

The Additional Costs and Health Effects of a Patient Being Overweight or Having Obesity: A Computational Model

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Table S1: Values of utility and cost parameters and associated references

Variable	Distribution type	Mean	Range or standard deviation	Source
Utility Values				
Stroke	Beta	0.6	0.09	(1-46)
CHD	Beta	0.73	0.1	
Diabetic nephropathy	Beta	0.74	0.09	
Diabetic neuropathy	Beta	0.65	0.04	
Diabetic retinopathy	Beta	0.78	0.04	
ESRD	Beta	0.63	0.03	
Blindness	Beta	0.52	0.06	
Renal Cancer	Beta	0.7	0.06	
Cervical Cancer	Beta	0.63	0.11	
Pancreatic Cancer	Beta	0.66	0.08	
Gastric Cancer	Beta	0.52	0.08	
Hypertension	Beta	0.97	0.01	
Prostate	Beta	0.71	0.16	
DM2	Beta	0.85	0.08	
Breast Cancer-First year	Beta	0.66	0.06	
Breast Cancer-After First year	Beta	0.77	0.06	
Breast Cancer-Last year	Beta	0.23	0.001	
Colon Cancer-First year	Beta	0.52	0.12	
Colon Cancer-After First year	Beta	0.83	0.05	
Colon Cancer-Last year	Beta	0.3	0.001	
Esophageal Cancer-Early years	Beta	0.71	0.22	
Esophageal Cancer-Last year	Beta	0.34	0.001	
Uterine Cancer-Early years	Beta	0.69	0.15	
Uterine Cancer-Last year	Beta	0.79	0.11	
Cost Values				
Stage 1 (CHS1)		\$497		(47)
Stage 2 (CHS2)		\$1,123		
Normal Weight-Stage 3 (CHS3)		\$1,680		
Overweight-Stage 3 (CHS3)		\$2,055		
Obese-Stage 3 (CHS3)		\$3,930		
Normal Weight-Stage 4 (CHS4)		\$2,906		
Overweight Stage 4 (CHS4)		\$3,656		
Obese-Stage 4 (CHS4)		\$7,406		
CHD-1 st Year-Age 18-44	Gamma	\$19,933	\$24,824	
CHD-1 st Year-Age 44- 65	Gamma	\$17,244	\$11,109	
CHD-1 st Year-Age>65	Gamma	\$13,724	\$9,324	
CHD-After first year-Age 18-44	Gamma	\$5,178	\$14,673	
CHD-After first year-Age 44-65	Gamma	\$6,926	\$18,766	
CHD-After first year-Age > 65	Gamma	\$4,100	\$11,576	
DM2-Age 18-44	Gamma	\$11,706	\$17,764	
DM2-Age 44-65	Gamma	\$8,109	\$22,031	
DM2-Age > 65	Gamma	\$1,332	\$3,409	
Hypertension-Age 18-44	Gamma	\$672	\$3,373	
Hypertension-Age 44-65	Gamma	\$867	\$3,895	
Hypertension-Age > 65	Gamma	\$1,050	\$3,901	

Variable	Distribution type	Mean	Range or standard deviation	Source
Diabetic Nephropathy	Gamma	\$593	\$220	(48)
ESRD-Initial year	Gamma	\$95,130	\$31,396	(49)
ESRD-After Initial year	Gamma	\$62,578	\$15,802	
Diabetic Neuropathy	Gamma	\$456	\$323	(47)
Diabetic Retinopathy	Gamma	\$650	\$363	
Blindness	Gamma	\$2,872	\$75	
Stroke-Age 18-44	Gamma	\$11,034	\$16,744	
Stroke-Age 44-65	Gamma	\$7,643	\$20,766	
Stroke-Age > 65	Gamma	\$7,098	\$13,860	
Breast cancer-First year-Females		\$25,386		(50)
Breast cancer-After First year- Females		\$2,207		
Breast cancer-Last year-Females		\$78,570		
Cervical cancer-First year-Females		\$49,692		
Cervical cancer-After First year-Females		\$1,425		
Cervical cancer-Last year-Females		\$98,192		
Colorectal cancer-First year-Females		\$56,460		
Colorectal cancer-After First year-Females		\$3,159		
Colorectal cancer-Last year-Females		\$105,649		
Esophageal cancer-First year-Females		\$87,486		
Esophageal cancer-After First year-Females		\$6,853		
Esophageal cancer-Last year-Females		\$130,348		
Renal cancer-First year-Females		\$42,237		
Renal cancer-After First year-Females		\$6,255		
Renal cancer -Last year-Females		\$92,304		
Pancreatic cancer-First year-Females		\$102,808		
Pancreatic cancer-After First year-Females		\$8,672		
Pancreatic cancer-Last year-Females		\$137,426		
Stomach cancer-First year-Females		\$78,184		
Stomach cancer-After First year-Females		\$3,977		
Stomach cancer-Last year-Females		\$129,697		
Uterine cancer-First year-Females		\$29,452		
Uterine cancer-After First year-Females		\$1,535		
Uterine cancer-Last year-Females		\$87,719		
Colorectal cancer-First year-Males		\$25,386		
Colorectal cancer-After First year-Males		\$2,207		
Colorectal cancer-Last year-Males		\$78,570		
Esophageal cancer-First year-Males		\$49,692		
Esophageal cancer-After First year-Males		\$1,425		
Esophageal cancer-Last year-Males		\$98,192		
Renal cancer-First year-Males		\$56,460		
Renal cancer-After First year-Males		\$3,159		
Renal cancer-Last year-Males		\$105,649		
Pancreatic cancer - First year-Males		\$87,486		

Variable	Distribution type	Mean	Range or standard deviation	Source
Pancreatic cancer - After First year-Males		\$6,853		
Pancreatic cancer - Last year-Males		\$130,348		
Prostate cancer - First year-Males		\$42,237		
Prostate cancer - After First year-Males		\$6,255		
Prostate cancer - Last year-Males		\$92,304		
Stomach cancer - First year-Males		\$102,808		
Stomach cancer - After First year-Males		\$8,672		
Stomach cancer - Last year-Males		\$137,426		
Annual wages	Triangular	\$48,320	\$37,286-\$94,873	(65)

Table S2: The probabilities of developing the health outcomes and probabilities of death associated with them

Variables	Distribution Type	Mean	Range	Source
Probability of developing coronary heart disease (CHD)				
at CHS2	Triangular	0.01023	0-0.04	(51, 52)
at CHS3	Triangular	0.01193	0-0.047	
at CHS4	Triangular	0.01813	0-0.063	
multiplier for increased probability due to being overweight	Triangular	1.31	1.22-1.4	(52)
multiplier for increased probability due to being obese	Triangular	1.56	1.54-1.58	
Probability of reoccurrence of CHD				
at CHS2	Triangular	0.0427	0-0.1	(53)
at CHS3	Triangular	0.0347	0-0.057	
at CHS4	Triangular	0.0397	0-0.074	
Probability of death due to CHD				
at CHS2	Triangular	0.01023	0-0.04	(51, 52)
at CHS3	Triangular	0.01193	0-0.047	
at CHS4	Triangular	0.037	0.0007-0.113	
multiplier for increased probability of death due to being overweight	Triangular	1.175	0.98-1.37	
multiplier for increased probability of death due to being obese	Triangular	1.375	1.3-1.45	
Probability of developing Stroke				
at CHS0	Uniform	0.06	0-0.012	(51, 52, 54)
at CHS1	Uniform	0.075	0-0.015	
at CHS2	Uniform	0.085	0-0.017	
at CHS3	Uniform	0.075	0-0.015	
at CHS4	Uniform	0.014	0-0.028	
multiplier for increased probability due to being overweight	Uniform	1.115	1.06-1.17	(55, 56)
multiplier for increased probability due	Uniform	1.325	1.23-1.42	

to being obese				
Probability of reoccurrence of Stroke at first year	Uniform	0.1287	0.0924-0.165	(57)
Probability of reoccurrence of Stroke after first year	Uniform	0.0443	0.0318-0.0567	
Probability of death due to stroke				
In the first year of developing stroke	Uniform	0.188	0.135-0.241	(57)
After First year of developing stroke	Uniform	0.083	0.0596-0.1064	
Probabilities associated with diabetes complications				
Probability of developing Diabetic nephropathy by years of having T2DM	Uniform	0.14	0-0.28	(58)
Probability of developing ESRD		0.0082		(59)
Probability of death from ESRD (by age)	Uniform	0.16	0.081-0.239	(60)
Probability of developing Diabetic neuropathy by years of having T2DM	Uniform	0.36	0-0.72	(58)
Probability of Diabetic neuropathy by years of having T2DM	Uniform	0.14	0-0.28	(58)
Probability of developing blindness	Uniform	0.4	0-0.8	(61, 62)
Probabilities of developing Cancer for females				
Breast	Uniform	0.0096	0-0.0191	(63, 64)
Cervical	Uniform	0.00035	0-0.0007	
Colorectal	Uniform	0.0033	0-0.0066	
Esophageal	Uniform	0.0002	0-0.0004	
Renal	Uniform	0.0009	0-0.0018	
Pancreatic	Uniform	0.00125	0-0.0025	
Stomach	Uniform	0.0005	0-0.001	
Uterine	Uniform	0.0022	0-0.0044	
Probabilities of developing Cancer for males				
Colorectal	Uniform	0.0036	0-0.0071	(63, 64)
Esophageal	Uniform	0.00065	0-0.0013	
Renal	Uniform	0.00155	0-0.0031	
Pancreatic	Uniform	0.00125	0-0.0025	
Prostate	Uniform	0.0142	0-0.0284	
Stomach	Uniform	0.00085	0-0.0017	
Probabilities of death due to Cancer for females				
Breast	Uniform	0.034	0.008-0.06	(64)
Cervical	Uniform	0.0445	0.006-0.083	
Colorectal	Uniform	0.066	0.027-0.105	
Esophageal	Uniform	0.2305	0.035-0.426	
Renal	Uniform	0.034	0.011-0.057	
Pancreatic	Uniform	0.161	0.033-0.289	
Stomach	Uniform	0.172	0.03-0.314	
Uterine	Uniform	0.0275	0.007-0.048	
Probabilities of death due to Cancer for males				
Colorectal	Uniform	0.089	0.016-0.162	

Esophageal	Uniform	0.2135	0.018-0.409	(64)
Renal	Uniform	0.0385	0.008-0.069	
Pancreatic	Uniform	0.1765	0.018-0.335	
Prostate	Uniform	0.033	0.015-0.051	
Stomach	Uniform	0.1395	0.015-0.264	

Table S3: Transition probabilities for adults Age <= 45 years old

	N_CHS0	N_CHS1	N_CHS2	N_CHS3	N_CHS4	OW_CHS0	OW_CHS1	OW_CHS2	OW_CHS3	OW_CHS4	OB_CHS0	OB_CHS1	OB_CHS2	OB_CHS3	OB_CHS4
N_CHS0	0.932	0.016	0.001	0	0	0.048	0.002	0	0	0	0	0	0	0	0
N_CHS1	0.023	0.9	0.007	0.007	0	0.002	0.051	0.002	0.002	0	0.001	0.001	0.003	0	0
N_CHS2	0.002	0.015	0.811	0.012	0.007	0	0	0.067	0.046	0.007	0	0	0.023	0.002	0.001
N_CHS3	0	0	0.024	0.844	0.002	0	0	0.046	0.067	0.003	0	0	0	0.002	0.001
N_CHS4	0	0	0	0.058	0.86	0	0	0	0	0.046	0	0	0	0	0.026
OW_CHS0	0.008	0.001	0	0	0	0.93	0.019	0.001	0	0	0.028	0.003	0.001	0	0
OW_CHS1	0.001	0.009	0.003	0.002	0.001	0.018	0.90	0.014	0.008	0	0.004	0.027	0.003	0.003	0
OW_CHS2	0	0.003	0.019	0.007	0	0.027	0.049	0.807	0.012	0.011	0	0.004	0.039	0.008	0.004
OW_CHS3	0	0	0	0.009	0	0	0	0.025	0.879	0	0	0	0.041	0.041	0
OW_CHS4	0	0	0	0.002	0.022	0	0	0	0.005	0.936	0	0	0	0	0.03
OB_CHS0	0	0	0	0	0	0.006	0	0	0	0	0.94	0.04	0.002	0.001	0.001
OB_CHS1	0	0.001	0	0	0	0.002	0.002	0	0	0	0.016	0.94	0.025	0.008	0.002
OB_CHS2	0	0.002	0	0	0	0	0.008	0.002	0.001	0	0.025	0.037	0.88	0.028	0.015
OB_CHS3	0	0	0.001	0.006	0	0	0	0.004	0.01	0.003	0	0	0.046	0.921	0.008
OB_CHS4	0	0	0	0	0.001	0	0	0	0	0.012	0	0	0	0	0.986

N: Normal Weight

OW: Overweight

OB: Obese

Table S4: Transition probabilities for adults Age > 45 years old

	N_CHS0	N_CHS1	N_CHS2	N_CHS3	N_CHS4	OW_CHS0	OW_CHS1	OW_CHS2	OW_CHS3	OW_CHS4	OB_CHS0	OB_CHS1	OB_CHS2	OB_CHS3	OB_CHS4
N_CHS0	0.865	0.102	0.001	0	0	0.012	0.011	0.002	0	0	0.001	0.001	0	0	0
N_CHS1	0.034	0.902	0.024	0.014	0	0.006	0.012	0.002	0.002	0	0.001	0	0.002	0	0
N_CHS2	0.036	0.053	0.869	0.015	0.004	0	0	0.015	0.002	0	0	0	0	0.001	0
N_CHS3	0	0	0.008	0.959	0.008	0	0	0	0.018	0.001	0	0	0	0	0
N_CHS4	0	0	0.007	0.011	0.948	0	0	0	0	0.018	0	0	0	0	0.002
OW_CHS0	0.008	0.004	0	0	0	0.876	0.069	0.013	0	0	0.013	0.014	0.001	0	0
OW_CHS1	0.004	0.004	0.003	0	0	0.023	0.912	0.027	0.014	0	0.002	0.007	0.002	0	0
OW_CHS2	0	0.007	0.004	0.001	0	0.003	0.039	0.90	0.019	0.006	0	0.002	0.009	0.001	0.001
OW_CHS3	0	0	0	0.005	0	0	0	0.013	0.957	0.01	0	0	0.001	0.009	0
OW_CHS4	0	0	0	0.001	0.007	0	0	0	0.009	0.962	0	0	0	0	0.01
OB_CHS0	0.001	0	0	0	0	0.007	0	0	0	0	0.866	0.079	0.043	0	0.002
OB_CHS1	0	0	0	0	0	0.003	0.005	0	0	0	0.016	0.913	0.039	0.02	0
OB_CHS2	0	0.001	0	0	0	0	0.001	0.005	0.001	0	0.001	0.032	0.919	0.026	0.011
OB_CHS3	0	0	0	0	0	0	0	0.001	0.006	0.001	0	0	0.013	0.959	0.017
OB_CHS4	0	0	0	0	0	0	0	0	0	0.008	0	0	0	0	0.984

N: Normal Weight

OW: Overweight

OB: Obesity

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