

Data Cleaning for Height and Weight – 1973-78 and 1946-51 cohorts

Age Cohorts	1973-78 and 1946-51 cohorts
Surveys	All
Derived Variable	Height
Definition	Best estimate of actual height given all survey responses
Source Items (Index Numbers)	Height reported at survey (WTSH-001)
Statistical form	Continuous variable
Index Number	(WTSH-074)
Age Cohorts	1973-78 and 1946-51 cohorts
Surveys	All
Derived Variable	BMI
Definition	Body Mass Index – a measure of adiposity which is independent of height; also known as the Quetelet Index
Source Items (Index Numbers)	Height: Estimated (WTSH-074) or reported (WTSH-001) Self-reported weight (WTSH-002)
Statistical form	Continuous variable
Index Number	(WTSH-041)
Prepared by	Jean Ball, Jess Ford, Anne Russell, Lauren Williams, and Richard Hockey
Endorsed	24 April 2002 (updated 19 July 2006 and March 2009)

Note: Further information on cleaning and derivation of anthropomorphic data is contained in ALSWH Technical Reports available here:

http://www.alswh.org.au/Reports/technical_reports.html

The earliest formal guidelines for cleaning anthropometric data were developed by Lauren Williams¹ as part of her doctoral research and are recorded below.

Height

At each survey, height is reported in either in centimetres, or in feet and inches and converted to centimetres; values are rounded to the nearest integer.

Between April 2002 and August 2006 limits were set on plausible values for height in each of the project cohorts (height less than 120cm: all cohorts; height greater than 200cm: 1973-78 and 1946-51 cohorts; height greater than 190cm: 1921-26 cohort) and values outside these limits were set to missing. From August 2006, these values were used to trigger a data audit (see later).

Weight

At each survey, weight is reported either as stones and pounds, or as kilograms; stones and pounds are converted to kilograms. Weight in kilograms is rounded to the nearest 0.1 of a kilogram.

In April 2002 the following limits were set for plausible weights and the derived variable body mass index (BMI) in each of the project cohorts; values outside these limits were set to missing. The

upper limit for weight among 1973-78 and 1946-51 cohort women was set at the maximum reading (139.9kg) for the digital scales used in Australia's National Nutrition Survey (NNS) in 1995.²

	1973-78	1946-51	1921-26
Lower limit for weight (kg)	30	30	30
Upper limit for weight (kg)	140	140	120
<i>Lower limit for body mass index</i>	14	14	14
Upper limit for body mass index	55	55	50

In July 2006 this decision was reviewed in light of analytic issues arising from it. Specifically, records with missing data are excluded from a statistical analysis. This is undesirable and, in cases such as weight (and consequently BMI) where the level of missing data is high, this has become a major issue. The exclusion of extreme values as a data cleaning strategy exacerbates this problem. Interestingly the technique of data imputation, which is being applied to the problem of missing data, would use responses to other survey items to estimate weight (or BMI), even if weight had not been missing from surveys but was believed to be implausible. Application of imputation in this instance would introduce incorrect data values into the statistical analysis.

An examination of the patterns of reported weight and BMI across Surveys 1 to 3 for all 1946-53 cohort women with an extreme BMI value (<14 or >55) at 1 or more surveys showed that the pattern of weight was mostly consistent, suggesting the reports were true though extreme. A sample of readily accessible survey forms was checked to exclude an error in data-entry. Values were mostly correctly entered and, in one case, the correction a data-entry error removed the outlying value.

In addition, data published from longitudinal studies of free-living populations of women in which body weight was *measured* was reviewed to describe the true range of weight changes which women experience. An attempt was made to use these data to develop values for weight change between ALSWH surveys consistent with that observed when weight is measured rather than reported (Appendix 2). A wide range of values of real changes were reported and so the option of assigning weight (and BMI) to missing when an extreme change is reported was rejected.

Examples of extreme changes reported by members of the 1973-78 cohort (Table 1) suggested data entry errors, e.g. the Survey 2 value for Case 1 may have been incorrectly entered as 30kg rather than 50kg.

Table 1 Some extreme weight changes in the 1973-78 cohort

	Reported weight at:			Weight Change for:			
	Survey 1	Survey 2	Survey 3	Surveys 1 to 2 (4 years)		Surveys 2 to 3 (3 years)	
<i>case</i>				<i>Actual</i>	<i>Percent</i>	<i>Actual</i>	<i>Percent</i>
1	58	30	55	-28kg	48%	+25	183%
2	50	50	115	0kg	0%	+65kg	230%
3	64	63	134	-1kg	98%	+71kg	213%
4	Missing	33.6	100			+66kg	298%

So, in 2006 (and revised in 2007) it was decided that:

- Extreme values should no longer be deleted
- Extreme values for weight, BMI, height and change in weight should be audited and unless a data-entry error is identified, the value should stand. Extremes are defined as:
 - Weight < 30kg or >140kg(all cohorts) where only one weight is recorded.
 - Weight < 20kg or > 200kg(all cohorts) where 2 or more weights are recorded.
 - Height less than 120cm (all cohorts)
 - Height > 200cm (1973-78 and 1946-51 cohorts) or > 190cm (1921-26 cohort)
 - Weight, lose or gain more than 10% per year with a maximum change over any period being 50%.

No limits were set on BMI. There were a few women with very low BMIs but on examination it appeared their values were consistent over more than one survey and were within the range reported in the literature (particularly amongst anorexic populations).

Weight and pregnancy

For the first 3 surveys of the 1921-26 cohort and the first survey of the 1946-51 cohort, the value of weight is set to missing for women who reported being pregnant at the time of the survey. Current pregnancy was not asked of the 1946-51 cohort after Survey 1. Starting with Survey 4, pregnant 1973-78 cohort women were asked to record their pre-pregnancy weight.

Historical Criteria for screening and cleaning of the anthropometric data of 1946-53 cohort at Surveys 1 and 2

Lauren Williams¹ developed these guidelines for cleaning anthropometric data for 1946-53 cohort women. Acceptable ranges for height, weight and BMI were based on the distributions of these parameters among women aged 45-64 years in the National Nutrition Survey (NNS).³ In the NNS heights and weights were measured, unlike the self-report data from ALSWH. The plausibility of weight changes between surveys was assessed against reported weight changes in The Melbourne Mid-life study.⁴

Height (cm)

Acceptable range:² ≥ 150 and < 180

Rationale:²

- No heights were 180cm or above.
- Only 3.9% of heights were in the range of 140-149 cm.

Data Checking:

Survey 1

If Survey 1 height is outside the reference range or missing:

- If Survey 2 height is inside the reference range, assign Survey 2 height to Survey 1.
- If Survey 2 height is outside the reference range, assign both heights to missing.

Survey 2

Use the reverse of Survey 1 procedure.

Weight (kg)

Acceptable range:² > 35 and < 130

Rationale:²

- No weights were below 40 kg; the lower limit of the acceptable range was decreased to 35 kg to allow for underestimation in self-report weight.
- Only 0.2% of weights were 130 kg or more; 130 kg is the maximum value on bathroom scales.

Data Checking:

Surveys 1 and 2

If the difference in weight between Surveys 1 and 2 exceeds 30 kg, assign weight at both surveys to missing.

BMI¹

Acceptable range:² ≥ 15 and < 50

Rationale:²

- The 5th percentile for BMI was 20.5.
- The 95th percentile for BMI was 37.9.

Data Checking:

Weight and height were revised as shown above prior to calculation of BMI.

Surveys 1 and 2

If both weight and height are in the acceptable ranges, BMI is calculated.

If either weight or height is outside the acceptable ranges, BMI is assigned as missing.

Weight change from Survey 1 to Survey 2 (two years)

Acceptable change: ≤ 30 kg

Rationale:

The Melbourne Mid-life study¹⁰ recorded weight loss over a five year period. The maximum observed for weight loss was 18.5 kg and for weight gain was 26.0 kg. The acceptable range of weight change was widened for the ALSWH.

Checking procedure:

Calculated weight changes exceeding 30 kg were set to missing.

References

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3. Physical Measurements. 1998, AGPS: Canberra. p. 110-112, 115
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Estimated Height – 1973-78 and 1946-53 cohorts

An examination of reported heights at the first 3 surveys showed implausible inconsistencies for all 3 age cohorts, with only 10.6% (n=1 439), 29.3% (n=4 005) and 16.4% (n=2 031) of 1973-78, 1946-53 and 1921-26 cohort women respectively reporting the same height at all 3 surveys. While a reduction in height may be expected among the 1921-26 cohort this is not true for the other two age cohorts and so a single estimate for height was developed for these women, making use of all the available data. Heights for the 1921-26 cohort see separate section.

Defining Consistency in reported heights for the 1973-78 and 1946-53 cohorts

Rules for consistency were based on differences in the height reported at each of the surveys (Table 2) and a difference of up to 5cm was considered to be sufficiently consistent as to represent a report of the same height. For example, reported heights of 175cm at Survey 1 and 180cm at Survey 2, a difference of 5, were considered consistent; however a height of 175cm at Survey 1 was considered inconsistent with a height of 183cm at Survey 2, a difference of 8cm.

Table 2 Descriptive statistics for differences in reported height (cm)

	Number	Mean	Std Dev	Median	Minimum	Maximum
1973-78 cohort						
Surveys 1 & 2	8 139	-0.111	4.49	0	-45	51
Surveys 3 & 2	6 280	-0.038	4.39	0	-39	43
Surveys 3 & 1	7 247	-0.236	4.27	0	-32	33
1946-53 cohort						
Surveys 1 & 2	10 660	-0.112	3.24	0	-41	43
Surveys 3 & 2	9 310	-0.161	3.60	0	-33	43
Surveys 3 & 1	10 297	-0.252	3.62	0	-33	50
1921-26 cohort						
Surveys 1 & 2	9 354	-0.753	4.95	0	-41	33
Surveys 3 & 2	7 314	-0.872	5.90	0	-43	51
Surveys 3 & 1	7 732	-1.680	5.44	0	-41	53

Calculation of Height for 1973-78 and 1946-53 cohorts

Rules for the estimation of Height were based on the patterns of responses at all surveys (Table 3). Height was assigned using the following rules (after 4 surveys):

Case	Action
Case 1 All heights missing:	Average height was set to missing,
Case 2 Three heights missing (one valid height):	Average height was set to this value.
Case 3 Two heights missing (two valid heights):	If difference between heights was >5cm then average height was set to missing other wise average of the 2 heights was used.
Case 4 One height missing (three valid heights):	If two heights were equal or within 5cm and any of the others differ by >5cm then average height set to the average of these two heights. Where this condition was satisfied by more than two pairs the most recent heights were used. If the maximum difference between measurements was >10cm then average height is set to missing. If none are equal and all are within 5cm then average height is

	taken as the average of all three heights. (Note: These are the same rules used previously for three surveys).
Case 5 No heights missing (four valid heights):	If all equal the average height set to this value. If three heights equal or within 5cm and 4 th different by >5cm then average height is set the average of these three heights. If two heights equal or within 5cm and two others different by >5cm then average height set to the average of these two heights. As for Case 4 where these conditions are met by more than one combination the most recent heights are used.

Table 4 shows the reported and estimated heights for the Younger and Mid-age women

Table 3: Number and percent for each unique data-pattern and the method used to estimate height for 14 247 1973-78 cohort and 13 716 1946-53 cohort women providing contact details for longitudinal follow-up

Method for estimating height applied to various data-patterns	1973-78		1946-53	
	Number	Percent	Number	Percent
Height is the single height reported				
Height reported at Survey 1 only	3 486	24.5	1 474	10.7
Height reported at Survey 2 only	215	1.5	67	0.5
Height reported at Survey 3 only	130	0.9	75	0.5
Height is the mean of 3 reported heights				
Heights reported at 3 surveys are equal.	1 439	10.1	4 005	29.2
Height is reported at all 3 surveys and no differences between them exceeds 5cm	925	6.5	609	4.4
Height is reported at all 3 surveys; none of the data patterns shown below are appropriate and no differences between these heights exceeds 10cm	295	2.1	199	1.5
Height is the mean of two equal heights				
Heights reported at Surveys 1 & 2 are equal; height reported at Survey 3 does not equal this value	769	5.4	1 484	10.8
Heights reported at Surveys 1 & 3 are equal; height reported at Survey 2 does not equal this value	680	4.8	1212	8.8
Heights reported at Surveys 2 & 3 are equal; height reported at Survey 1 does not equal this value	1 269	8.9	1 389	10.1
Height is the mean of the 2 heights reported				
<i>Survey 1 height is missing</i>				
Heights reported at Surveys 2 & 3 are equal	120	0.8	76	0.6
Heights reported at Surveys 2 & 3 are within 5cm of one another	196	1.4	83	0.6
<i>Survey 2 height is missing</i>				
Heights reported at Surveys 1 & 3 are equal	489	3.4	584	4.3
Heights reported at Surveys 1 & 3 are within 5cm of one another	733	5.1	497	3.6
<i>Continued over</i>				

Table 3 (continued)

Method for estimating height applied to various data-patterns	1973-78		1946-53	
	Number	Percent	Number	Percent
<i>Survey 3 height is missing</i>				
Heights reported at Surveys 1 & 2 are equal	796	5.6	843	6.1
Heights reported at Surveys 1 & 2 are within 5cm of one another	1 159	8.1	603	4.4
Height is the mean of 2 heights with a difference not exceeding 5cm				
Difference between Surveys 1 & 2 does not exceed 5 cm	146	1.0	90	0.7
Difference between Surveys 2 & 3 does not exceed 5 cm	140	1.0	59	0.4
Difference between Surveys 1 & 3 does not exceed 5 cm	136	1.0	59	0.4
Height is not estimated (Set to missing)				
Inconsistencies – not matching any of the above patterns	515	3.6	124	0.9
All three heights are missing.	609	4.3	184	1.3

Table 4: Minimum, maximum, mean median and 25th and 75th percentiles for height and weight for the 1973-78 and 1946-53 cohort, before and after rules for heights and weights were applied.

(a) 1973-78 cohort

	Min	Max	Mean	Median	25 th percentile	75 th percentile
Height (cm)-						
Before S1	120	198	165.0	165.1	160	171
Before S2	120	198	165.9	165	160	171
Before S3	121	196	165.9	165	160	171
Before S4	120	197	165.8	165	160	171
After (Av)	120	193	165.8	165	161	171
Weight-(Kg)						
Before S1	25	190	62.8	60	54	69
After S1	25	190	62.7	60	54	69
Before S2	30	190	66.0	63	56	72
After S2	34	175	65.9	63	56	72
Before S3	26	200	68.6	65	58	75
After S3	26	200	68.3	65	58	75
Before S4	20	189	69.8	66	58	77
After S4	20	180	69.5	65	58	77

(b) 1946-53 cohort

	Min	Max	Mean	Median	25 th percentile	75 th percentile
Height (cm)-						
Before S1	121.9	198.1	163.1	162.6	157.5	167.6
Before S2	121.9	198.0	163.0	162.6	157.5	167.6
Before S3	121.9	198.1	162.9	162.6	157.5	167.6
Before S4	124.5	198.1	162.9	162.6	157.5	167.6
After (Av)	120.0	198.0	163.0	163.0	157.0	168.0
Weight-(Kg)						
Before S1	31	182	68.8	66	59	76
After S1	33.6	146.1	68.7	66	59	76
Before S2	31	182	69.0	67	60	77
After S2	33	150	69.8	67	60	76.7
Before S3	22	200	71.4	69	60	79.8
After S3	36	188	71.3	69	60	79.4
Before S4	25	190	72.4	70	61.7	80
After S4	36	154	72.2	70	61.7	80

Table 5: number of women with heights, weight and BMI for the 1973-78 and 1946-53 cohorts, before and after rules for heights and weights were applied.

(a) 1973-78 cohort

	Survey 1	Survey 2	Survey 3	Survey 4
Height				
Initial No.	13521	9308	8741	8313
Average Ht	13825	13825	13825	13825
Weight				
Initial No.	13712	9457	8907	8495
Final	13628	9428	8860	8413
BMI				
Final	12905	8979	8523	8122

(b) 1946-53 cohort

	Survey 1	Survey 2	Survey 3	Survey 4
Height				
Initial No.	13456	10904	10595	10272
Average Ht	13796	13796	13796	13796
Weight				
Initial No.	13427	10966	10544	10322
Final	13259	10839	10508	10264
BMI				
Final	12962	10660	10352	10114

The SAS code for estimated height in the 1946-53 cohort at survey 3 is:

```
data middata.m123AvHt;
merge middata.wha1midb(in=inS1)
      middata.wha2midb(in=inS2)
      middata.wha3midb(in=inS3) ;
by IDalias ;

m1htr = round(m1htcm,1);
m2htr = round(m2htcm,1);
m3htr = round(m3htcm,1);

array hts{3} m1htr m2htr m3htr ;

/* Calculate difference between maximum and minimum height */
maxdiff = max(of hts{*})- min(of hts{*}) ;

/* Calculate differences in heights */
diff1=abs(m1htr-m2htr) ;
diff2=abs(m1htr-m3htr) ;
diff3=abs(m2htr-m3htr) ;

/* Calculate the 'average' height */
if nmiss(of hts{*})=3 then ht = .;
else if nmiss(of hts{*})=1 and maxdiff>5 then ht=. ;
else if diff3=0 or ((diff1>5 and diff2>5) and diff3<=5) then
    ht=mean(m2htr,m3htr) ;
else if diff2=0 or ((diff1>5 and diff3>5) and diff2<=5) then
    ht=mean(m1htr,m3htr) ;
else if diff1=0 or ((diff2>5 and diff3>5) and diff1<=5) then
    ht=mean(m1htr,m2htr) ;
else if maxdiff>10 then ht=. ;
else ht = mean(of hts{*}) ;

m123AvHt=round(ht,1) ;
```

Body mass index – 1973-78 and 1946-53 cohorts

Body mass index (BMI) is calculated as reported weight (kg) divided by the square of reported height (metres).

Categories

Conventionally BMI is categorised according to risk of morbidity. Prior to 2004 the Australian National Health and Medical Research Council (NHMRC)¹ recommended 4 categories while the World Health Organisation (WHO)² recommended 6, although there is some overlap between these classification systems (Table 6). Subsequently the NHMRC have adopted the WHO classification.³

Table 6 BMI categories recommended by the Australian NHMRC and the World Health Organisation

Classification	Range for BMI	
NHMRC prior to 2004³		
Underweight	< 20	
Healthy weight	20 to 25	
Overweight	> 25 to 30	
Obese	> 30	
WHO⁴		
Underweight	< 18.5	Risk of co-morbidities Low (but the risk of other clinical problems is increased)
Normal range	18.5 – 24.99	Average
Overweight:	≥ 25.00	
- Pre-obese	- 25.00 - 29.99	Increased
- Obese class I	- 30.00 - 34.99	Moderate
- Obese class II	- 35.00 - 39.99	Severe
- Obese class III	- ≥ 40.00	Very severe

Analysis of BMI should be informed by the following notes from the WHO.

- Recommendations are based on the relationship between BMI and mortality, are independent of age and apply to both men and women.
- BMI may not be associated with the same level of adiposity in different populations.
- The cut-points reflect a simplistic relationship between BMI and the risk of co-morbidity, which can also be affected by factors such as diet, ethnicity and physical activity.
- The risks associated with BMI begin at 25 and are continuous and graded.
- Interpretation of risk categories may vary between populations.
- Both BMI and a measure of fat distribution (such as waist circumference) are important in calculating the risk of co-morbidities.

Although some publications from the first survey of the 1973-78 ALSWH cohort have used WHO category⁴, the ALSWH data sets distributed prior to October 2005 contained only the NHMRC classification, mainly because of the relatively small number of women meeting the WHO criteria for underweight. At the first survey 10.3%, 1.8% and 3.3% of the 1973-78, 1946-53 and 1921-26 cohorts respectively had a BMI of less than 18.5 while 26.9%, 7.1% and 8.6% had BMI less than 20.

References

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Weight change – 1973-78 and 1946-53 cohorts

Variables for weight change are not included in the ALSWH datasets. However it is recommended that weight change (in kilograms) is calculated so that negative values indicate weight loss and positive values indicate weight gain.

The statistical analysis of weight change has varied according to the research question being addressed; some analyses have used categories for the observed weight change¹ while others used percentage change in BMI.²

Review of measured weight change in community-dwelling populations of women

A literature search was conducted on 22 June 2006 using Pubmed (www.pubmed.gov). The criteria were: (weight change AND prospective studies AND epidemiology) NOT (clinical OR controlled trial OR oncology) with limits Adults: 19-44 years, Middle Aged: 45-64 years, Middle aged + Aged: 45+years, Aged: 65+ years, 80 and over: 80+ years, English, published in the last 5 years, Journal Article, Female, Humans.

The search found 74 articles of which 8 were relevant.⁴⁻⁹ Other data sources were also included.^{3, 10-12}

Published means and standard deviations (SD) for weight change (Table A1a) were used to estimate the range of change by calculating the mean \pm 2.5SD for the period observed in the study; to obtain an estimate of change per year these limits were divided the years (or mean of years) observed. Where the range of weight change (Table A1a) was reported they were similarly converted to an estimate of the range per year. Studies summarised in Table A1b have not been used at this time.

Table A2 Estimates of annual range and mean of weight changes from studies with measured weight, extrapolated to intervals between surveys

Reference/ Relevant ALSWH cohorts	Estimated change(kg) per year	Intervals between ALSWH surveys		
		3 years (All cohorts)	2 years (Mid-age Surveys 1 to 2)	4 years (Younger Surveys 1 to 2)
Range				
1973-78 ¹²	-2.3 to 3.7	-6.9 to 11.1	-4.6 to 7.4	-9.2 to 14.8
1973-78 ¹³	-3.0 to 5.1	-9.0 to 15.3	-6.0 to 10.2	-12.0 to 20.4
1946-51 ¹⁰	-2.1 to 3.0	-6.3 to 9.0	-4.2 to 6.0	-8.4 to 12.0
1946-51 ¹⁰	-3.7 to 5.2	-11.1 to 15.6	-7.4 to 10.4	-14.8 to 20.8
1946-51 ¹¹	-1.8 to 3.1	-5.4 to 9.3	-3.6 to 6.2	-7.2 to 12.4
1946-51 ¹³	-3.0 to 5.1	-9.0 to 15.3	-6.0 to 10.2	-12.0 to 20.4
1946-51 ¹³	-2.8 to 6.6	-8.4 to 19.8	-5.6 to 13.2	-11.2 to 26.4
1921-26 ¹¹	-2.5 to 2.8	-7.5 to 8.4	-5.0 to 5.6	-10.0 to 11.2
1921-26 ¹³	-2.8 to 6.6	-8.4 to 19.8	-5.6 to 13.2	-11.2 to 26.4
Mean				
1973-78 ¹²	0.7	2.1	1.4	2.8
1973-78 ¹³	1.1	3.3	2.2	4.4
1946-51 ¹⁰	0.4-0.6	1.2-1.8	0.8-1.2	1.6-2.4
1946-51 ¹¹	0.6	0.9	1.2	2.4
1946-51 ¹³	1.1, 1.9	3.3, 5.7	2.2, 3.8	4.4, 7.6
1921-26 ¹¹	0.2	0.6	0.4	0.8
1921-26 ¹³	1.9	5.7	3.8	7.6

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Table A1a Studies with follow-up in which weight was measured – kilograms of weight change reported as Mean, (SD) or [Range]

1 st author, Year Published	Study Population	Years of Follow-up	Weight Change reported (kg)			Estimated change/year (kg)		
						Range ^a	Mean	
K Ball, 2003 ^b	Melbourne Collaborative Cohort Study: Multi-ethnic; men & women; 35-69 years; Australia	5	<i>Anglo-Celtic women</i>			-1.8 to 3.1	0.6	
			35-40yrs	3.15 (4.91)				-2.5 to 2.8
J Guthrie, 1999	Melbourne Mid-Life Study: women aged 46-57 years (106 Pre menopausal; 106 Peri-menopausal; 21 HRT), Australia	5	Overall: 2.1 (5.1)			-2.1 to 3.0	0.4	
			Premenopausal	2.0	Premenopausal			0.4
			Premenopausal	2.7	Perimenopausal			0.5
			Premenopausal	3.0	Postmenopausal			0.6
Overall:	[-18.5 to 26.0]		[-3.7 to 5.2]					
C Lewis, 1997	CARDIA (Coronary Artery Risk Development in Young Adults): Black and white, men and women aged 18-30 years, USA	7	<i>White women</i>			-2.3 to 3.7	0.7	
P Lahmann, 2005 ^c	EPIC (European Prospective Investigation into Cancer and Nutrition): women median age [Range] 1992 to 2000: Premenopausal 39 [20-58], Postmenopausal 59 [39-80]	Mean 5.8 (±1.6)	Premenopausal:	6.2 (9.4)	-3.0 to 5.1	1.1		
			Postmenopausal:	11.2 (10.9)	-2.8 to 6.6	1.9		
C Langenberg, 2005	Rancho Bernardo Cohort: men and women aged 20-79 years in 1972 to 1974 (mean age: 74.4 years men, 75.6 years women), USA	Median 4.7 (0-18.2)	<i>Men & women, kg/yr</i>			negligible		
			60-64 years:	0.01 [-1.3 to 1.6]				
			70-74 years:	0.19 [-2.5 to 2.5]				
			≥80 years:	-0.47 [-3.1 to 2.5]				

^a Estimated range of change calculated as mean ± 2.5SD for the period observed; limits so calculated divided (mean) years observed

^b Self-report weight at follow-up, corrected according to Australian National Nutrition Survey; ^c Baseline is recalled weight at 20 years

Table A1b Studies with follow-up in which weight was measured – percentage changes

1st author & Pub Year	Study Population	Years of Follow-up	Weight Change
K Ball, 2003	Melbourne Collaborative Cohort Study: Multi-ethnic; men & women; 35-69 years; Australia	5	<p>Percent who Gained or Lost > 10kg <i>Anglo-Celtic women</i> 35-40yrs: 6.3% Gained >10 kg 0.9% Lost > 10kg 65+ yrs: 1.5% Gained >10kg 1.8% Lost >10kg</p>
A Newman, 2001	Community dwelling adults, 65+ years; USA	3	<p><i>Women</i> 4.0% Gained >10kg 6.3% Lost >10kg</p>
A Bell, 2001	CHNS (Chinese Health and Nutrition Survey); adults 20-45 years	8	<p>Percent increase of BMI\geq25 <i>Women: 10.2%</i></p>
J Stevens, 2006	(Review)		<p>Percent Weight Change Recommended definition of long-term maintenance in adults was 'weight change <3% of body weight'</p>
E Bannerman	Australian Longitudinal Study of Ageing (ALSA): Community dwelling adults, 70+ years; Australia	2	<p><i>Women aged 70-103 years; mean (SD) 77.1 (5.5)</i> Mean (SD) [Range]: -0.8% (6.6) [-29.6% to 48.1%]</p>
S Maru, 2004	DOM cohort (Diagnostic Investigation into Breast Cancer): population-based screening program, women aged 50-66 years; Netherlands	0.5 to 3.4 (mean 1)	<p>1.2% Gained >10% body weight 1.8% Lost >10% body weight</p>

