

Web Appendix

Description of missing data:

Analysis focused on missing data from the last three years of life for two reasons: 1) The median time between the last observation and death is 3.4 years, with 53.3% of participants having no weight information in this important period; and 2) The smallest inflection point identified in best-fitting models was 3 years before death.

Web Table 1. Prevalence of missing data by age at death and cause of death

	Missing in last 3 years (%)
Age	
60-69	32.2
70-79	41.2
80-89	58.4
90+	68.1
Cause of death	
Cancer	39.9
CVD	48.7
Other	65.9

Sensitivity Analyses

Four imputation schemes are described in the text. Models 1-5 were tested using each alternative imputation scheme to determine the extent to which missing data might influence selection of the best-fit model and best-fitting knot points. Analyses were conducted for all deaths, each age at death group, and each cause of death group. Additional analyses examined the potential effects of missing data on coefficients from Model 5 for all deaths and each age at death group.

Web Table 2. Model fit comparisons (AIC) for models predicting weight by time to death under alternative missing scenarios

		Model 1	Model 2	Model 3	Model 4	Model 5				
	N	AIC	AIC	AIC	AIC	AIC	k1	(95% CI)	k2	(95% CI)
a. Original data										
All deaths	800	36942.4	36756.0	36084.9	35826.1	35783.0 ^a	9	(7, 10)	17	(16, 18)
60-69	87	3288.7	3295.4	3250.4	3234.0	3230.0 ^a	3	(1, 6)	15	(8, 19)
70-79	211	8972.3	8905.9	8701.0	8617.4	8606.9 ^a	7	(6, 9)	18	(17, 21)
80-89	320	15812.8	15752.0	15463.2	15376.8	15354.0 ^a	3	(2, 4)	16	(14, 17)
90+	182	8726.2	8677.1	8471.3	8432.7	8399.8 ^a	10	(9, 12)	16	(14, 17)
Cancer deaths	143	6626.5	6637.6	6558.2	6504.6	6495.2 ^a	3	(2, 4)	17	(15, 23)
CVD deaths	349	14802.7	14681.4	14461.6	14330.2 ^a	14340.0	8	(7, 10)	19	(17, 21)
Other deaths	211	9655.3	9590.7	9429.2	9377.3	9345.7 ^a	9	(8,11)	16	(15, 18)
b. Imputation 1: Assuming 4% weight loss since last visit for participants missing observations in last three years										
All deaths	800	39337.2	39090.4	38378.1	38087.3	38040.6 ^a	9		17	
60-69	87	3428.3	3434.9	3391.7	3376.7	3373.4 ^a	5		24 [‡]	
70-79	211	9458.7	9382.4	9184.1	9089.9	9079.9 ^a	9		18	
80-89	320	16892.2	16802.1	16473.4	16386.5	16373.7 ^a	3		15	
90+	182	9416.2	9344.5	9131.8	9081.3	9042.9 ^a	10		16	
Cancer deaths	143	6924.5	6934.3	6856.0	6803.2	6796.6 ^a	3		17	
CVD deaths	349	15736.3	15595.7	15363.8	15230.1 ^a	15237.9	8		18	
Other deaths	211	10486.7	10386.2	10189.6	10121.1	10084.0 ^a	9		16	
c. Imputation 2: Assuming 8% weight loss since last visit for participants missing observations in last three years										
All deaths	800	40331.0	40055.0	39509.4	39299.6	39260.7 ^a	9		17	
60-69	87	3496.2	3502.0	3470.3	3465.7	3455.2 ^a	3		6 [‡]	
70-79	211	9633.2	9550.3	9390.9	9322.3	9314.0 ^a	8		18	
80-89	320	17342.4	17239.1	16982.2	16932.8	16909.1 ^a	9 [‡]		17	
90+	182	9731.1	9647.3	9483.5	9448.1	9421.7 ^a	10		16	
Cancer deaths	143	7072.2	7078.7	7019.0	6984.9	6981.5 ^a	3		18	
CVD deaths	349	16126.7	15988.8	15816.3	15724.7 ^a	15727.7	9		18	
Other deaths	211	10829.1	10714.1	10558.5	10508.3	10471.9 ^a	9		16	
d. Imputation 3: Assuming 0.7% weight loss/year since last visit for participants missing observations in last three years										

All deaths	800	40659.0	40488.7	40006.9	39855.0	39832.6 ^a	9		17	
60-69	87	3534.0	3542.0	3512.1	3511.7	3497.8 ^a	3		6‡	
70-79	211	9693.2	9636.7	9483.1	9428.2	9423.9 ^a	7		18	
80-89	320	17479.2	17419.2	17199.4	17165.3	17146.0 ^a	3		16	
90+	182	9836.0	9792.5	9663.1	9640.3	9622.6 ^a	10		17	
Cancer deaths	143	7091.5	7102.2	7043.0	7008.3	7000.3 ^a	3		18	
CVD deaths	349	16234.0	16136.6	16215.2	15991.9	15917.5 ^a	9		19	
Other deaths	211	10814.6	10740.8	10596.5	10563.7	10535.6 ^a	9		16	
e. Imputation 4: Assuming 2.6% weight loss/year since last visit for participants missing observations in last three years										
All deaths	800	49283.7	49249.1	49215.2	49191.0	49185.2 ^a	8		25‡	
60-69	87	4247.1	4256.0	4238.7	4251.2	4232.9 ^a	2		3‡	
70-79	211	11373.3	11362.3	11331.0	11314.7	11312.0 ^a	9		27‡	
80-89	320	21346.1	21328.5	21323.9	21323.2	21314.0 ^a	9‡		24‡	
90+	182	12257.5	12254.7	12235.7	12242.5	12228.2 ^a	14‡		15	
Cancer deaths	143	8418.1	8427.7	8409.6 ^a	8421.3	8412.3	3		4‡	
CVD deaths	349	19561.6	19547.0	19528.5	19533.5	19523.3 ^a	4‡		5‡	
Other deaths	211	13105.4	13079.7	13058.9	13062.9	13040.3 ^a	9		16	

†Indicates best-fitting model (lowest AIC)

‡Indicates knot beyond confidence intervals from (a)

Web Table 3. Fixed effect coefficients from Model 5 under alternative missing scenarios predicting weight by time to death for all causes of death (N=800)

Age group (years)	N	Inflection points (years)	Weight at death	P=	Weight loss rate after inflection	P=	Change in weight loss rate before inflection 1	P=	Change in weight loss rate before inflection 2	P=
		k ₁ , k ₂	B ₀		B ₁ (Time)		B ₂ (Time>k ₁)		B ₃ (Time>k ₂)	
a. Original data										
Average model for all age groups										
60-107	800	9, 17	73.517	<.001	0.390	<.001	-0.270	<.001	-0.109	0.019
Model with varied knot and slopes by age group										
60-69	87	3, 15	77.850	<.001	1.011	0.001	-1.123	<.001	-0.063	0.618
70-79	211	7, 18	75.781	<.001	0.566	<.001	-0.463	0.002	-0.250	0.012
80-89	320	3, 16	70.903	<.001	1.263	<.001	-1.003	0.001	-0.189	0.003
90+	182	10, 16	68.096	<.001	0.468	<.001	-0.267	0.036	-0.099	0.256
b. Imputation 1: Assuming 4% weight loss since last visit for participants missing observations in last three years										
Average model for all age groups										
60-107	800	9, 17	72.129	<.001	0.489	<.001	-0.321	<.001	-0.138	0.004
Model with varied knot and slopes by age group										
60-69	87	5, 24	77.974	<.001	0.436	0.014	-0.525	0.007	-0.098	0.658
70-79	211	9, 18	75.287	<.001	0.497	<.001	-0.385	0.004	-0.228	0.046
80-89	320	3, 15	69.775	<.001	1.209	<.001	-0.833	0.008	-0.287	0.001
90+	182	10,16	66.310	<.001	0.601	<.001	-0.368	0.003	-0.099	0.277
c. Imputation 2: Assuming 8% weight loss since last visit for participants missing observations in last three years										
Average model for all age groups										
60-107	800	9, 17	70.854	<.001	0.581	<.001	-0.370	<.001	-0.164	<.001
Model with varied knot and slopes by age group										
60-69	87	3, 6	76.790	<.001	0.948	0.002	-0.892	0.022	-0.159	0.398
70-79	211	8, 18	74.068	<.001	0.617	<.001	-0.441	0.002	-0.294	0.007
80-89	320	9, 17	70.023	<.001	0.617	<.001	-0.330	<.001	-0.192	0.009
90+	182	10,16	64.572	<.001	0.733	<.001	-0.460	<.001	-0.120	0.201
d. Imputation 3: Assuming 0.7% weight loss/year since last visit for participants missing observations in last three years										

Average model for all age groups

60-107	800	9, 17	71.812	<.001	0.430	<.001	-0.241	<.001	-0.108	0.030
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Model with varied knot and slopes by age group

60-69	87	3, 6	76.614	<.001	1.004	0.001	-1.019	0.009	-0.080	0.676
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70-79	211	7, 18	74.533	<.001	0.562	<.001	-0.408	0.005	-0.228	0.030
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80-89	320	3, 16	69.235	<.001	1.217	<.001	-0.882	0.004	-0.210	0.002
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90+	182	10,17	66.079	<.001	0.535	<.001	-0.293	0.015	-0.048	0.601
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e. Imputation 4: Assuming 2.6% weight loss/year since last visit for participants missing observations in last three years

Average model for all age groups, all causes of death (N=800)

60-107	800	8, 25	69.647	<.001	0.400	<.001	-0.153	0.025	-0.238	<.001
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Model with varied knot and slopes by age group, all causes of death (N=800)

60-69	87	2, 3	74.068	<.001	1.439	0.017	-0.956	0.430	-0.501	0.533
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70-79	211	9, 27	72.716	<.001	0.465	<.001	-0.359	<.001	-0.267	0.188
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80-89	320	9, 24	68.934	<.001	0.408	<.001	-0.099	0.243	-0.295	<.001
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90+	182	14,15	63.475	<.001	0.504	<.001	-0.500	0.375	0.285	0.617
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