



# Technical Note No. 11

Note on the Cleaning of Anthropometric Data



## **NOTE ON THE CLEANING OF ANTHROPOMETRIC DATA**

### **Background:**

The NSPMS used the following anthropometric indicators to evaluate child malnutrition:

- (1) Wasting is measured as a weight-for-height z-score below -2 SD to classify moderate wasting. A severe case of wasting is defined as a z-score below -3 SD and/or presence of bilateral oedema;
- (2) Stunting is measured as a height-for-age z-score below -2 SD to classify moderate and a z-score below -3 SD to classify severe stunting;
- (3) Underweight is measured as a weight-for-age z-score below -2 SD to classify moderate and a z-score below -3 SD to classify severe underweight.

The NSPMS analysis includes 25,644 observations with valid age information below five years of age when combining the four rounds. There was missing information for length/height (1,370 observations) and weight (1,300 observations).

### **Cross-sectional and longitudinal data cleaning:**

There were two approaches for exclusion of biologically implausible values for length/height and weight: one based on longitudinal and the other based on cross-sectional information. The longitudinal implausible values were defined by evaluating each child's growth according to the child growth velocity charts for children aged 0-24 months by sex, from the WHO Child Growth Standards (2006)<sup>1</sup>. The growth velocity presents the expected growth of length/height and weight of a child for each z-score (from -3 to + 3) in three- and six-month increments.

We follow the growth of a child under 24 months old throughout the rounds and compared their length/height to what should be expected. We compared the expected growth for a child in three- and six-month intervals using all possible combinations of data collection periods (rounds 1, 2 and 3, rounds 1, 2 and 4, rounds 1, 3 and 4 and rounds 2, 3 and 4).

Growth was considered biologically implausible when it suggested a decrease in child length/height or an implausible increase in growth for length/height and weight (a value greater than the growth expected for a child with a z-score of + 3). The height or length allowed for a difference of 1.7 cm to account for the acceptable 1 cm measurement error between enumerators and the 0.7 cm adjustment for height if the measurement was taken in a recumbent or standing position.

Even with this adjustment, there were 3,914 observations excluded which exhibited biologically implausible longitudinal growth, mostly due to an unacceptable decrease in height between rounds. We then applied flexible criteria for the exclusion of biologically implausible values for wasting, stunting and underweight if the z-score was greater or lower than 3 standard deviations of the observed mean, disaggregated by governorate (known as the 'smart flags' methodology).

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<sup>1</sup> WHO (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.

The NSPMS had 489 biologically implausible measures for wasting, stunting and underweight across all rounds, which keeps it below the WHO recommendation of 1 per cent for each round (1995). However, looking at age groups, children below the age of six months had the highest percentage of implausible measures (above 1 per cent) for all indicators, even after the longitudinal cleaning; for this reason, we recommend only using information for children aged 6-59 months (see table CH 14 in the Final Analytical Report).

Missing information and biologically implausible measures were excluded from the analyses, which resulted in a sample of 22,556 observations from children aged 6-59 months, combining all rounds (Table 1 below).

Table 1: Number of observations and missing values in nutritional indicators for children aged 6 to 59 months, Yemen 2012-2013

	Round 1	Round 2	Round 3	Round 4	Total
<b>Wasting</b>					
Number of observations	3,536	4,445	4,834	4,866	17,681
Missing	1,742	1,235	981	917	4,875
<b>Stunting</b>					
Number of observations	3,537	4,445	4,834	4,865	17,681
Missing	1,741	1,235	981	918	4,875
<b>Underweight</b>					
Number of observations	3,578	4,448	4,838	4,873	17,737
Missing	1,700	1,232	977	910	4,819
<b>Sample</b>	<b>5,278</b>	<b>5,680</b>	<b>5,815</b>	<b>5,783</b>	<b>22,556</b>

Source: NSPMS, All Rounds.

## ANNEX 1 – Syntax in Stata format

/\* Longitudinal flags \*/

/\* Longitudinal cleaning of implausible measurements using child height and weight growth velocity for 3 and 6 months based on WHO reference population in 2006 \*/

\*\*\*\* Height (using height adjusted in 0.7cm for children >24 months from standing/recumbent position)

\* preparing the data

```

sort indkey f2          // order data
xtset indkey f2        // set panel data
gen dheight=D.clenhei if (agemons>=0 & agemons<60) // diff round and previous
lab var dheight "Diff height"
gen dr1height=0 if (agemons>=0 & agemons<60) // difference against round 1
replace dr1height=S.clenhei if f2==2
replace dr1height=S2.clenhei if f2==3
replace dr1height=S3.clenhei if f2==4

gen dr2height=0 if (agemons>=0 & agemons<60) // difference against round 2
replace dr2height=S.clenhei if f2==3
replace dr2height=S2.clenhei if f2==4

gen dr3height=0 if (agemons>=0 & agemons<60) // difference against round 3
replace dr3height=S.clenhei if f2==4

```

```
xtset, clear // unset panel data
```

```
gen d123=dheight if f2!=4 & (agemons>=0 & agemons<60) // difference for rounds 123
```

```
gen d124=dheight if f2==2 & (agemons>=0 & agemons<60) // difference for rounds 124  
replace d124=dr2height if f2==4
```

```
gen d134=dr1height if f2==3 & (agemons>=0 & agemons<60) // difference for rounds 134  
replace d134=dheight if f2==4
```

```
gen d234=dheight if f2>2 & (agemons>=0 & agemons<60) // difference for rounds 234
```

```
**** exclusion criteria for height between rounds
```

```
gen hei=0 if (agemons>=0 & agemons<60)
```

```
** girls          velocity for 3 -months
```

```
replace hei=1 if agemons== 3 & p2_q_03== 2 & (dheight> 14.4 & dheight!.=.)  
replace hei=1 if agemons== 4 & p2_q_03== 2 & (dheight> 12.4 & dheight!.=.)  
replace hei=1 if agemons== 5 & p2_q_03== 2 & (dheight> 10.6 & dheight!.=.)  
replace hei=1 if agemons== 6 & p2_q_03== 2 & (dheight> 9.2 & dheight!.=.)  
replace hei=1 if agemons== 7 & p2_q_03== 2 & (dheight> 8.3 & dheight!.=.)  
replace hei=1 if agemons== 8 & p2_q_03== 2 & (dheight> 7.8 & dheight!.=.)  
replace hei=1 if agemons== 9 & p2_q_03== 2 & (dheight> 7.4 & dheight!.=.)  
replace hei=1 if agemons== 10 & p2_q_03== 2 & (dheight> 7.1 & dheight!.=.)  
replace hei=1 if agemons== 11 & p2_q_03== 2 & (dheight> 6.9 & dheight!.=.)  
replace hei=1 if agemons== 12 & p2_q_03== 2 & (dheight> 6.7 & dheight!.=.)  
replace hei=1 if agemons== 13 & p2_q_03== 2 & (dheight> 6.5 & dheight!.=.)  
replace hei=1 if agemons== 14 & p2_q_03== 2 & (dheight> 6.4 & dheight!.=.)  
replace hei=1 if agemons== 15 & p2_q_03== 2 & (dheight> 6.3 & dheight!.=.)  
replace hei=1 if agemons== 16 & p2_q_03== 2 & (dheight> 6.2 & dheight!.=.)  
replace hei=1 if agemons== 17 & p2_q_03== 2 & (dheight> 6.2 & dheight!.=.)  
replace hei=1 if agemons== 18 & p2_q_03== 2 & (dheight> 6.1 & dheight!.=.)  
replace hei=1 if agemons== 19 & p2_q_03== 2 & (dheight> 6 & dheight!.=.)  
replace hei=1 if agemons== 20 & p2_q_03== 2 & (dheight> 5.9 & dheight!.=.)  
replace hei=1 if agemons== 21 & p2_q_03== 2 & (dheight> 5.8 & dheight!.=.)  
replace hei=1 if agemons== 22 & p2_q_03== 2 & (dheight> 5.7 & dheight!.=.)  
replace hei=1 if agemons== 23 & p2_q_03== 2 & (dheight> 5.6 & dheight!.=.)  
replace hei=1 if agemons== 24 & p2_q_03== 2 & (dheight> 5.5 & dheight!.=.)  
replace hei=1 if (agemons>= 25 & agemons<60) & p2_q_03== 2 & (dheight> 5.5 & dheight!.=.)
```

```
**boys
```

```
replace hei=1 if agemons== 3 & p2_q_03== 1 & (dheight> 15.4 & dheight!.=.)  
replace hei=1 if agemons== 4 & p2_q_03== 1 & (dheight> 13.2 & dheight!.=.)  
replace hei=1 if agemons== 5 & p2_q_03== 1 & (dheight> 11.2 & dheight!.=.)  
replace hei=1 if agemons== 6 & p2_q_03== 1 & (dheight> 9.7 & dheight!.=.)  
replace hei=1 if agemons== 7 & p2_q_03== 1 & (dheight> 8.6 & dheight!.=.)  
replace hei=1 if agemons== 8 & p2_q_03== 1 & (dheight> 7.9 & dheight!.=.)  
replace hei=1 if agemons== 9 & p2_q_03== 1 & (dheight> 7.4 & dheight!.=.)  
replace hei=1 if agemons== 10 & p2_q_03== 1 & (dheight> 7.1 & dheight!.=.)  
replace hei=1 if agemons== 11 & p2_q_03== 1 & (dheight> 6.8 & dheight!.=.)  
replace hei=1 if agemons== 12 & p2_q_03== 1 & (dheight> 6.7 & dheight!.=.)  
replace hei=1 if agemons== 13 & p2_q_03== 1 & (dheight> 6.5 & dheight!.=.)  
replace hei=1 if agemons== 14 & p2_q_03== 1 & (dheight> 6.4 & dheight!.=.)  
replace hei=1 if agemons== 15 & p2_q_03== 1 & (dheight> 6.3 & dheight!.=.)  
replace hei=1 if agemons== 16 & p2_q_03== 1 & (dheight> 6.1 & dheight!.=.)  
replace hei=1 if agemons== 17 & p2_q_03== 1 & (dheight> 6 & dheight!.=.)  
replace hei=1 if agemons== 18 & p2_q_03== 1 & (dheight> 5.9 & dheight!.=.)
```

```

replace hei=1 if agemons== 19 & p2_q_03== 1 & (dheight> 5.8 & dheight!=.)
replace hei=1 if agemons== 20 & p2_q_03== 1 & (dheight> 5.7 & dheight!=.)
replace hei=1 if agemons== 21 & p2_q_03== 1 & (dheight> 5.7 & dheight!=.)
replace hei=1 if agemons== 22 & p2_q_03== 1 & (dheight> 5.6 & dheight!=.)
replace hei=1 if agemons== 23 & p2_q_03== 1 & (dheight> 5.6 & dheight!=.)
replace hei=1 if agemons== 24 & p2_q_03== 1 & (dheight> 5.5 & dheight!=.)
replace hei=1 if (agemons>= 25 & agemons<60) & p2_q_03== 1 & (dheight> 5.5 & dheight!=.)

/* exclude children with negative growth > 1.7 cm (1 cm measurement error intrafrom measurement
recumbent/standing) */

replace hei=1 if dheight<-1.7 & dheight!=.

*** generating flags for groups of rounds 123, 124, 134 and 234
* rounds 123
gen fhei123=hei if (agemons>=0 & agemons<60) & (f2==2 | f2==3) // flags for rounds 123

* rounds 124
gen fhei124=hei if (agemons>=0 & agemons<60) & f2==2 // flags for rounds 124
replace fhei124=0 if f2==4
** girls
replace fhei124=1 if agemons== 6 & p2_q_03== 2 & (d124> 21.6 & d124!=.) & f2==4 // velocity
for 6-months
replace fhei124=1 if agemons== 7 & p2_q_03== 2 & (d124> 18.6 & d124!=.) & f2==4
replace fhei124=1 if agemons== 8 & p2_q_03== 2 & (d124> 16.2 & d124!=.) & f2==4
replace fhei124=1 if agemons== 9 & p2_q_03== 2 & (d124> 14.5 & d124!=.) & f2==4
replace fhei124=1 if agemons== 10 & p2_q_03== 2 & (d124> 13.3 & d124!=.) & f2==4
replace fhei124=1 if agemons== 11 & p2_q_03== 2 & (d124> 12.5 & d124!=.) & f2==4
replace fhei124=1 if agemons== 12 & p2_q_03== 2 & (d124> 11.9 & d124!=.) & f2==4
replace fhei124=1 if agemons== 13 & p2_q_03== 2 & (d124> 11.5 & d124!=.) & f2==4
replace fhei124=1 if agemons== 14 & p2_q_03== 2 & (d124> 11.2 & d124!=.) & f2==4
replace fhei124=1 if agemons== 15 & p2_q_03== 2 & (d124> 10.9 & d124!=.) & f2==4
replace fhei124=1 if agemons== 16 & p2_q_03== 2 & (d124> 10.6 & d124!=.) & f2==4
replace fhei124=1 if agemons== 17 & p2_q_03== 2 & (d124> 10.4 & d124!=.) & f2==4
replace fhei124=1 if agemons== 18 & p2_q_03== 2 & (d124> 10.2 & d124!=.) & f2==4
replace fhei124=1 if agemons== 19 & p2_q_03== 2 & (d124> 10 & d124!=.) & f2==4
replace fhei124=1 if agemons== 20 & p2_q_03== 2 & (d124> 9.8 & d124!=.) & f2==4
replace fhei124=1 if agemons== 21 & p2_q_03== 2 & (d124> 9.6 & d124!=.) & f2==4
replace fhei124=1 if agemons== 22 & p2_q_03== 2 & (d124> 9.4 & d124!=.) & f2==4
replace fhei124=1 if agemons== 23 & p2_q_03== 2 & (d124> 9.1 & d124!=.) & f2==4
replace fhei124=1 if agemons== 24 & p2_q_03== 2 & (d124> 8.9 & d124!=.) & f2==4
replace fhei124=1 if agemons>= 25 & p2_q_03== 2 & (d124> 8.9 & d124!=.) & f2==4
** boys
replace fhei124=1 if agemons== 6 & p2_q_03== 1 & (d124> 22.7 & d124!=.) & f2==4
replace fhei124=1 if agemons== 7 & p2_q_03== 1 & (d124> 19.6 & d124!=.) & f2==4
replace fhei124=1 if agemons== 8 & p2_q_03== 1 & (d124> 17 & d124!=.) & f2==4
replace fhei124=1 if agemons== 9 & p2_q_03== 1 & (d124> 15 & d124!=.) & f2==4
replace fhei124=1 if agemons== 10 & p2_q_03== 1 & (d124> 13.5 & d124!=.) & f2==4
replace fhei124=1 if agemons== 11 & p2_q_03== 1 & (d124> 12.6 & d124!=.) & f2==4
replace fhei124=1 if agemons== 12 & p2_q_03== 1 & (d124> 11.9 & d124!=.) & f2==4
replace fhei124=1 if agemons== 13 & p2_q_03== 1 & (d124> 11.3 & d124!=.) & f2==4
replace fhei124=1 if agemons== 14 & p2_q_03== 1 & (d124> 10.9 & d124!=.) & f2==4
replace fhei124=1 if agemons== 15 & p2_q_03== 1 & (d124> 10.5 & d124!=.) & f2==4
replace fhei124=1 if agemons== 16 & p2_q_03== 1 & (d124> 10.2 & d124!=.) & f2==4
replace fhei124=1 if agemons== 17 & p2_q_03== 1 & (d124> 9.9 & d124!=.) & f2==4
replace fhei124=1 if agemons== 18 & p2_q_03== 1 & (d124> 9.6 & d124!=.) & f2==4
replace fhei124=1 if agemons== 19 & p2_q_03== 1 & (d124> 9.4 & d124!=.) & f2==4
replace fhei124=1 if agemons== 20 & p2_q_03== 1 & (d124> 9.2 & d124!=.) & f2==4
replace fhei124=1 if agemons== 21 & p2_q_03== 1 & (d124> 9 & d124!=.) & f2==4
replace fhei124=1 if agemons== 22 & p2_q_03== 1 & (d124> 8.8 & d124!=.) & f2==4

```

```
replace fhei124=1 if agemons== 23 & p2_q_03== 1 & (d124> 8.6 & d124!.) & f2==4
replace fhei124=1 if agemons== 24 & p2_q_03== 1 & (d124> 8.4 & d124!.) & f2==4
replace fhei124=1 if agemons>= 25 & p2_q_03== 1 & (d124> 8.4 & d124!.) & f2==4
```

```
replace fhei124=1 if d124<-1.7 & d124!., // cut off points for negative values ( 1 cm + .7 cm)
```

```
* rounds 134
```

```
gen fhei134=hei if (agemons>=0 & agemons<60) & f2==4 // flags for rounds 134
```

```
* girls
```

```
replace fhei134=0 if f2==3
```

```
replace fhei134=1 if agemons== 6 & p2_q_03== 2 & (d134> 21.6 & d134!.) & f2==3 // velocity
for 6-months
```

```
replace fhei134=1 if agemons== 7 & p2_q_03== 2 & (d134> 18.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 8 & p2_q_03== 2 & (d134> 16.2 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 9 & p2_q_03== 2 & (d134> 14.5 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 10 & p2_q_03== 2 & (d134> 13.3 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 11 & p2_q_03== 2 & (d134> 12.5 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 12 & p2_q_03== 2 & (d134> 11.9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 13 & p2_q_03== 2 & (d134> 11.5 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 14 & p2_q_03== 2 & (d134> 11.2 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 15 & p2_q_03== 2 & (d134> 10.9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 16 & p2_q_03== 2 & (d134> 10.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 17 & p2_q_03== 2 & (d134> 10.4 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 18 & p2_q_03== 2 & (d134> 10.2 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 19 & p2_q_03== 2 & (d134> 10 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 20 & p2_q_03== 2 & (d134> 9.8 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 21 & p2_q_03== 2 & (d134> 9.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 22 & p2_q_03== 2 & (d134> 9.4 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 23 & p2_q_03== 2 & (d134> 9.1 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 24 & p2_q_03== 2 & (d134> 8.9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons>= 25 & p2_q_03== 2 & (d134> 8.9 & d134!.) & f2==3
```

```
* boys
```

```
replace fhei134=1 if agemons== 6 & p2_q_03== 1 & (d134> 22.7 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 7 & p2_q_03== 1 & (d134> 19.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 8 & p2_q_03== 1 & (d134> 17 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 9 & p2_q_03== 1 & (d134> 15 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 10 & p2_q_03== 1 & (d134> 13.5 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 11 & p2_q_03== 1 & (d134> 12.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 12 & p2_q_03== 1 & (d134> 11.9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 13 & p2_q_03== 1 & (d134> 11.3 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 14 & p2_q_03== 1 & (d134> 10.9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 15 & p2_q_03== 1 & (d134> 10.5 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 16 & p2_q_03== 1 & (d134> 10.2 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 17 & p2_q_03== 1 & (d134> 9.9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 18 & p2_q_03== 1 & (d134> 9.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 19 & p2_q_03== 1 & (d134> 9.4 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 20 & p2_q_03== 1 & (d134> 9.2 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 21 & p2_q_03== 1 & (d134> 9 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 22 & p2_q_03== 1 & (d134> 8.8 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 23 & p2_q_03== 1 & (d134> 8.6 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons== 24 & p2_q_03== 1 & (d134> 8.4 & d134!.) & f2==3
```

```
replace fhei134=1 if agemons>= 25 & p2_q_03== 1 & (d134> 8.4 & d134!.) & f2==3
```

```
replace fhei134=1 if d134<-1.7 & d134!.,
```

```
* rounds 234
```

```
gen fhei234=hei if (f2==3 | f2==4) & (agemons>=0 & agemons<60) // flags for rounds 234
```

```
** selecting the child for each flag value for groups of rounds
```

```
tempvar child_hei child_fhei123 child_fhei124 child_fhei134 child_fhei234
```

```

egen `child_hei`=total(hei) , by(indkey)
egen `child_fhei123`=total(fhei123), by(indkey)
egen `child_fhei124`=total(fhei124), by(indkey)
egen `child_fhei134`=total(fhei134), by(indkey)
egen `child_fhei234`=total(fhei234), by(indkey)

*** selecting children to be excluded from the analysis due to implausible growth

gen flongh=0 if agemons>=0 & agemons<60
replace flongh=1 if `child_hei`!=0 & `child_fhei123`==0 & f2==4
replace flongh=1 if `child_hei`!=0 & `child_fhei124`==0 & f2==3
replace flongh=1 if `child_hei`!=0 & `child_fhei134`==0 & f2==2
replace flongh=1 if `child_hei`!=0 & `child_fhei234`==0 & f2==1
replace flongh=1 if `child_fhei123`!=0 & `child_fhei124`!=0 & `child_fhei134`!=0 & `child_fhei234`!=0
lab var flongh "flagged longitudinal height "

/* Weight */

* preparing of the data

sort indkey f2 // order data
xtset indkey f2 // set panel data

tempvar weight
gen `weight`=p9_q_6cor if p9_q_6cor<80 // gen weight variable without 88/99 codes

gen dweight=D.`weight' if (agemons>=0 & agemons<60) // simple difference round and previous
one using weight of the child
lab var dweight "Diff weight"

gen dr1weight=0 if (agemons>=0 & agemons<60) // difference against round 1
replace dr1weight=S.`weight' if f2==2
replace dr1weight=S2.`weight' if f2==3
replace dr1weight=S3.`weight' if f2==4

gen dr2weight=0 if (agemons>=0 & agemons<60) // difference against round 2
replace dr2weight=S.`weight' if f2==3
replace dr2weight=S2.`weight' if f2==4

gen dr3weight=0 if (agemons>=0 & agemons<60) // difference against round 3
replace dr3weight=S.`weight' if f2==4

xtset, clear

capture drop dw123 dw124 dw134 dw234

gen dw123=dweight if f2!=4 & (agemons>=0 & agemons<60) // difference for rounds 123

gen dw124=dweight if f2==2 & (agemons>=0 & agemons<60) // difference for rounds 124
replace dw124=dr2weight if f2==4

gen dw134=dr1weight if f2==3 & (agemons>=0 & agemons<60) // difference for rounds 134
replace dw134=dweight if f2==4

gen dw234=dweight if f2>2 & (agemons>=0 & agemons<60) // difference for rounds 234

**** exclusion criteria for weight between rounds ( weight velocity)

```

\*\* simple difference amongs rounds 1234

gen wei=0 if (agemons>=0 & agemons<60)

\*\* girls

replace wei=1 if agemons== 3 & p2\_q\_03== 2 & (dweight> 4.6 & dweight!=.) // growth from 3 months

replace wei=1 if agemons== 4 & p2\_q\_03== 2 & (dweight> 4.079 & dweight!=.)  
replace wei=1 if agemons== 5 & p2\_q\_03== 2 & (dweight> 3.445 & dweight!=.)  
replace wei=1 if agemons== 6 & p2\_q\_03== 2 & (dweight> 2.931 & dweight!=.)  
replace wei=1 if agemons== 7 & p2\_q\_03== 2 & (dweight> 2.57 & dweight!=.)  
replace wei=1 if agemons== 8 & p2\_q\_03== 2 & (dweight> 2.328 & dweight!=.)  
replace wei=1 if agemons== 9 & p2\_q\_03== 2 & (dweight> 2.153 & dweight!=.)  
replace wei=1 if agemons== 10 & p2\_q\_03== 2 & (dweight> 2.019 & dweight!=.)  
replace wei=1 if agemons== 11 & p2\_q\_03== 2 & (dweight> 1.921 & dweight!=.)  
replace wei=1 if agemons== 12 & p2\_q\_03== 2 & (dweight> 1.857 & dweight!=.)  
replace wei=1 if agemons== 13 & p2\_q\_03== 2 & (dweight> 1.815 & dweight!=.)  
replace wei=1 if agemons== 14 & p2\_q\_03== 2 & (dweight> 1.784 & dweight!=.)  
replace wei=1 if agemons== 15 & p2\_q\_03== 2 & (dweight> 1.766 & dweight!=.)  
replace wei=1 if agemons== 16 & p2\_q\_03== 2 & (dweight> 1.764 & dweight!=.)  
replace wei=1 if agemons== 17 & p2\_q\_03== 2 & (dweight> 1.779 & dweight!=.)  
replace wei=1 if agemons== 18 & p2\_q\_03== 2 & (dweight> 1.802 & dweight!=.)  
replace wei=1 if agemons== 19 & p2\_q\_03== 2 & (dweight> 1.824 & dweight!=.)  
replace wei=1 if agemons== 20 & p2\_q\_03== 2 & (dweight> 1.841 & dweight!=.)  
replace wei=1 if agemons== 21 & p2\_q\_03== 2 & (dweight> 1.856 & dweight!=.)  
replace wei=1 if agemons== 22 & p2\_q\_03== 2 & (dweight> 1.868 & dweight!=.)  
replace wei=1 if agemons== 23 & p2\_q\_03== 2 & (dweight> 1.878 & dweight!=.)  
replace wei=1 if agemons== 24 & p2\_q\_03== 2 & (dweight> 1.88 & dweight!=.)  
replace wei=1 if agemons>= 25 & p2\_q\_03== 2 & (dweight> 1.88 & dweight!=.)

\*\* boys

replace wei=1 if agemons== 3 & p2\_q\_03== 1 & (dweight> 4.836 & dweight!=.)  
replace wei=1 if agemons== 4 & p2\_q\_03== 1 & (dweight> 4.293 & dweight!=.)  
replace wei=1 if agemons== 5 & p2\_q\_03== 1 & (dweight> 3.576 & dweight!=.)  
replace wei=1 if agemons== 6 & p2\_q\_03== 1 & (dweight> 3.007 & dweight!=.)  
replace wei=1 if agemons== 7 & p2\_q\_03== 1 & (dweight> 2.618 & dweight!=.)  
replace wei=1 if agemons== 8 & p2\_q\_03== 1 & (dweight> 2.365 & dweight!=.)  
replace wei=1 if agemons== 9 & p2\_q\_03== 1 & (dweight> 2.197 & dweight!=.)  
replace wei=1 if agemons== 10 & p2\_q\_03== 1 & (dweight> 2.081 & dweight!=.)  
replace wei=1 if agemons== 11 & p2\_q\_03== 1 & (dweight> 1.998 & dweight!=.)  
replace wei=1 if agemons== 12 & p2\_q\_03== 1 & (dweight> 1.938 & dweight!=.)  
replace wei=1 if agemons== 13 & p2\_q\_03== 1 & (dweight> 1.893 & dweight!=.)  
replace wei=1 if agemons== 14 & p2\_q\_03== 1 & (dweight> 1.858 & dweight!=.)  
replace wei=1 if agemons== 15 & p2\_q\_03== 1 & (dweight> 1.832 & dweight!=.)  
replace wei=1 if agemons== 16 & p2\_q\_03== 1 & (dweight> 1.811 & dweight!=.)  
replace wei=1 if agemons== 17 & p2\_q\_03== 1 & (dweight> 1.797 & dweight!=.)  
replace wei=1 if agemons== 18 & p2\_q\_03== 1 & (dweight> 1.786 & dweight!=.)  
replace wei=1 if agemons== 19 & p2\_q\_03== 1 & (dweight> 1.779 & dweight!=.)  
replace wei=1 if agemons== 20 & p2\_q\_03== 1 & (dweight> 1.775 & dweight!=.)  
replace wei=1 if agemons== 21 & p2\_q\_03== 1 & (dweight> 1.772 & dweight!=.)  
replace wei=1 if agemons== 22 & p2\_q\_03== 1 & (dweight> 1.767 & dweight!=.)  
replace wei=1 if agemons== 23 & p2\_q\_03== 1 & (dweight> 1.756 & dweight!=.)  
replace wei=1 if agemons== 24 & p2\_q\_03== 1 & (dweight> 1.738 & dweight!=.)  
replace wei=1 if agemons>= 25 & p2\_q\_03== 1 & (dweight> 1.738 & dweight!=.)

\*\*\* generating flags for groups of rounds 123, 124, 134 and 234

gen fwei123=wei if (agemons>=0 & agemons<60) & (f2==2 | f2==3) // flags for rounds 123

gen fwei124=wei if (agemons>=0 & agemons<60) & f2==2 // flags for rounds 124

replace fwei124=0 if f2==4





```

replace fwei134=1 if agemons== 15 & p2_q_03== 2 & (dw134> 3.049 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 16 & p2_q_03== 2 & (dw134> 2.991 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 17 & p2_q_03== 2 & (dw134> 2.969 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 18 & p2_q_03== 2 & (dw134> 2.967 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 19 & p2_q_03== 2 & (dw134> 2.974 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 20 & p2_q_03== 2 & (dw134> 2.984 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 21 & p2_q_03== 2 & (dw134> 2.993 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 22 & p2_q_03== 2 & (dw134> 2.995 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 23 & p2_q_03== 2 & (dw134> 2.986 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 24 & p2_q_03== 2 & (dw134> 2.972 & dw134!.=) & f2==3
replace fwei134=1 if agemons>= 25 & p2_q_03== 2 & (dw134> 2.972 & dw134!.=) & f2==3

```

\*\* boys

```

replace fwei134=1 if agemons== 6 & p2_q_03== 1 & (dw134> 7.158 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 7 & p2_q_03== 1 & (dw134> 6.432 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 8 & p2_q_03== 1 & (dw134> 5.392 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 9 & p2_q_03== 1 & (dw134> 4.642 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 10 & p2_q_03== 1 & (dw134> 4.152 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 11 & p2_q_03== 1 & (dw134> 3.8 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 12 & p2_q_03== 1 & (dw134> 3.602 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 13 & p2_q_03== 1 & (dw134> 3.461 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 14 & p2_q_03== 1 & (dw134> 3.333 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 15 & p2_q_03== 1 & (dw134> 3.212 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 16 & p2_q_03== 1 & (dw134> 3.12 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 17 & p2_q_03== 1 & (dw134> 3.053 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 18 & p2_q_03== 1 & (dw134> 2.99 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 19 & p2_q_03== 1 & (dw134> 2.932 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 20 & p2_q_03== 1 & (dw134> 2.88 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 21 & p2_q_03== 1 & (dw134> 2.832 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 22 & p2_q_03== 1 & (dw134> 2.783 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 23 & p2_q_03== 1 & (dw134> 2.733 & dw134!.=) & f2==3
replace fwei134=1 if agemons== 24 & p2_q_03== 1 & (dw134> 2.687 & dw134!.=) & f2==3
replace fwei134=1 if agemons>= 25 & p2_q_03== 1 & (dw134> 2.687 & dw134!.=) & f2==3

```

```

gen fwei234=wei if (f2==3 | f2==4) & (agemons>=0 & agemons<60) // flags for 234

```

\*\* selecting the child for each flag value for groups of rounds

```

tempvar child_wei child_fwei123 child_fwei124 child_fwei134 child_fwei234

```

```

egen `child_wei`=total(wei) , by(indkey)
egen `child_fwei123`=total(fwei123), by(indkey)
egen `child_fwei124`=total(fwei124), by(indkey)
egen `child_fwei134`=total(fwei134), by(indkey)
egen `child_fwei234`=total(fwei234), by(indkey)

```

\*\*\* selecting children to be excluded from the analysis due to implausible growth

```

gen flongw=0 if agemons>=0 & agemons<60
replace flongw=1 if `child_wei`!=0 & `child_fwei123`==0 & f2==4
replace flongw=1 if `child_wei`!=0 & `child_fwei124`==0 & f2==3
replace flongw=1 if `child_wei`!=0 & `child_fwei134`==0 & f2==2
replace flongw=1 if `child_wei`!=0 & `child_fwei234`==0 & f2==1
replace flongw=1 if `child_fwei123`!=0 & `child_fwei124`!=0 & `child_fwei134`!=0 &
`child_fwei234`!=0
lab var flongw "flagged longitudinal weight "

```

/\* Longitudinal flags for height and weight \*/

```

gen flong=((flongh==1) | (flongw==1)) if (agemons>=0 & agemons<60) // weight and height longitudinal
flags
lab var flong "flagged longitudinal height and weight"

/* Cross sectional flags */

**** using flexible flags cut off points for implausible values = mean +/- 3SD by region and rounds

** preparing the data

* generate child muac in mm without 0, 88 or 99 values
gen muac=p9_q_3cor*10 if p9_q_3cor!=0 & p9_q_3cor<80 & (agemons>=0 & agemons<60)

/* getting the n and mean for the implausible values by region and round

** the mean and sd of each indicator to give the parameters for the flexible flags by region
local zlist zwfl zlen zwei muac
foreach var in `zlist' {
  forvalues r=1(1)4 {
    display as text "`var' in Round `r' "
    tabstat `var' if (agemons>= 0 & agemons<60) & (f2==`r'), by(region) stat(n mean SD) // meand and SD
by region implausible values
  }
}
*/

*** generating the flags

gen fwfl=0 if zwfl~=. // wasting for rounds 1-4
gen flen=0 if zlen~=. // stunting for rounds 1-4
gen fwei=0 if zwei~=. // underweight for rounds 1-4
replace fwfl=1 if (region== 0 ) & (f2== 1 ) & (zwfl< -4.0068829 | zwfl > 2.5546811 )
replace fwfl=1 if (region== 1 ) & (f2== 1 ) & (zwfl< -6.1264229 | zwfl > 4.9075051 )
replace fwfl=1 if (region== 2 ) & (f2== 1 ) & (zwfl< -6.3719358 | zwfl > 5.5088802 )
replace fwfl=1 if (region== 3 ) & (f2== 1 ) & (zwfl< -5.7057583 | zwfl > 4.5959357 )
replace fwfl=1 if (region== 4 ) & (f2== 1 ) & (zwfl< -5.5286122 | zwfl > 3.6605918 )
replace fwfl=1 if (region== 5 ) & (f2== 1 ) & (zwfl< -4.7188794 | zwfl > 2.8474206 )
replace fwfl=1 if (region== 6 ) & (f2== 1 ) & (zwfl< -4.4259734 | zwfl > 3.1136746 )

replace fwfl=1 if (region== 0 ) & (f2== 2 ) & (zwfl< -3.5152546 | zwfl > 2.5375274 )
replace fwfl=1 if (region== 1 ) & (f2== 2 ) & (zwfl< -3.5852944 | zwfl > 2.7294296 )
replace fwfl=1 if (region== 2 ) & (f2== 2 ) & (zwfl< -3.6191777 | zwfl > 2.7308323 )
replace fwfl=1 if (region== 3 ) & (f2== 2 ) & (zwfl< -3.7223151 | zwfl > 2.9652729 )
replace fwfl=1 if (region== 4 ) & (f2== 2 ) & (zwfl< -3.2317507 | zwfl > 1.7729111 )
replace fwfl=1 if (region== 5 ) & (f2== 2 ) & (zwfl< -3.791178 | zwfl > 2.354304 )
replace fwfl=1 if (region== 6 ) & (f2== 2 ) & (zwfl< -3.3140014 | zwfl > 2.3503094 )

replace fwfl=1 if (region== 0 ) & (f2== 3 ) & (zwfl< -3.6784508 | zwfl > 2.5359892 )
replace fwfl=1 if (region== 1 ) & (f2== 3 ) & (zwfl< -4.0386315 | zwfl > 2.8084785 )
replace fwfl=1 if (region== 2 ) & (f2== 3 ) & (zwfl< -4.0338624 | zwfl > 2.8404636 )
replace fwfl=1 if (region== 3 ) & (f2== 3 ) & (zwfl< -3.4741756 | zwfl > 2.8003544 )
replace fwfl=1 if (region== 4 ) & (f2== 3 ) & (zwfl< -3.3831998 | zwfl > 1.7755306 )
replace fwfl=1 if (region== 5 ) & (f2== 3 ) & (zwfl< -3.5329863 | zwfl > 2.4007857 )
replace fwfl=1 if (region== 6 ) & (f2== 3 ) & (zwfl< -3.5223701 | zwfl > 2.4538267 )

replace fwfl=1 if (region== 0 ) & (f2== 4 ) & (zwfl< -3.9122156 | zwfl > 2.6349964 )
replace fwfl=1 if (region== 1 ) & (f2== 4 ) & (zwfl< -4.1694329 | zwfl > 2.7523111 )

```

replace fwfl=1 if (region== 2 ) & (f2== 4 ) & (zwfl< -4.1675947 | zwfl > 2.8681193 )  
replace fwfl=1 if (region== 3 ) & (f2== 4 ) & (zwfl< -3.575013 | zwfl > 2.776623 )  
replace fwfl=1 if (region== 4 ) & (f2== 4 ) & (zwfl< -3.8131853 | zwfl > 2.0726215 )  
replace fwfl=1 if (region== 5 ) & (f2== 4 ) & (zwfl< -3.6266169 | zwfl > 2.3440701 )  
replace fwfl=1 if (region== 6 ) & (f2== 4 ) & (zwfl< -4.1781239 | zwfl > 2.7007081 )

replace flen=1 if (region== 0 ) & (f2== 1 ) & (zlen< -5.59575 | zlen > 1.752906 )  
replace flen=1 if (region== 1 ) & (f2== 1 ) & (zlen< -7.649786 | zlen > 4.600252 )  
replace flen=1 if (region== 2 ) & (f2== 1 ) & (zlen< -8.057559 | zlen > 3.732021 )  
replace flen=1 if (region== 3 ) & (f2== 1 ) & (zlen< -7.680355 | zlen > 4.152929 )  
replace flen=1 if (region== 4 ) & (f2== 1 ) & (zlen< -7.511735 | zlen > 3.572611 )  
replace flen=1 if (region== 5 ) & (f2== 1 ) & (zlen< -8.009437 | zlen > 3.331835 )  
replace flen=1 if (region== 6 ) & (f2== 1 ) & (zlen< -7.649394 | zlen > 3.308844 )

replace flen=1 if (region== 0 ) & (f2== 2 ) & (zlen< -5.22451 | zlen > 1.33742 )  
replace flen=1 if (region== 1 ) & (f2== 2 ) & (zlen< -5.493669 | zlen > 3.047331 )  
replace flen=1 if (region== 2 ) & (f2== 2 ) & (zlen< -5.374753 | zlen > 2.028941 )  
replace flen=1 if (region== 3 ) & (f2== 2 ) & (zlen< -5.206226 | zlen > 3.246454 )  
replace flen=1 if (region== 4 ) & (f2== 2 ) & (zlen< -5.082051 | zlen > 1.467501 )  
replace flen=1 if (region== 5 ) & (f2== 2 ) & (zlen< -6.458378 | zlen > 2.520124 )  
replace flen=1 if (region== 6 ) & (f2== 2 ) & (zlen< -5.726503 | zlen > 1.451135 )

replace flen=1 if (region== 0 ) & (f2== 3 ) & (zlen< -5.620918 | zlen > 1.672754 )  
replace flen=1 if (region== 1 ) & (f2== 3 ) & (zlen< -5.1264163 | zlen > 3.3466457 )  
replace flen=1 if (region== 2 ) & (f2== 3 ) & (zlen< -5.168786 | zlen > 1.883428 )  
replace flen=1 if (region== 3 ) & (f2== 3 ) & (zlen< -4.995207 | zlen > 2.757183 )  
replace flen=1 if (region== 4 ) & (f2== 3 ) & (zlen< -5.24995 | zlen > 1.47425 )  
replace flen=1 if (region== 5 ) & (f2== 3 ) & (zlen< -6.169084 | zlen > 2.20898 )  
replace flen=1 if (region== 6 ) & (f2== 3 ) & (zlen< -5.729323 | zlen > 1.365767 )

replace flen=1 if (region== 0 ) & (f2== 4 ) & (zlen< -5.660815 | zlen > 1.936241 )  
replace flen=1 if (region== 1 ) & (f2== 4 ) & (zlen< -5.316475 | zlen > 3.019685 )  
replace flen=1 if (region== 2 ) & (f2== 4 ) & (zlen< -5.171217 | zlen > 2.025693 )  
replace flen=1 if (region== 3 ) & (f2== 4 ) & (zlen< -4.822251 | zlen > 2.670549 )  
replace flen=1 if (region== 4 ) & (f2== 4 ) & (zlen< -5.551132 | zlen > 1.763204 )  
replace flen=1 if (region== 5 ) & (f2== 4 ) & (zlen< -5.973065 | zlen > 2.205691 )  
replace flen=1 if (region== 6 ) & (f2== 4 ) & (zlen< -6.776489 | zlen > 2.451415 )

replace fwei=1 if (region== 0 ) & (f2== 1 ) & (zwei< -4.830409 | zwei > 1.565477 )  
replace fwei=1 if (region== 1 ) & (f2== 1 ) & (zwei< -5.386199 | zwei > 2.813827 )  
replace fwei=1 if (region== 2 ) & (f2== 1 ) & (zwei< -5.603153 | zwei > 2.559427 )  
replace fwei=1 if (region== 3 ) & (f2== 1 ) & (zwei< -5.464753 | zwei > 2.743379 )  
replace fwei=1 if (region== 4 ) & (f2== 1 ) & (zwei< -5.08886 | zwei > 1.587988 )  
replace fwei=1 if (region== 5 ) & (f2== 1 ) & (zwei< -5.48951 | zwei > 1.503268 )  
replace fwei=1 if (region== 6 ) & (f2== 1 ) & (zwei< -5.12902 | zwei > 1.738982 )

replace fwei=1 if (region== 0 ) & (f2== 2 ) & (zwei< -4.3601768 | zwei > 1.4510368 )  
replace fwei=1 if (region== 1 ) & (f2== 2 ) & (zwei< -4.1712669 | zwei > 2.1979851 )  
replace fwei=1 if (region== 2 ) & (f2== 2 ) & (zwei< -4.363058 | zwei > 1.825444 )  
replace fwei=1 if (region== 3 ) & (f2== 2 ) & (zwei< -4.3877136 | zwei > 2.7516504 )  
replace fwei=1 if (region== 4 ) & (f2== 2 ) & (zwei< -4.235703 | zwei > 1.185993 )  
replace fwei=1 if (region== 5 ) & (f2== 2 ) & (zwei< -4.939138 | zwei > 1.640072 )  
replace fwei=1 if (region== 6 ) & (f2== 2 ) & (zwei< -4.5394409 | zwei > 1.3764889 )

replace fwei=1 if (region== 0 ) & (f2== 3 ) & (zwei< -4.4063076 | zwei > 1.3273236 )  
replace fwei=1 if (region== 1 ) & (f2== 3 ) & (zwei< -3.8865476 | zwei > 2.0199892 )  
replace fwei=1 if (region== 2 ) & (f2== 3 ) & (zwei< -4.409672 | zwei > 1.715458 )  
replace fwei=1 if (region== 3 ) & (f2== 3 ) & (zwei< -4.1920284 | zwei > 2.4738156 )  
replace fwei=1 if (region== 4 ) & (f2== 3 ) & (zwei< -4.2937324 | zwei > 1.0100084 )  
replace fwei=1 if (region== 5 ) & (f2== 3 ) & (zwei< -5.101787 | zwei > 1.998433 )

```

replace fwei=1 if (region== 6 ) & (f2== 3 ) & (zwei< -4.659644 | zwei > 1.378036 )

replace fwei=1 if (region== 0 ) & (f2== 4 ) & (zwei< -4.3471872 | zwei > 1.2828492 )
replace fwei=1 if (region== 1 ) & (f2== 4 ) & (zwei< -4.301759 | zwei > 2.023993 )
replace fwei=1 if (region== 2 ) & (f2== 4 ) & (zwei< -4.441531 | zwei > 1.757807 )
replace fwei=1 if (region== 3 ) & (f2== 4 ) & (zwei< -4.223305 | zwei > 2.433695 )
replace fwei=1 if (region== 4 ) & (f2== 4 ) & (zwei< -4.5221007 | zwei > 1.1256207 )
replace fwei=1 if (region== 5 ) & (f2== 4 ) & (zwei< -5.100936 | zwei > 2.012628 )
replace fwei=1 if (region== 6 ) & (f2== 4 ) & (zwei< -5.044858 | zwei > 1.549172 )

foreach Y in wfl len wei {
  replace f`Y'= . if z`Y'= .
}

```

```

gen fac=0 if muac!=.
replace fac=1 if (region==0) & (f2==1) & (muac<94.35641 | muac >182.50799 )
replace fac=1 if (region==1) & (f2==1) & (muac<92.17409 | muac >190.22531 )
replace fac=1 if (region==2) & (f2==1) & (muac<100.0618 | muac >187.7458 )
replace fac=1 if (region==3) & (f2==1 ) & (muac< 86.41067 | muac > 186.94913 )
replace fac=1 if (region== 4 ) & (f2== 1 ) & (muac< 93.72321 | muac > 184.81719 )
replace fac=1 if (region== 5 ) & (f2== 1 ) & (muac< 99.83975 | muac > 174.82565 )
replace fac=1 if (region== 6 ) & (f2== 1 ) & (muac< 93.60384 | muac > 187.56816 )

replace fac=1 if (region== 0 ) & (f2== 2 ) & (muac< 106.89085 | muac > 180.93175 )
replace fac=1 if (region== 1 ) & (f2== 2 ) & (muac< 108.72026 | muac > 182.81474 )
replace fac=1 if (region== 2 ) & (f2== 2 ) & (muac< 103.07959 | muac > 181.69261 )
replace fac=1 if (region== 3 ) & (f2== 2 ) & (muac< 100.05384 | muac > 186.39456 )
replace fac=1 if (region== 4 ) & (f2== 2 ) & (muac< 103.12086 | muac > 177.33414 )
replace fac=1 if (region== 5 ) & (f2== 2 ) & (muac< 107.17716 | muac > 174.28164 )
replace fac=1 if (region== 6 ) & (f2== 2 ) & (muac< 102.13907 | muac > 177.25433 )

replace fac=1 if (region== 0 ) & (f2== 3 ) & (muac< 108.18711 | muac > 181.57509 )
replace fac=1 if (region== 1 ) & (f2== 3 ) & (muac< 111.23701 | muac > 180.50479 )
replace fac=1 if (region== 2 ) & (f2== 3 ) & (muac< 108.20051 | muac > 179.05709 )
replace fac=1 if (region== 3 ) & (f2== 3 ) & (muac< 95.62987 | muac > 193.81453 )
replace fac=1 if (region== 4 ) & (f2== 3 ) & (muac< 108.95942 | muac > 171.50558 )
replace fac=1 if (region== 5 ) & (f2== 3 ) & (muac< 108.28138 | muac > 178.32262 )
replace fac=1 if (region== 6 ) & (f2== 3 ) & (muac< 101.28487 | muac > 176.81293 )

replace fac=1 if (region== 0 ) & (f2== 4 ) & (muac< 109.98055 | muac > 179.42305 )
replace fac=1 if (region== 1 ) & (f2== 4 ) & (muac< 104.21314 | muac > 184.98406 )
replace fac=1 if (region== 2 ) & (f2== 4 ) & (muac< 108.36189 | muac > 179.55231 )
replace fac=1 if (region== 3 ) & (f2== 4 ) & (muac< 93.66479 | muac > 194.72921 )
replace fac=1 if (region== 4 ) & (f2== 4 ) & (muac< 104.05644 | muac > 174.70536 )
replace fac=1 if (region== 5 ) & (f2== 4 ) & (muac< 104.89604 | muac > 180.86456 )
replace fac=1 if (region== 6 ) & (f2== 4 ) & (muac< 104.40283 | muac > 174.66817 )
replace fac=. if muac==.

```

```

lab var fwfl "flexible flags for wasting"
lab var flen "flexible flags for stunting"
lab var fwei "flexible flags for underweight"
lab var fac "flexible flags for muac"

```

\*\*\*\* cross sectional flags for wasting , stunting and underweight

```

tempvar ovflag
gen `ovflag'=((fwfl==1) | (flen==1) | (fwei==1)) if (agemons>=0 & agemons<60)

```

```

egen fcros=total(`ovflag'), by (indkey f2) // excludes only the observation not the child
lab var fcros "flagged cross sectional flexible flags"

```

```

/* Nutrition indicators */

** preparing the variables of oedema
tempvar oedema
gen `oedema'=(p9_q_4cor==1) if (agemons>=0 & agemons<60) // selecting children with oedema

/* wasting*/

gen wasting_GLO=0 if zwfl~=. // global = moderate + severe
replace wasting_GLO=1 if zwfl<-2
replace wasting_GLO=1 if `oedema'==1
replace wasting_GLO=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var wasting_GLO "child with global wasting (moderate + severe)"

gen wasting_MO=0 if zwfl~=. // moderate
replace wasting_MO=1 if zwfl>=-3 & zwfl<-2
replace wasting_MO=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var wasting_MO "child with moderate wasting"

gen wasting_SE=0 if zwfl~=. // severe
replace wasting_SE=1 if zwfl<-3
replace wasting_SE=1 if `oedema'==1
replace wasting_SE=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var wasting_SE "child with severe wasting"

/* stunting */

gen stunting_GLO=0 if zlen~=. // global = moderate + severe
replace stunting_GLO=1 if zlen<-2
replace stunting_GLO=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var stunting_GLO "child with global stunting (moderate + severe)"

gen stunting_MO=0 if zlen~=. // moderate
replace stunting_MO=1 if zlen>=-3 & zlen<-2
replace stunting_MO=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var stunting_MO "child with moderate stunting"

gen stunting_SE=0 if zlen~=. // severe
replace stunting_SE=1 if zlen<-3
replace stunting_SE=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var stunting_SE "child with severe stunting"

/* underweight */

gen underweight_GLO=0 if zwei~=.
replace underweight_GLO=1 if zwei<-2 // global = moderate + severe
replace underweight_GLO=1 if `oedema'==1 // select oedema cases
replace underweight_GLO=. if (fcros==1) | (flong==1) // excluding biologically implausibles
crosssectional and longitudinal
lab var underweight_GLO "child with global underweight (moderate + severe)"

gen underweight_MO=0 if zwei~=.
replace underweight_MO=1 if zwei>=-3 & zwei<-2 // moderate
replace underweight_MO=. if (fcros==1) | (flong==1) // excluding biologically implausibles
lab var underweight_MO "child with moderate underweight"

gen underweight_SE=0 if zwei~=.
replace underweight_SE=1 if zwei<-3 // severe cases
replace underweight_SE=1 if `oedema'==1 // select oedema cases
replace underweight_SE=. if (fcros==1) | (flong==1) // excluding biologically implausibles

```

```

lab var underweight_SE "child with severe underweight"

/* child arm circumference MUAC */

gen muac_GLO=0 if muac!=.
replace muac_GLO=1 if muac<125 // cut off points in mm to define MUAC wasting for
children 6-59 months
replace muac_GLO=1 if `oedema'==1
replace muac_GLO=. if (fac==1) | (fcros==1) | (flong==1) // excluding biologically implausibles
lab var muac_GLO "child with global wasting MUAC (moderate + severe)"

gen muac_MO=0 if muac!=.
replace muac_MO=1 if muac>=115 & muac<125 // moderate
replace muac_MO=. if (fac==1) | (fcros==1) | (flong==1) // excluding biologically implausibles
lab var muac_MO "child with moderate wasting MUAC"

gen muac_SE=0 if muac!=.
replace muac_SE=1 if muac<115 // severe
replace muac_SE=1 if `oedema'==1 // select oedema cases
replace muac_SE=. if (fac==1) | (fcros==1) | (flong==1) // excluding biologically implausibles
lab var muac_SE "child with severe wasting MUAC"

local droplist dheight dr1height dr2height dr3height d123 d124 d134 d234 hei fhei123 fhei124 fhei134
fhei234 ///
dweight dr1weight dr2weight dr3weight dw123 dw124 dw134 dw234 wei fwei123 fwei124
fwei134 fwei234 ///
muac
foreach var in `droplist' {
capture drop `var'
}

```