

WHO Child Growth Standards SPSS Syntax File (*igrowup.sps*)

The package *igrowup_SPSS.zip* contains the following items:

1. The syntax file, **igrowup.sps**
2. Nine permanent (read-only) SPSS data sets containing the WHO Child Growth Standards: **wazlms.sav**, **hazlms.sav**, **wflms.sav**, **wfhlms.sav**, **bmilms.sav**, **hclms.sav**, **aclms.sav**, **tslms.sav** and **sslms.sav**
3. The file **readme_spss.pdf**
4. An example data set, **sample_igrowup.sav**
5. The example syntax file, **sample_igrowup.sps**
6. The example output file **sample_igrowup.txt**

Syntax file requirements

Users should have good and reasonable knowledge of SPSS programming to run the syntax file properly; in addition, the following requirements must be met:

1. The Syntax file has been written to run in SPSS Version 6.0 or higher.
2. The Syntax file requires the following nine permanent SPSS data sets containing the WHO Child Growth Standards:

Weight-for-age	wazlms.sav
Length/height-for-age	hazlms.sav
Weight-for-length	wflms.sav
Weight-for-height	wfhlms.sav
BMI-for-age	bmilms.sav
Head circumference-for-age	hclms.sav
Arm circumference-for-age	aclms.sav
Triceps skinfold-for-age	tslms.sav
Subscapular skinfold-for-age	sslms.sav

These files must be stored in the working directory, which is currently set to **D:\igrowup** by the program. This is also where the input dataset (*filename.sav*) is expected to be copied to. The location can easily be changed by the user, but if so, be sure to do a multiple search and replaces for **D:\igrowup** so that all occurrences are found.

3. The syntax file requires a SPSS data set containing the variables: sex, age, weight, length/height, head circumference (HC), mid-upper arm circumference (AC), triceps skinfolds (TS) and subscapular skinfolds (SS). If any of the anthropometric variables are missing, users must create one, and set its values as missing (see the comments in the SPSS macro). Ideally the file could be stored in the same directory **D:\igrowup** or alternatively a user-defined working directory (referred to in the syntax file as **D:\user**); the detailed requirements for its input variables are specified in the **Syntax File Parameters** section.

4. Avoid any variable names starting with underscore "_" or "\$" in the input SPSS data set; they may conflict with SPSS system variables.

Syntax file functions

1. The SPSS syntax file (*igrowup.sps*) calculates z-scores for the nine anthropometric indicators, weight-for-age, length/height-for-age, weight-for-length, weight-for-height, body mass index (BMI)-for-age, head circumference-for-age, arm circumference-for-age, triceps skinfold-for-age and subscapular skinfold-for-age based on the WHO Child Growth Standards. This syntax file was written to handle any SPSS file that has values for sex, age, weight, length/height, head circumference (HC), mid-upper arm circumference (AC), triceps skinfolds (TS) and subscapular skinfolds (SS). If you are analyzing a file from DHS or MICS, there are specific syntax files which have the typical variable names already specified (see *igrowup_DHShh.sps*, *igrowup_DHSind.sps* and *igrowup_MICS.sps*) and which are found in their respective zip-files.

2. The syntax file flags any extreme (i.e. biologically implausible) z-scores for each indicator. The extreme z-scores are defined as follows:

Weight-for-age z-score	(ZWAZ)	ZWAZ<-6 or ZWAZ >5
Length/height-for-age z-score	(ZHAZ)	ZHAZ<-6 or ZHAZ >6
Weight-for-length/height z-score	(ZWHZ)	ZWHZ<-5 or ZWHZ>5
BMI-for-age z-score	(ZBMI)	ZBMI <-5 or ZBMI >5
Head circumference-for-age z-score	(ZHCZ)	ZHCZ < -5 or ZHCZ > 5
Arm circumference-for-age z-score	(ZACZ)	ZACZ < -5 or ZACZ > 5
Triceps skinfold-for-age z-score	(ZTSZ)	ZTSZ < -5 or ZTSZ > 5
Subscapular skinfold-for-age z-score	(ZSSZ)	ZSSZ < -5 or ZSSZ > 5

3. The syntax file produces sex- and age-specific estimates for the prevalence of under/over nutrition and summary statistics (mean and SD) of the z-scores for each indicator, and if requested, stratified analysis by group such as urban/rural or regions for the weight and length/ height-based standards only. The first part of the output is in cross tabulation form, which some people prefer. The second part of the output uses REPORT format for the prevalences. Both give similar results, but they may not match exactly. This is because SPSS crosstabs, particularly in the earlier versions, rounds to the nearest whole N on weighted crosstabs. The REPORT statistics at the end do not round to the nearest whole N on weighted samples. These REPORT statistics at the end are what WHO uses in the WHO Global Database on Child Growth and Malnutrition.

Syntax file outputs

The syntax file creates a new file based on the input file. The name of the new data set will be *filename_z.sav*. This data set comprises the key variables needed and the key computed variables at the end. These variables and their labels are listed below in case you need to do any debugging of the program.

Variables	Variable labels
casenum	case number
wgting	weighting of sample, set to 1 if not needed
sex	1 is male, 2 is female
agemos	age in months
agedays3	age in days (agemos \times 30.4375 days)
agedays2	rounded(agedays3)
weight2	child's weight in kg
length	length or height of the child in cm
lenhei2	converted length/ height according to age
lorh	Indicator measuring length or height (L=1, H=2)
uselngth	Indicator variable (1=use Length tables, 2=use Height tables)
oedema	Indicator variable ("n" or "y", default = "n")
hc	head circumference of the child in cm
ac	mid-upper arm circumference of the child in cm
ts	triceps skinfolds of the child in mm
ss	subscapular skinfolds of the child in mm
region	country regions
urbanr	urban or rural
bmi	Computed BMI
zhaz	Height-for-age z-score
zwaz	Weight-for-age z-score
zwhz	Weight-for-length/height z-score
zbmi	BMI-for-age z-score
zhcz	Head circumference-for-age z-score
zacz	Arm circumference-for-age z-score
ztsz	Triceps skinfold-for-age z-score
zssz	Subscapular skinfold--for-age z-score
wazflag	Flag for zwaz <-6 or zwaz >5
hazflag	Flag for zhaz <-6 or zhaz >6
whzflag	Flag for zwhz <-5 or zwhz >5
bmiflag	Flag for zbmi <-5 or zbmi >5
hczflag	Flag for zhcz <-5 or zhcz >5
aczflag	Flag for zacz <-5 or zacz >5
tszflag	Flag for ztsz <-5 or ztsz >5
sszflag	Flag for zssz <-5 or zssz >5
whznoage	Flag for no age given, but (zwhz \geq -5 and zwhz \leq 5)

Syntax file parameters:

The Syntax file requires the following **11 parameters** to be specified:

- **sex**: to specify the name of a variable containing sex information. If it is a numeric variable, its values must be 1 for males and 2 for females. If it is a character variable, e.g. "m" or "M" for males and "f" or "F" for females, an appropriate recode must be made to transform character variables into a numeric **1** and **2**. Users must code its missing value as no entry for either character or numeric variables, in which case no z-scores will be calculated. If the missing value is something else, such as 0, then you must declare it as missing in the usual fashion: **missing values sex (0)**.
- **agedays3**: to specify the name of a numeric variable containing age in days. Ideally age in days should be calculated from the values given for the interview date (for example, dovY, dovM, dovD) minus the values for the birthdate (for example, dobY, dobM, dobD). As a minimum option, the syntax expects the user to specify the age in months (e.g. **agemos**), a numeric variable containing age in months information. Users must code missing values as **no entry or a user declared value**, in which case the age-related z-scores are not calculated.
- **weight2**: to specify the name of a numeric variable containing body weight information. Body weight must be in kilograms. Users must code the missing value as **no entry**, in which case weight-related z-scores are not calculated.
- **length**: to specify the name of a numeric variable containing height or length information. Height or length must be in centimeters. Users must code the missing value as **no entry**, in which case height-related z-scores are not calculated. For children aged below 24 months (< 731 days) and measured standing, the syntax file converts the height to recumbent length by adding 0.7 cm; and for children aged 24 months (\geq 731 days) and above who were measured in recumbent position, the syntax file converts the length to standing height by subtracting 0.7 cm. In other words, all the z-scores generated by the syntax file are length-based for children below 24 months, and height-based otherwise. The variable **lenhei2** is the converted length/height according to age.
- **lorh**: to specify the name of a character variable indicating whether recumbent length or standing height was measured. The values of this variable should be 1 for length and 2 for height. Otherwise they could be "l" or "L" for recumbent length, and "h" or "H" for standing height and the user must recode the character variables to 1 and 2 or change the proper syntax lines. Users must code its missing value as **no entry**. The syntax file imputes the missing value according to the following algorithm:
 - a. If age is not missing, then it is recumbent length if age below 24 months (< 731 days), and standing height if age is 24 months (\geq 731 days) or above.
 - b. If age is missing, then it is recumbent length if height < 87 cm and standing height if height \geq 87 cm.

- **hc**: to specify the name of a numeric variable containing the head circumference information, which must be in centimeters. Users must code any missing values as **no entry**, in which case the head circumference-for-age z-scores are not calculated. If the survey does not have this variable for **hc**, users must create one and assign all its values to missing.
- **ac**: to specify the name of a numeric variable containing the mid-upper arm circumference information, which must be in centimeters. Users must code any missing values as **no entry**, in which case the arm circumference-for-age z-scores are not calculated. If the survey does not have this variable for **ac**, users must create one and assign all its values to missing.
- **ts**: to specify the name of a numeric variable containing the triceps skinfold information, which must be in millimeters. Users must code any missing values as **no entry**, in which case the triceps skinfold-for-age z-scores are not calculated. If the survey does not have this variable for **ts**, users must create one and assign all its values to missing.
- **ss**: to specify the name of a numeric variable containing the subscapular skinfold information, which must be in millimeters. Users must code any missing values as **no entry**, in which case the subscapular skinfold-for-age z-scores are not calculated. If the survey does not have this variable for **ss**, users must create one and assign all its values to missing.
- **oedema**: to specify the name of the character variable containing oedema information. The values of this variable must be character, i.e. "n" or "N" for non-oedema, and "y" or "Y" for oedema. The current program assumes there is no oedema present in the dataset, so oedema is set to "n". If oedema is present, you must set oedema to the variable that contains those values. Users must code its missing value as **no entry**, and the syntax file assumes missing to be non-oedema.
- **wgting**: to specify the name of a numeric variable containing sampling weight. If "**wgting=1**" for all records, the un-weighted analysis is performed. If not otherwise specified, observations with missing or negative values in sampling weight are excluded from the analysis.

Syntax file setup and run

1. Create a directory, assumed by the syntax file to be **D:\igrowup**, where you will place the 9 files containing the standards, i.e. wazlms.sav, hazlms.sav, wflms.sav, wflms.sav, bmilms.sav, hclms.sav, aclms.sav, tslms.sav and sslms.sav.
2. Copy the file **igrowup.sps** to this same directory. In older versions of SPSS you may want to set SPSS to open a syntax file at startup. This is done by checking the appropriate box under Edit/Preferences.

3. Copy the file containing the child data into this same directory. In the syntax file, change the name of "*filename.sav*" to the actual name.
4. If needed, edit the syntax file so that the key variables such as weight, sex, age, length, etc. are given the correct variable names as found in the child data file.
5. Open SPSS and run the entire syntax file. It will find the data file and create the proper statistics in the output file, which will appear onscreen as you run it. You must save this output file to whatever name you wish, *filename.lst* for older versions of SPSS and *filename.spo* for newer versions. It will also create a new data file, *filename_z.sav*, which will have the key variables from the original file, plus the key computed variables. If you do not wish to have this new file saved, you can simply delete the following line near the end:

```
XSAVE outfile="d:\igrowup\filename_z.sav" /keep=casenum to zbmi,zwaz,zwhz,zhcz,zacz,ztsz,zssz,whzflag to whznoage.
```

The **Untitled** data file that remains on screen at the end of the run contains all of the variables mentioned above, plus intermediate calculation variables which might be of use to those involved in understanding or debugging the syntax file.

Note: To get started, the *igrowup_SPSS.zip* package provides the user with an example data set (*sample_igrowup.sav*), the respective syntax (*sample_igrowup.sps*) and the expected output (*sample_igrowup.txt*).

Contact for reporting bugs/ comments:

Should you encounter any problems with this macro, please send an e-mail with a clear description of the identified problem to anthro2005@who.int, specifying in the subject line that it concerns the *igrowup_SPSS* package - also indicate which version of SPSS you are using. Thank you.

References

WHO Multicentre Growth Reference Study Group (2006). WHO Child Growth Standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. Geneva: World Health Organization; pp 312 (available on the web site: <http://www.who.int/childgrowth/publications/en>).

WHO Multicentre Growth Reference Study Group (2007). WHO Child Growth Standards: Head circumference-for-age, arm circumference-for-age, triceps skinfold-for-age and subscapular skinfold-for-age: Methods and development. Geneva: World Health Organization; pp 217 available on the web site: <http://www.who.int/childgrowth/publications/en>).