weight, and height information were not missing or too extreme to be flagged.

Flag 1: H/A is flagged but not W/H or W/A. This could truly be an extremely short or extremely tall child. Double check the height information to assure that it is correct and has been entered into the computer correctly. Also, look at the WHZ value. If height is incorrect, generally the WHZ value may be close to -3.09 or 3.09 (a WHZ beyond these values with an extreme HAZ value would produce Flag error 5 if the weight and age information is correct). Also, the age could be incorrect, therefore look at the WAZ value to see if it appears extreme.

Flag 2: W/H is flagged but not H/A or W/A. The first thing to check is the child's age. W/H is not calculated for males 11.5 years and older or females 10.0 years or older. If the age is within the limits, check for the minimum and maximum height limits (the minimum limit is 49 cms for both males and females; the maximum is 145 cms for males and 137 cms for females). If the child is within the height and age range for W/H, this could be an extremely thin or heavy child. If height is incorrect, then the HAZ would also be expected to be close to an extreme value (but not extreme enough to be flagged), and if weight is incorrect, then the WAZ would be expected to be close to an extreme value (but not extreme enough to be flagged).

Flag 3: H/A and W/H are both flagged but not W/A. This is an indicator that height is most likely incorrect or missing.

Flag 4: W/A is flagged but not H/A or W/H. If weight is incorrect, then the W/H may be near an extreme value (but not extreme enough to be flagged), and if age is incorrect, then H/A may be near an extreme value.

Flag 5: H/A and W/A are flagged but not W/H. This is an indicator that the age information is most likely incorrect, missing, or out of range. This flag will occur in populations where accurate age information is not known.

Flag 6: W/H and W/A are flagged but not H/A. A likely indicator that weight is incorrect or missing.

Flag 7: All three indices are flagged. This can occur if sex is unknown or incorrectly recorded, or at least two of the following are unknown, incorrectly recorded, extreme, or beyond the limitations of the growth curves: age, weight, height.

When analyzing the data in a statistical package, we would recommend that you set the appropriate Z-score fields to missing based on the coding in the FLAG field. An example of a SAS (Statistical Analysis System) coding scheme is as follow:

```
if flag=1 or flag=3 or flag=5 or flag=7 then haz=. and hap=. and ham=.;
if flag=2 or flag=3 or flag=6 or flag=7 then whz=. and whp=. and whm=.;
if flag>3 and flag<8 then waz=. and wap=. and wam=.;
```

How to Reduce Anthropometry Errors

Below are some basic steps that should be taken to ensure the accurate collection of anthropometry data.

1. Make sure the equipment is correctly calibrated on regular basis.
2. Thorough training of those who collect data.
3. To reduce errors on child's age, collect information on both the child's age and the dates of birth and measurement. The year of birth is frequently given incorrectly. Compare the calculated age and the age provided by the child's caretaker. If there is a large discrepancy between the two age values, the age provided by the caretaker is probably closer to the true value. Double check the year of birth and determine what happens if you correct the year to correspond with the stated age.
4. After the age, sex, weight, and height information is collected, assure that the data appear to be correct through the use of a growth chart or by calculating the anthropometry on a computer. Children with extreme values should be remeasured.
5. The data should be entered twice on computer to reduce data entry errors ("double data entry").

99. Exit

To exit ANTHRO and return to DOS, enter 99 at the main menu.

Other Software for Anthropometric Calculations

Another software package that can perform anthropometric calculations is Epi Info Dean et al., 1995; Sullivan et al., 1990; Fichtner et al., 1989). Epi Info is recommended for those who need to perform interactive anthropometric calculations, create customized screens for data entry, and analyze data. Epi Info Version 6 can also analyze dBase files directly. EpiNut, a program included with Epi Info, calculates anthropometry on Epi Info files in a batch-processing mode.

Other Information on the Development, Use, and Interpretation of Anthropometric Data

For additional information on the use and interpretation of anthropometric data, please refer to articles by the Report of a WHO Expert Committee (1995), Gorstein et al. (1994), WHO Working Group (1989), Dibley et al. (1987a, 1987b), and Waterlow et al. (1977). To review anthropometry prevalences from countries around the world, please refer to de Onis and Blössner (1997).

Trouble Shooting

Though we have attempted to assure that this software works properly, virtually all software programs have "bugs". We would appreciate your notifying us should you have problems. The following are typical problems.

Not Enough Memory

ANTHRO requires computers to have at least 512K RAM. If you get a message that there is not enough memory, determine how much RAM your computer has. One way is to use the DOS CHKDSK program. Total bytes of memory is the number of bytes you have in RAM, and bytes free is the amount of RAM available to run programs. If your computer has 512K RAM and you still cannot run ANTHRO, be sure there are no memory resident programs, such as Sidekick, in the RAM. Memory resident programs use up some of the RAM and therefore may not leave enough available to load ANTHRO.

Other Problems

The Clipper run-time module prints error messages across the top of the screen. Error messages follow this format:

```
proc:xxxxx      line:xxxx      description xxxx      (Q/A/I)
```

The "Q" in this message means to Quit and this choice closes all files, halts processing, and returns the user to the DOS prompt. "A" (Abort) halts processing and returns the user to DOS, and I (Ignore) attempts to ignore the error and continue. If you are working with a database when the error occurs, press the "Q" or "I" key. Pressing the "A" key may result in a loss of data.

If you get an error at the top of the screen and you are using DOS and not Windows, please be sure the CONFIG.SYS file discussed on page 2 is correct.

Information contained in the dBase file could cause some error messages. As an example, if there is a field called HAZ in the dBase file and it is a character field, ANTHRO will not add the field numeric field HAZ to the file for the results of the anthropometric calculation; consequently, there will be a "type mismatch" error when ANTHRO tries to save the results of the calculation to the dBase file. Therefore, if an error occurs, be sure to look closely at the dBase file to be sure that the data file did not cause the error.

If you cannot solve a problem with the ANTHRO software by consulting the appropriate sections in this manual or by close scrutiny of your dBase file, please notify either the Centers for Disease Control and Prevention or the World Health Organization (addresses are on page ii). Send the following information:

1. ANTHRO version number and date.
2. Description of the problem.
3. Copy of the screen where the problem occurred (using the DOS <PRINT SCREEN> option). Also send a copy of the ANTHRO Setup Menu and the CONFIG.SYS file.
4. Type of computer you are using.
5. The version of DOS or Windows you are using. To determine this in DOS, type 'VER' at the DOS prompt.

History of ANTHRO

For those who had test versions of ANTHRO, changes in Version 1.0 included:

- Two programs: ANTHRO1 & ANTHRO2. This was because the code became too large to fit in one program for older DOS computers with limited RAM.
- A utility is included that allows for capturing screen information and sending results to either the printer or to a disk file called SNIPPER

Changes in Version 1.01

- In some copies of Version 1.0 the anthropometric calculator could not be used. This was fixed in Version 1.01.
- If age in years is greater than 83.3 then it is changed to missing. In version 1.0 ages older than 83.3 would crash the system.
- Improved documentation, although as of this writing it is only available in English.

Changes in Version 1.02

- The program was modified to accept four-digit year dates and the two executable programs (ANTHRO1 and ANTHRO2) were combined into one (ANTHRO).
- Program documentation was revised to take into account the Windows operating system and now the documentation is available electronically.

References

- de Onis M, Blössner M. WHO Global Database on Child Growth and Malnutrition. WHO/NUT/97.4, World Health Organization, Geneva, 1997.
- Dean AG, Dean JA, Coulombier D, Brendel KA, Smith DC, Burton AH, Dicker RC, Sullivan K, Fagan RF, Arner TG. *Epi Info, Version 6: a word processing, database, and statistics program for epidemiology on IBM microcomputers*. Centers for Disease Control and Prevention, Atlanta, Georgia, USA, 1995.
- Dibley MJ, Staehling N, Nieburg P, Trowbridge FL. Interpretation of Z-score anthropometric indicators derived from the international growth reference. *Am J Clin Nutr* 1987;46:749-62.
- Dibley MJ, Goldsby JB, Staehling N, Trowbridge FL. Development of normalized curves for the international growth reference: historical and technical considerations. *Am J Clin Nutr* 1987;46:736-48.
- Fichtner RR, Sullivan KM, Trowbridge FL, Carlson B. Report of the technical meeting on software for nutritional surveillance. *Food and Nutrition Bulletin*, 1989;11:57-61.
- Gorstein J, Sullivan K, Yip R, de Onis M, Trowbridge F, Fajans P, Clugston G. Issues in the assessment of nutrition status using anthropometry. *Bull WHO* 1994;72:273-83.
- Report of a WHO Expert Committee. Physical status: the use and interpretation of anthropometry. WHO Technical Report Series 854, Geneva, 1995.
- Sullivan KM, Gorstein J, Dean AM, Fichtner R. Use and availability of anthropometry software. *Food and Nutrition Bulletin*, 1990;12:116-9.
- Waterlow JC, Buzina R, Keller W, Lane JM, Nichaman MZ, Tanner JM. The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of 10 years. *Bull WHO* 1977;55:489-98.
- WHO working group. Use and interpretation of anthropometric indicators of nutritional status. *Bull WHO* 1989;67:143-50.