

WEB MATERIAL

Body Mass and Weight Change in Adults in Relation to Mortality Risk

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Web Table 1. Cause-Specific Mortality Risk Among Never Smokers in Relation to Body Mass Index^a at Ages 18, 35, and 50 Years, National Institutes of Health-AARP Diet and Health Study, 1996–2009

	Cause of Death															
	Cancer				Cardiovascular Disease				Stroke				Other Causes			
	No. of Deaths ^b	MV HR ^c	95% CI	<i>P</i> -trend ^d	No. of Deaths	MV HR	95% CI	<i>P</i> -trend	No. of Deaths	MV HR	95% CI	<i>P</i> -trend	No. of Deaths	MV HR	95% CI	<i>P</i> -trend
BMI at age 18 years	3,458			0.001	2,567			<0.0005	505			0.003	2,723			<0.0005
<18.5		1.08	0.99, 1.19			0.91	0.81, 1.04			1.18	0.92, 1.51			1.08	0.96, 1.21	
18.5–<22.5		1.0	Referent			1.0	Referent			1.0	Referent			1.0	Referent	
22.5–<25		1.09	0.99, 1.19			1.34	1.21, 1.48			1.30	1.03, 1.65			1.16	1.04, 1.29	
25–<27.5		1.27	1.12, 1.44			1.65	1.44, 1.88			1.43	1.02, 1.99			1.49	1.30, 1.71	
≥27.5		1.33	1.11, 1.59			2.42	2.06, 2.84			1.98	1.31, 2.98			2.66	2.29, 3.09	
BMI at age 35 years	3,542			<0.0005	2,564			<0.0005	517			<0.0005	2,758			<0.0005
<18.5		0.96	0.76, 1.21			1.03	0.76, 1.41			1.36	0.81, 2.26			1.24	0.98, 1.59	
18.5–<22.5		1.0	Referent			1.0	Referent			1.0	Referent			1.0	Referent	
22.5–<25		1.09	1.00, 1.19			1.15	1.03, 1.29			0.94	0.74, 1.18			1.01	0.91, 1.11	
25–<27.5		1.10	1.00, 1.22			1.51	1.34, 1.69			1.09	0.84, 1.41			1.25	1.12, 1.40	
27.5–<30		1.36	1.19, 1.56			2.58	2.25, 2.96			1.58	1.12, 2.22			1.51	1.30, 1.76	
≥30		1.58	1.38, 1.82			3.06	2.66, 3.53			2.25	1.63, 3.10			2.69	2.36, 3.07	
BMI at age 50 years	3,562			<0.0005	2,619			<0.0005	526			<0.0005	2,796			<0.0005
<18.5		1.03	0.73, 1.45			1.66	1.11, 2.47			1.13	0.50, 2.58			2.04	1.49, 2.78	
18.5–<22.5		1.0	Referent			1.0	Referent			1.0	Referent			1.0	Referent	
22.5–<25		1.04	0.94, 1.15			1.10	0.96, 1.27			0.84	0.64, 1.09			1.11	0.99, 1.26	
25–<27.5		1.11	1.00, 1.23			1.36	1.19, 1.56			1.03	0.79, 1.34			1.18	1.05, 1.34	
27.5–<30		1.23	1.08, 1.39			1.94	1.67, 2.26			1.12	0.81, 1.54			1.43	1.24, 1.66	
30–<32.4		1.51	1.31, 1.74			2.52	2.14, 2.97			1.34	0.92, 1.95			1.93	1.64, 2.26	
≥32.5		1.60	1.38, 1.84			4.16	3.58, 4.83			2.15	1.55, 2.98			2.89	2.51, 3.34	
Average BMI ^e	3,334			<0.0005	2,426			<0.0005	481			<0.0005	2,571			<0.0005

<18.5	1.08	0.82, 1.43	1.30	0.90, 1.86	1.30	0.66, 2.54	1.48	1.10, 1.98
18.5–<22.5	1.0	Referent	1.0	Referent	1.0	Referent	1.0	Referent
22.5–<25	1.06	0.98, 1.16	1.19	1.07, 1.33	0.97	0.77, 1.22	1.07	0.96, 1.18
25–<27.5	1.14	1.03, 1.26	1.71	1.52, 1.93	1.11	0.84, 1.45	1.35	1.20, 1.51
27.5–<30	1.43	1.25, 1.64	2.74	2.38, 3.15	1.91	1.39, 2.64	1.80	1.55, 2.08
≥30	1.56	1.31, 1.84	3.70	3.17, 4.32	2.12	1.43, 3.15	3.26	2.81, 3.78

Abbreviations: BMI, body mass index; CI, confidence interval; MV HR, multivariate hazard ratio.

^aWeight (kg)/height (m)².

^bSubjects with missing data on cause of death were not included in cause-specific analyses.

^cAll regression analyses adjusted for age (in the baseline hazard of the Cox regression) and the following covariates: gender, race/ethnicity, education, and leisure-time physical activity (see text Table 3 for definitions).

^dStatistical significance of the linear trend in BMI categories, evaluated using BMI category medians.

^eAverage BMI was calculated as the weighted average of BMIs at 18, 35, and 50 years of age.

Web Table 2. Cause-specific Mortality Risk Among Never Smokers in Relation to Weight Change During 3 Age Intervals, National Institutes of Health-AARP Diet and Health Study, 1996–2009

Age Interval and Weight Change, kg/year	Cause of Death																
	Cancer				Cardiovascular Disease				Stroke				Other Causes				
	No. of Deaths	MV HR ^a	95% CI	<i>P</i> -trend ^b	No. of Deaths	MV HR	95% CI	<i>P</i> -trend	No. of Deaths	MV HR	95% CI	<i>P</i> -trend	No. of Deaths	MV HR	95% CI	<i>P</i> -trend	
18–35 years	3,384			<0.0005	2,468			<0.0005	489				0.006	2,629			<0.0005
Loss of >0.2		1.01	0.83, 1.21			0.68	0.52, 0.88			0.90	0.55, 1.46			0.89	0.72, 1.10		
Stable (±0.2)		1.0	Referent			1.0	Referent			1.0	Referent			1.0	Referent		
Gain of >0.2–0.6		1.08	0.99, 1.19			1.23	1.10, 1.39			0.92	0.73, 1.17			1.02	0.91, 1.13		
Gain of >0.6–1		1.18	1.05, 1.32			1.47	1.28, 1.68			1.03	0.77, 1.38			1.23	1.08, 1.39		
Gain of >1		1.37	1.21, 1.56			2.10	1.82, 2.42			1.51	1.10, 2.06			1.73	1.51, 1.98		
35–50 years	3,486			<0.0005	2,520			<0.0005	506				0.07	2,698			<0.0005
Loss of >0.2		1.03	0.90, 1.19			1.11	0.95, 1.31			0.99	0.68, 1.44			1.13	0.97, 1.31		
Stable (±0.2)		1.0	Referent			1.0	Referent			1.0	Referent			1.0	Referent		
Gain of >0.2–0.6		1.04	0.96, 1.13			1.24	1.12, 1.38			0.97	0.78, 1.21			0.91	0.82, 1.00		
Gain of >0.6–1		1.13	1.02, 1.24			1.44	1.28, 1.62			1.21	0.94, 1.55			1.10	0.98, 1.23		
Gain of >1		1.32	1.16, 1.50			2.08	1.81, 2.38			1.24	0.88, 1.73			1.76	1.55, 2.00		
50–69 years	3,507			0.54	2,560			0.003	511				0.72	2,743			0.04
Loss of >0.2		1.12	1.01, 1.24			1.51	1.35, 1.69			1.26	0.96, 1.64			1.71	1.53, 1.90		
Stable (±0.2)		1.0	Referent			1.0	Referent			1.0	Referent			1.0	Referent		
Gain of >0.2–0.6		0.94	0.86, 1.02			0.90	0.81, 1.00			0.80	0.64, 1.01			0.88	0.80, 0.98		
Gain of >0.6–1		1.01	0.90, 1.13			1.05	0.92, 1.21			1.09	0.82, 1.44			1.01	0.88, 1.15		
Gain of >1		1.02	0.90, 1.16			1.21	1.05, 1.39			0.86	0.61, 1.21			1.16	1.01, 1.33		

Abbreviations: CI, confidence interval; MV HR, multivariate hazard ratio.

^aAll regression analyses adjusted for age (in the baseline hazard of the Cox regression) and the following covariates: gender, race/ethnicity, education, physical activity, alcohol consumption, body mass index at the beginning of the age interval (weight (kg)/height (m)²; categorical), and height (inches, in quintiles). (For additional definitions, see text Table 3.)

^bStatistical significance of the linear trend in weight-gain categories, evaluated using weight-gain category medians.

Web Table 3. Cause-Specific Mortality Risk Among Never Smokers in Relation to Combined Initial Body Mass Index^a and Weight Change During 3 Age Intervals, National Institutes of Health Diet and Health Study, 1996–2009

Age Interval and Weight Change, kg/year	Cause of Death													
	Cancer							Cardiovascular Disease						
	No. of Deaths	Initial BMI <25			Initial BMI ≥25			No. of Deaths	Initial BMI <25			Initial BMI ≥25		
MV HR ^b		95% CI	<i>P</i> -trend ^c	MV HR	95% CI	<i>P</i> -trend	MV HR		95% CI	<i>P</i> -trend	MV HR	95% CI	<i>P</i> -trend	
18–35 years	2,860		<0.0005			0.04	2,174			<0.0005			<0.0005	
Loss of >0.2		1.13	0.89, 1.45	1.18	0.92, 1.51			0.60	0.38, 0.95	1.48	1.10, 1.98			
Stable (±0.2)		1.0	Referent	1.12	0.88, 1.43			1.0	Referent	1.77	1.38, 2.27			
Gain of >0.2–0.6		1.05	0.95, 1.17	1.59	1.31, 1.92			1.18	1.03, 1.35	2.15	1.75, 2.65			
Gain of >0.6–1		1.14	1.01, 1.30	1.54	1.19, 2.00			1.40	1.20, 1.63	2.54	1.97, 3.27			
Gain of >1		1.35	1.16, 1.56	1.66	1.21, 2.27			2.03	1.72, 2.40	3.53	2.69, 4.63			
35–50 years	3,415		0.002			<0.0005	2,479			<0.0005			<0.0005	
Loss of >0.2		1.14	0.91, 1.44	1.24	1.05, 1.46			1.37	1.01, 1.85	2.07	1.72, 2.49			
Stable (±0.2)		1.0	Referent	1.11	0.97, 1.26			1.0	Referent	1.53	1.31, 1.79			
Gain of >0.2–0.6		1.04	0.94, 1.15	1.20	1.04, 1.37			1.12	0.98, 1.28	2.22	1.91, 2.57			
Gain of >0.6–1		1.10	0.97, 1.24	1.37	1.18, 1.60			1.34	1.14, 1.57	2.62	2.23, 3.08			
Gain of >1		1.28	1.08, 1.51	1.64	1.37, 1.97			2.11	1.74, 2.57	3.54	2.95, 4.25			
50–69 years	3,473		0.65			0.48	2,535			0.63			<0.0005	
Loss of >0.2		1.19	0.99, 1.43	1.40	1.23, 1.59			1.71	1.37, 2.13	2.77	2.41, 3.18			
Stable (±0.2)		1.0	Referent	1.19	1.07, 1.33			1.0	Referent	1.53	1.34, 1.76			
Gain of >0.2–0.6		0.95	0.84, 1.07	1.10	0.97, 1.24			0.82	0.70, 0.97	1.44	1.24, 1.67			
Gain of >0.6–1		0.94	0.79, 1.12	1.28	1.10, 1.48			0.91	0.72, 1.17	1.76	1.48, 2.09			
Gain of >1		1.06	0.87, 1.30	1.23	1.06, 1.43			1.06	0.81, 1.40	2.12	1.79, 2.51			

	Cause of Death													
	Stroke							Other Causes						
	No. of Deaths	Initial BMI <25			Initial BMI ≥25			No. of Deaths	Initial BMI <25			Initial BMI ≥25		
		MV HR	95% CI	<i>P</i> -trend	MV HR	95% CI	<i>P</i> -trend		MV HR	95% CI	<i>P</i> -trend	MV HR	95% CI	<i>P</i> -trend
18–35 years	409			0.001			0.77	2,249			<0.0005			<0.0005
Loss of >0.2		1.18	0.63, 2.22		1.30	0.69, 2.44			1.14	0.85, 1.54		1.62	1.25, 2.11	
Stable (±0.2)		1.0	Referent		1.50	0.86, 2.62			1.0	Referent		1.79	1.42, 2.27	
Gain of >0.2–0.6		0.86	0.65, 1.13		1.66	1.02, 2.68			1.03	0.91, 1.16		1.76	1.43, 2.18	
Gain of >0.6–1		1.02	0.73, 1.44		0.63	0.23, 1.73			1.19	1.03, 1.38		2.05	1.58, 2.67	
Gain of >1		1.73	1.21, 2.47		2.65	1.36, 5.17			1.67	1.42, 1.97		3.56	2.74, 4.61	
35–50 years	490			0.06			0.41	2,632			<0.0005			<0.0005
Loss of >0.2		1.26	0.68,2.35		1.52	0.99,2.35			1.16	0.87, 1.54		1.90	1.60, 2.25	
Stable (±0.2)		1.0	Referent		1.51	1.08,2.10			1.0	Referent		1.43	1.24, 1.65	
Gain of >0.2–0.6		0.95	0.72,1.25		1.42	1.00,2.02			0.94	0.83, 1.06		1.24	1.06, 1.45	
Gain of >0.6–1		1.32	0.97,1.81		1.59	1.07,2.36			1.10	0.95, 1.28		1.69	1.43, 1.99	
Gain of >1		1.29	0.82,2.04		1.92	1.20,3.07			1.88	1.58, 2.24		2.75	2.31, 3.28	
50–69 years	505			0.61			0.51	2,703			0.35			0.01
Loss of >0.2		0.88	0.49,1.57		2.01	1.47,2.74			1.97	1.63, 2.38		2.40	2.10, 2.73	
Stable (±0.2)		1.0	Referent		1.30	0.97,1.74			1.0	Referent		1.25	1.10, 1.43	
Gain of >0.2–0.6		0.80	0.58,1.10		1.05	0.76,1.45			0.83	0.72, 0.97		1.15	1.00, 1.32	
Gain of >0.6–1		1.34	0.90,2.00		1.21	0.82,1.79			0.93	0.75, 1.15		1.37	1.15, 1.62	
Gain of >1		0.91	0.52,1.61		1.16	0.77,1.77			1.11	0.87, 1.41		1.61	1.36, 1.90	

Abbreviations: BMI, body mass index; CI, confidence interval; MV HR, multivariate hazard ratio.

^aWeight (kg)/height (m)².

^bAll regression analyses adjusted for age (in the baseline hazard of the Cox regression) and the following covariates: gender, race/ethnicity, education, physical activity, alcohol consumption, and height (see text Tables 3 and 4 for definitions). The analyses did not include subjects with an initial BMI less than 18.5.

^cStatistical significance of the linear trend in weight-gain categories, evaluated using weight-gain category medians.