Supplemental Material

Long-Term Exposure to Walkable Residential Neighborhoods and Risk of Obesity-Related Cancer in the New York University Women's Health Study (NYUWHS)

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Table S1. First Incident Obesity-related Cancers in the NYUWHS (n=13,240). [a]

Cancer Subtypes	ICD-9	n (% of NYUWHS)
All Obesity-related Cancers		2,411 (18.2 %)
Breast cancer (postmenopausal)	174	1,269 (9.6 %)
Colorectal cancer [b]	153 & 154	343 (2.6 %)
Malignant neoplasm of uterus and endometrium [c]	179 & 182	282 (2.1 %)
Ovarian cancer	183	138 (1.0 %)
Pancreatic cancer	157	108 (0.8 %)
Multiple myeloma and malignant plasma cell neoplasms	203	73 (0.6 %)
Renal cancer	189	73 (0.6 %)
Thyroid cancer	193	70 (0.5 %)
Liver cancer	155	24 (0.2 %)
Malignant neoplasm of gallbladder and biliary tract	156	15 (0.1 %)
Esophageal cancer	150	13 (0.1 %)
Meningioma	192	3 (0.0 %)

[a] Administrative censoring date on January 1st 2017. First obesity-related cancers are counted as cases. Obesity-related cancers that occurred after an obesity-related cancer or a non-obesity-related cancer are censored and not treated as cases.

[b] Colon cancer (n = 275, 2.1%) and rectal cancer (n = 68, 0.5%).

[c] Endometrial cancer (n = 280, 2.1%) and uterine cancer (n = 2, 0.0%).

Table S2. Linearity Test using Cubic splines for the Association between Neighborhood Walkability and Obesity-related Cancer in the NYUWHS (n=13,240). [a]

		Cases (n)	Effect *P*-Value	Non-Linearity *P*-value
Overall (Any First Incident Obesity-related Cancer)		2,411	$p<0.001$	$p=0.954$
Postmenopausal Breast Cancer [b]		1,269	$p=0.003$	$p=0.748$
Colorectal Cancer		343	$p=0.450$	$p=0.775$
	Colon Cancer	275	$p=0.351$	$p=0.387$
	Rectal Cancer	68	$p=0.532$	$p=0.656$
Cancer of the Uterus (including Endometrium)		282	$p=0.214$	$p=0.785$
Ovarian Cancer		138	$p=0.175$	$p=0.430$
Pancreatic Cancer		108		$p=0.863$
Multiple Myeloma and Malignant Plasma Cell Neoplasms		73	$p=0.254$	$p=0.924$
Renal Cancer		73	$p=0.026$	$p=0.021$
Thyroid Cancer		70	$p=0.811$	$p=0.668$

[a] Cox proportional hazard (PH) models were implemented with splines for neighborhood walkability as continuous NW (non-scaled) as predictor of first incident obesity-related cancer adjusted for baseline age, race/ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood, and ever moving from baseline residence at any time during the study follow-up. All models using an average neighborhood walkability exposure implemented a carried forward measure of population density after 2010 and a carried forward measure of destination accessibility after 2014. Only cancer subtypes with a number of first obesity-related malignant cancer cases n>30 were included in the table. Spline modelling of fixed variable walkability was conducted with 5 knots (k=5) located at every 20th percentile with corresponding walkability values as follows: 0.59, 2.22, 3.35, 4.76, and 9.87.

[b] Breast cancer diagnosed in menopause. 21 women had unknown menopausal status at breast cancer diagnosis that were treated as a postmenopausal diagnosis if age at diagnosis was greater than 50 and treated as premenopausal if age at diagnosis was lower than 50 years of age.

Table S3. Testing Proportional Hazards (PH) Assumption in the Association between Neighborhood Walkability and Obesity-related Cancer in the NYUWHS (n=13,240).

	Cases (n)	P-Value [a]
Overall (Any First Incident Obesity-related Cancer)	2,411	p=0.437
Postmenopausal Breast Cancer [b]	1,269	p=0.641
Colorectal Cancer	343	p=0.336
Colon Cancer	275	p=0.402
Rectal Cancer	68	p=0.721
Cancer of the Uterus (including Endometrium)	282	p=0.130
Ovarian Cancer	138	p=0.490
Pancreatic Cancer	108	p=0.170
Multiple Myeloma and Malignant Plasma Cell Neoplasms	73	p=0.334
Renal Cancer	73	p=0.402
Thyroid Cancer	70	p=0.092

[a] P-values associated with the cross-product term between the scaled neighborhood walkability measure and the log function of survival time for overall and site-specific cancers.

[b] Breast cancer diagnosed in menopause. 21 women had unknown menopausal status at breast cancer diagnosis that were treated as a postmenopausal diagnosis if age at diagnosis was greater than 50 and treated as premenopausal if age at diagnosis was lower than 50 years of age.

Table S4. NYUWHS Demographic and Lifestyle Characteristics by History of Moving from Baseline Residence, N=13,240. [a]

	NYUWHS Total (n=13,240)	Movers (n=6,436)	Non-Movers (n=6,804)
Average annual walkability, N (%)			
NW ≤ Median (≤3.3)	6,620 (50.0)	3,796 (59.0)	2,824 (41.5)
NW > Median (>3.3)	6,620 (50.0)	2,640 (41.0)	3,980 (58.5)
Mean (SD)	5.5 (5.9)	4.2 (5.1)	6.6 (6.4)
Scaled Mean (SD)	0.9 (1.0)	0.7 (0.9)	1.1 (1.1)
Age at Enrollment (in years), mean (SD)	50.6 (8.7)	49.8 (8.8)	51.4 (8.6)
BMI (kg/m^2), mean (SD)	24.9 (4.6)	24.8 (4.5)	25.0 (4.7)
Outdoor Walking (MET-hours per week), mean (SD) [a]	6.8 (8.1)	6.8 (7.9)	6.7 (8.2)
Education, N (%) [a]			
High School or Less	3,379 (31.2)	1,688 (31.3)	1,691 (31.0)
College/Vocational/Technical School/Other	4,402 (40.6)	2,188 (40.6)	2,214 (40.7)
Graduate School	3,061 (28.2)	1,519 (28.2)	1,542 (28.3)
Race–Ethnicity, N (%) [a]			
Non-Hispanic White	9,115 (78.5)	4,431 (77.9)	4,684 (79.1)
Non-Hispanic Black	1,370 (11.8)	649 (11.4)	721 (12.2)
Hispanic	726 (6.3)	398 (7.0)	328 (5.5)
Other	397 (3.4)	208 (3.7)	189 (3.2)
Menopausal Status, N (%)			
Premenopausal	6,896 (52.1)	3,553 (55.2)	3,343 (49.1)
Postmenopausal	6,344 (47.9)	2,883 (44.8)	3,461 (50.9)
Smoking Status, N (%) [a]			
Never Smoker	5,692 (47.5)	2,741 (46.4)	2,951 (48.5)
Ever Smoker	6,304 (52.6)	3,172 (53.6)	3,132 (51.5)
Parity at enrollment, N (%)			
No	4,212 (31.8)	2,018 (31.4)	2,194 (32.3)
Yes	9,028 (68.2)	4,418 (68.7)	4,610 (67.8)
Neighborhood Poverty Rate, mean (SD) [b]	10.8 (9.6)	10.9 (9.8)	10.7 (9.3)
Alcohol Intake, N (%) [a]			
≤14 g/day	9,906 (88.8)	4,856 (88.7)	5,050 (88.9)
>14 g/day	1,254 (11.2)	622 (11.4)	632 (11.1)

History of Diabetes, N (%) [a]			
No	10,450 (84.7)	5,096 (84.2)	5,354 (85.2)
Yes	1,885 (15.3)	957 (13.3)	928 (14.8)
Death during Follow-Up, N (%) [c]			
No	10,753 (81.2)	5,555 (86.3)	5,198 (76.4)
Yes	2,487 (18.8)	811 (13.7)	1,606 (23.6)
First Incident Obesity-related Cancer, N (%)			
No	10,829 (81.8)	5,617 (87.3)	5,212 (76.6)
Yes	2,411 (18.2)	819 (12.7)	1,592 (23.4)

[a] Daily alcohol intake was missing in 2,080; race–ethnicity was missing in 1,632; education level was missing in 2,398; outdoor walking was missing in 2,679; smoking status was missing in 1,244; and history of diabetes was missing in 905 women.

[b] Percent of people in residential neighborhood living in baseline year with a ratio of income to federal poverty level (FPL) below 1.Census block groups aggregated to 1-km radial buffers.

[c] At any time during the NYU Women's Health Study active follow-up.

Table S5. Neighborhood Walkability Exposure Availability and Person-Time Years in the NYUWHS.

		Mean Follow-Up [a] (Years)	n	Total Person-Time (Years)	% Follow-Up Time Covered by Available Exposure [b] Mean (SD), [range]	Mean Follow-Up Time Available for Exposure (Years)	Average Annual Neighborhood Walkability [c] Mean (SD), [range]
Moving from Baseline Residence	Residents Moved at Follow-Up	26.1	6,436	167,725.2	94.3 % (14.7), [4.9-100]	24.5	4.2 (5.1), [-0.8, 32.4]
	Residents Remained in Address	21.9	6,804	149,058.3	92.1 % (18.9), [6.4-100]	19.7	6.6 (6.4), [-0.8, 44.6]
Total Withdrawn	Withdrawn	24.1	1,904	45,823.2	72.4 % (26.2), [6.4-100]	16.2	5.3 (5.6), [-0.8, 44.6]
	Not Withdrawn	23.9	11,336	270,960.3	96.7 % (11.8), [4.9-100]	23.0	5.5 (6.0), [-0.8, 32.4]
Movers & Withdrawals	Moved and Withdrawn	25.4	646	16,377.5	78.5 % (23.3), [22.1-100]	19.2	4.0 (5.0), [-0.8, 24.8]
	Moved and Not Withdrawn	26.1	5,790	151,347.7	96.0 % (12.2), [4.9-100]	25.1	4.2 (5.1), [-0.8, 32.4]
	Not Moved and Withdrawn	23.4	1,258	29,445.7	69.2 % (27.0), [6.4-100]	14.7	6.0 (5.8), [-0.8, 44.6]
	Not Moved and Not Withdrawn	21.6	5,546	119,612.6	97.3 % (11.3), [10.8-100]	20.8	6.8 (6.5), [-0.8, 31.0]
Total in Cohort		23.9	13,240	316,783.5	93.2 % (17.0), [4.9-100]	22.0	5.5 (5.9), [-0.8, 44.6]

[a] Mean follow-up time until first incident cancer, death, or end of study (January 1st 2017).

[b] Average annual neighborhood walkability was estimated for years prior to date of lost to follow-up or withdrawal from study.

[c] Means of average annual neighborhood walkability.

Table S6. Obesity-related Cancer Hazard Ratios based on Neighborhood Walkability Sensitivity Analyses. [a]

Models	Cohort (n)	Cases (n)	NW Q1 [-0.8, 0.9] Ref.	NW Q2 [0.9, 3.3] HR (95% CI)	NW Q3 [3.3, 8.1] HR (95% CI)	NW Q4 [8.1, 44.6] HR (95% CI)	Per SD [b] (Continuous NW) HR (95% CI)	NW Above Median (>3.3) HR (95% CI)
Cancer Subtype								
Overall (Any First Incident Obesity-related Cancer)								
Model 1: Average annual NW (extrapolated) [c]	13,240	2,411	ref.	0.94 (0.84-1.05)	0.92 (0.81-1.04)	0.74 (0.65-0.84)	0.88 (0.84-0.93)	0.86 (0.79-0.94)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	2,263	ref.	0.93 (0.83-1.05)	0.92 (0.81-1.05)	0.74 (0.65-0.84)	0.88 (0.84-0.92)	0.86 (0.79-0.95)
Model 3: Average annual NW (3-year lag) [e]	12,852	2,223	ref.	0.95 (0.84-1.07)	0.97 (0.86-1.10)	0.79 (0.69-0.91)	0.91 (0.86-0.95)	0.91 (0.83-1.00)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	1,864	ref.	1.01 (0.89-1.15)	0.98 (0.85-1.13)	0.79 (0.69-0.92)	0.91 (0.87-0.96)	0.88 (0.79-0.97)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	1,872	ref.	0.97 (0.85-1.11)	0.88 (0.76-1.02)	0.75 (0.64-0.87)	0.90 (0.85-0.95)	0.84 (0.76-0.93)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	2,374	ref.	0.94 (0.84-1.06)	0.92 (0.81-1.03)	0.75 (0.66-0.86)	0.89 (0.85-0.93)	0.87 (0.79-0.95)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	2,411	ref.	0.95 (0.84-1.06)	0.92 (0.81-1.04)	0.74 (0.65-0.84)	0.88 (0.84-0.92)	0.86 (0.78-0.94)
Breast Cancer [j]								
Model 1: Average annual NW (extrapolated) [c]	13,240	1,269	ref.	0.89 (0.76-1.05)	0.86 (0.73-1.02)	0.72 (0.61-0.86)	0.89 (0.84-0.95)	0.84 (0.74-0.96)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	1,202	ref.	0.91 (0.78-1.07)	0.88 (0.74-1.05)	0.72 (0.60-0.86)	0.88 (0.83-0.94)	0.84 (0.74-0.96)
Model 3: Average annual NW (3-year lag) [e]	12,852	1,160	ref.	0.89 (0.75-1.05)	0.96 (0.80-1.14)	0.77 (0.64-0.93)	0.92 (0.86-0.98)	0.93 (0.81-1.06)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	999	ref.	0.93 (0.78-1.11)	0.94 (0.77-1.14)	0.79 (0.65-0.96)	0.93 (0.87-1.00)	0.90 (0.78-1.03)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	965	ref.	0.95 (0.79-1.15)	0.83 (0.68-1.01)	0.70 (0.57-0.87)	0.87 (0.81-0.94)	0.80 (0.69-0.92)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	1,252	ref.	0.89 (0.76-1.05)	0.85 (0.72-1.01)	0.73 (0.62-0.88)	0.90 (0.84-0.95)	0.85 (0.75-0.96)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	1,269	ref.	0.90 (0.77-1.05)	0.86 (0.73-1.02)	0.72 (0.61-0.86)	0.89 (0.83-0.94)	0.84 (0.74-0.95)
Colorectal Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	343	ref.	0.87 (0.64-1.19)	0.91 (0.66-1.25)	0.79 (0.56-1.11)	0.91 (0.80-1.03)	0.92 (0.72-1.17)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	323	ref.	0.83 (0.60-1.14)	0.89 (0.64-1.23)	0.79 (0.56-1.12)	0.92 (0.81-1.04)	0.94 (0.73-1.20)
Model 3: Average annual NW (3-year lag) [e]	12,852	315	ref.	0.89 (0.65-1.23)	0.96 (0.69-1.34)	0.77 (0.54-1.11)	0.90 (0.79-1.03)	0.93 (0.73-1.20)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	228	ref.	1.24 (0.85-1.80)	1.23 (0.82-1.85)	0.90 (0.59-1.39)	0.92 (0.79-1.06)	0.95 (0.71-1.27)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	285	ref.	0.88 (0.61-1.25)	0.89 (0.62-1.29)	0.83 (0.56-1.23)	0.91 (0.79-1.06)	0.94 (0.73-1.23)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	335	ref.	0.87 (0.64-1.19)	0.91 (0.66-1.25)	0.81 (0.57-1.14)	0.91 (0.81-1.04)	0.93 (0.73-1.18)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	343	ref.	0.88 (0.65-1.20)	0.91 (0.66-1.26)	0.78 (0.56-1.10)	0.90 (0.80-1.02)	0.92 (0.72-1.16)
Colon Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	275	ref.	0.84 (0.59-1.19)	1.01 (0.71-1.44)	0.80 (0.54-1.17)	0.92 (0.80-1.06)	1.00 (0.77-1.31)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	260	ref.	0.76 (0.53-1.09)	0.97 (0.67-1.38)	0.78 (0.53-1.15)	0.93 (0.81-1.07)	1.01 (0.77-1.33)
Model 3: Average annual NW (3-year lag) [e]	12,852	253	ref.	0.81 (0.56-1.16)	1.02 (0.71-1.47)	0.74 (0.49-1.12)	0.91 (0.79-1.06)	1.01 (0.76-1.34)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	176	ref.	1.43 (0.92-2.22)	1.72 (1.07-2.74)	1.15 (0.70-1.91)	0.99 (0.84-1.16)	1.17 (0.84-1.64)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	238	ref.	0.95 (0.63-1.42)	1.08 (0.72-1.62)	0.94 (0.60-1.46)	0.94 (0.80-1.09)	1.06 (0.80-1.42)

	N	Cases						
Model 6: Average annual NW, adjusting for DASH [h]	12,996	269	ref.	0.83 (0.59-1.18)	0.99 (0.69-1.41)	0.79 (0.54-1.17)	0.92 (0.80-1.06)	0.99 (0.76-1.30)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	275	ref.	0.85 (0.60-1.20)	1.02 (0.72-1.45)	0.79 (0.54-1.16)	0.92 (0.80-1.06)	1.00 (0.77-1.31)
Rectal Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	68	ref.	1.00 (0.53-1.90)	0.52 (0.24-1.15)	0.76 (0.36-1.61)	0.86 (0.65-1.14)	0.65 (0.37-1.12)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	63	ref.	1.09 (0.56-2.13)	0.56 (0.24-1.28)	0.85 (0.39-1.85)	0.88 (0.66-1.17)	0.67 (0.38-1.18)
Model 3: Average annual NW (3-year lag) [e]	12,852	62	ref.	1.26 (0.64-2.50)	0.67 (0.29-1.55)	0.89 (0.40-1.98)	0.85 (0.63-1.14)	0.68 (0.38-1.19)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	52	ref.	0.85 (0.42-1.71)	0.38 (0.15-0.95)	0.45 (0.19-1.12)	0.70 (0.49-0.99)	0.46 (0.25-0.88)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	47	ref.	0.67 (0.31-1.45)	0.34 (0.13-0.88)	0.50 (0.20-1.24)	0.81 (0.56-1.18)	0.52 (0.27-1.01)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	66	ref.	1.02 (0.53-1.98)	0.58 (0.26-1.29)	0.85 (0.40-1.80)	0.88 (0.66-1.16)	0.70 (0.40-1.22)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	68	ref.	1.01 (0.53-1.92)	0.52 (0.24-1.15)	0.76 (0.36-1.59)	0.84 (0.64-1.12)	0.63 (0.37-1.09)
Cancer of the Uterus and Endometrium								
Model 1: Average annual NW (extrapolated) [c]	13,240	282	ref.	0.93 (0.66-1.31)	0.93 (0.66-1.33)	0.71 (0.49-1.04)	0.87 (0.76-0.99)	0.85 (0.65-1.11)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	268	ref.	0.87 (0.62-1.24)	0.95 (0.66-1.35)	0.70 (0.47-1.02)	0.86 (0.75-0.99)	0.88 (0.67-1.16)
Model 3: Average annual NW (3-year lag) [e]	12,852	259	ref.	0.96 (0.67-1.36)	0.95 (0.66-1.38)	0.81 (0.54-1.20)	0.91 (0.79-1.04)	0.90 (0.68-1.18)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	228	ref.	1.17 (0.81-1.68)	0.91 (0.61-1.38)	0.75 (0.49-1.14)	0.87 (0.75-1.01)	0.75 (0.56-1.01)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	220	ref.	1.19 (0.80-1.76)	1.00 (0.65-1.52)	0.78 (0.50-1.23)	0.90 (0.77-1.05)	0.81 (0.60-1.09)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	279	ref.	0.92 (0.66-1.30)	0.93 (0.65-1.33)	0.71 (0.49-1.04)	0.87 (0.76-0.99)	0.86 (0.66-1.13)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	282	ref.	0.94 (0.67-1.32)	0.93 (0.66-1.33)	0.70 (0.48-1.02)	0.86 (0.76-0.99)	0.85 (0.65-1.10)
Ovarian Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	138	ref.	1.20 (0.72-1.98)	1.48 (0.89-2.47)	0.84 (0.48-1.47)	0.82 (0.67-0.99)	1.03 (0.70-1.51)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	127	ref.	1.22 (0.73-2.04)	1.46 (0.86-2.48)	0.81 (0.45-1.45)	0.80 (0.66-0.98)	1.00 (0.67-1.49)
Model 3: Average annual NW (3-year lag) [e]	12,852	127	ref.	1.31 (0.78-2.19)	1.39 (0.81-2.38)	0.92 (0.51-1.64)	0.84 (0.69-1.03)	0.98 (0.66-1.46)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	110	ref.	1.05 (0.60-1.82)	1.21 (0.68-2.15)	0.86 (0.47-1.57)	0.89 (0.72-1.10)	1.00 (0.65-1.54)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	98	ref.	0.90 (0.49-1.66)	1.16 (0.63-2.14)	0.67 (0.34-1.33)	0.90 (0.71-1.13)	1.00 (0.64-1.57)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	137	ref.	1.20 (0.73-1.99)	1.48 (0.89-2.47)	0.82 (0.46-1.45)	0.83 (0.68-1.00)	1.04 (0.71-1.52)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	138	ref.	1.22 (0.73-2.01)	1.49 (0.90-2.49)	0.84 (0.48-1.47)	0.82 (0.68-1.00)	1.04 (0.71-1.52)
Pancreatic Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	108	ref.	0.97 (0.57-1.64)	0.84 (0.47-1.48)	0.70 (0.38-1.30)	0.86 (0.69-1.08)	0.78 (0.51-1.20)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	101	ref.	0.98 (0.56-1.69)	0.81 (0.45-1.48)	0.72 (0.38-1.35)	0.87 (0.69-1.09)	0.77 (0.49-1.20)
Model 3: Average annual NW (3-year lag) [e]	12,852	104	ref.	0.95 (0.55-1.63)	0.84 (0.47-1.50)	0.73 (0.39-1.37)	0.86 (0.68-1.09)	0.81 (0.52-1.25)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	78	ref.	1.20 (0.65-2.21)	0.93 (0.47-1.86)	0.63 (0.30-1.35)	0.82 (0.63-1.08)	0.69 (0.42-1.15)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	92	ref.	1.02 (0.55-1.87)	0.92 (0.48-1.75)	0.77 (0.38-1.54)	0.90 (0.70-1.15)	0.84 (0.53-1.33)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	105	ref.	0.98 (0.57-1.68)	0.86 (0.48-1.54)	0.77 (0.41-1.43)	0.89 (0.71-1.12)	0.82 (0.53-1.26)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	108	ref.	0.96 (0.57-1.63)	0.83 (0.47-1.47)	0.70 (0.38-1.30)	0.87 (0.69-1.09)	0.79 (0.52-1.21)
Multiple Myeloma and Malignant Plasma Cell Neoplasms								
Model 1: Average annual NW (extrapolated) [c]	13,240	73	ref.	1.13 (0.61-2.10)	0.72 (0.36-1.44)	0.36 (0.15-0.85)	0.68 (0.49-0.94)	0.51 (0.30-0.87)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	61	ref.	1.21 (0.62-2.36)	0.65 (0.30-1.41)	0.37 (0.15-0.92)	0.65 (0.45-0.94)	0.45 (0.25-0.82)
Model 3: Average annual NW (3-year lag) [e]	12,852	70	ref.	1.24 (0.67-2.32)	0.62 (0.30-1.31)	0.44 (0.19-1.03)	0.69 (0.49-0.96)	0.47 (0.28-0.82)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	58	ref.	0.77 (0.38-1.55)	0.73 (0.35-1.55)	0.40 (0.16-1.01)	0.70 (0.49-1.01)	0.67 (0.37-1.21)

Model	N	Cases						
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	63	ref.	0.72 (0.35-1.46)	0.68 (0.33-1.40)	0.39 (0.16-0.93)	0.74 (0.52-1.05)	0.67 (0.38-1.19)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	73	ref.	1.27 (0.68-2.36)	0.77 (0.38-1.57)	0.39 (0.16-0.93)	0.68 (0.49-0.95)	0.51 (0.30-0.87)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	73	ref.	1.25 (0.67-2.33)	0.77 (0.38-1.56)	0.40 (0.17-0.95)	0.70 (0.50-0.97)	0.53 (0.31-0.89)
Renal Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	73	ref.	1.28 (0.69-2.37)	0.74 (0.36-1.54)	0.61 (0.27-1.36)	0.83 (0.62-1.11)	0.58 (0.34-0.99)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	65	ref.	1.38 (0.71-2.68)	0.79 (0.36-1.74)	0.70 (0.30-1.62)	0.86 (0.64-1.16)	0.61 (0.35-1.07)
Model 3: Average annual NW (3-year lag) [e]	12,852	69	ref.	1.19 (0.64-2.23)	0.67 (0.31-1.43)	0.64 (0.29-1.44)	0.82 (0.61-1.12)	0.59 (0.34-1.03)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	58	ref.	1.03 (0.53-1.99)	0.63 (0.27-1.44)	0.52 (0.21-1.26)	0.76 (0.54-1.07)	0.56 (0.30-1.04)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	58	ref.	1.40 (0.66-2.95)	0.72 (0.30-1.72)	0.78 (0.31-1.96)	0.88 (0.63-1.22)	0.58 (0.32-1.05)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	71	ref.	1.36 (0.73-2.54)	0.74 (0.35-1.57)	0.66 (0.29-1.49)	0.85 (0.64-1.14)	0.58 (0.34-1.00)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	73	ref.	1.28 (0.69-2.37)	0.73 (0.35-1.51)	0.59 (0.27-1.30)	0.82 (0.61-1.10)	0.57 (0.33-0.97)
Thyroid Cancer								
Model 1: Average annual NW (extrapolated) [c]	13,240	70	ref.	1.07 (0.52-2.19)	1.30 (0.62-2.72)	1.42 (0.68-2.96)	1.03 (0.80-1.31)	1.30 (0.76-2.21)
Model 2: Average annual NW censoring at LTF or withdrawal [d]	13,240	66	ref.	0.87 (0.40-1.86)	1.26 (0.60-2.67)	1.45 (0.70-3.03)	1.05 (0.82-1.35)	1.44 (0.83-2.51)
Model 3: Average annual NW (3-year lag) [e]	12,852	67	ref.	1.42 (0.68-3.00)	1.67 (0.77-3.62)	1.87 (0.86-4.06)	1.10 (0.86-1.40)	1.42 (0.82-2.46)
Model 4: Average annual NW, window of susceptibility ≤60 y.o. [f]	10,746	65	ref.	0.99 (0.48-2.05)	1.08 (0.49-2.34)	1.36 (0.65-2.82)	1.12 (0.87-1.43)	1.22 (0.70-2.12)
Model 5: Average annual NW, window of susceptibility >60 y.o. [g]	11,600	43	ref.	0.77 (0.29-2.03)	0.88 (0.33-2.40)	1.69 (0.67-4.26)	1.22 (0.90-1.64)	1.43 (0.72-2.85)
Model 6: Average annual NW, adjusting for DASH [h]	12,996	68	ref.	1.10 (0.54-2.25)	1.20 (0.56-2.56)	1.48 (0.71-3.10)	1.03 (0.81-1.32)	1.25 (0.73-2.15)
Model 7: Average annual NW (no imputed covariates) [i]	13,240	70	ref.	1.08 (0.53-2.20)	1.30 (0.62-2.72)	1.41 (0.68-2.92)	1.02 (0.80-1.31)	1.30 (0.76-2.22)

[a] Cox proportional hazard (PH) models were implemented for neighborhood walkability as predictor of first incident obesity-related cancer adjusted for baseline age, race/ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood, and ever moving from baseline residence at any time during the study follow-up. Covariates alcohol, smoking status, education level, and race/ethnicity had missing observations and were included in the model using multiple imputation with 10 iterations for missing covariates. All models using the average annual neighborhood walkability exposure implemented a carried forward measure of population density after 2010 and a carried forward measure of destination accessibility after 2014, except for model 3. Only cancer subtypes with a number of first obesity-related malignant cancer cases n>30 were included in the table. Quartile cut-offs were at the 25th, 50th, and 75th percentiles of the z-scored summed walkability measure.

[b] Continuous neighborhood walkability variable scaled to the SD of each population: models 1, 6, 7, 8, 9 (SD=5.9368709), model 2 (SD=5.9351510), model 3 (SD=5.9384698), model 4 (SD=5.8863328), and model 5 (SD=6.4290072).

[c] Model using extrapolated population density after 2010 and of destination accessibility after 2014.

[d] Model additionally censoring at lost to follow-up or withdrawal from study. In main analyses, we censored women that were non-respondent, were lost to follow-up, or who withdrew from active follow-up, only if they last resided outside the three states (NY, NJ, FL) with cancer linkages at the year they last responded a follow-up questionnaire or at the year they moved out of the three states because we did not know their cancer status afterwards. The additional censoring in this sensitivity analysis was done for women who resided in NY, NJ, or FL at last contact and either withdrew from active follow-up or were lost to follow-up. This was done to assess the impact of the partial walkability data and the assumption that they did not move out of the three states, as walkability was computed until last contact, and we continue following them using linkages.

[e] Model using a 3-year lag for neighborhood walkability exposure.

[f] Model using a window of susceptibility where neighborhood walkability exposure is averaged only for ages 60 or below. As a result, there were 2,494 missing observations with no available geocoded address corresponding to an age equal or below 60.

[g] Model using a window of susceptibility where neighborhood walkability exposure is averaged only for ages above 60. As a result, there were 1,640 missing observations with no available geocoded address corresponding to an age above 60.

[h] Model additionally adjusting for continuous DASH dietary index with participants that had completed the FFQ.

[i] Model with no multiple imputation for missing covariates. We created categories with missing values for the following variables: daily alcohol intake (n=2,080), education level (n=2,398), race-ethnicity (n=1,632), and smoking status (n=1,244).

[j] Breast cancer diagnosed in menopause. 21 women had unknown menopausal status at breast cancer diagnosis that were treated as a postmenopausal diagnosis if age at diagnosis was greater than 50 and treated as premenopausal if age at diagnosis was lower than 50 years of age.

Abbreviations: NW indicates neighborhood walkability; HR, hazard ratio; and CI, confidence interval.

Table S7. Obesity-related Cancer Hazard Ratios based on Neighborhood Walkability Sensitivity Analyses Using Different Time-Scales (n=13,240). [a]

	NW Q1 [-0.8, 0.9] Reference	NW Q2 [0.9, 3.3] HR (95% CI)	NW Q3 [3.3, 8.1] HR (95% CI)	NW Q4 [8.1, 44.6] HR (95% CI)	Per SD [b] (Continuous NW) HR (95% CI)	NW Above Median (>3.3) HR (95% CI)
Model 1 [c]						
Overall [d]	ref.	0.94 (0.84-1.06)	0.92 (0.81-1.04)	0.74 (0.65-0.85)	0.89 (0.85-0.93)	0.86 (0.79-0.94)
Breast Cancer [e]	ref.	0.90 (0.77-1.05)	0.86 (0.73-1.02)	0.73 (0.61-0.87)	0.89 (0.84-0.95)	0.85 (0.75-0.96)
Model 2 [f]						
Overall [d]	ref.	0.94 (0.84-1.06)	0.92 (0.81-1.04)	0.74 (0.65-0.85)	0.89 (0.85-0.93)	0.86 (0.79-0.94)
Breast Cancer [e]	ref.	0.90 (0.77-1.05)	0.86 (0.73-1.02)	0.73 (0.61-0.87)	0.89 (0.84-0.95)	0.85 (0.75-0.96)
Model 3 [g]						
Overall [d]	ref.	0.94 (0.84-1.06)	0.92 (0.82-1.04)	0.75 (0.66-0.85)	0.89 (0.85-0.93)	0.86 (0.79-0.95)
Breast Cancer [e]	ref.	0.90 (0.77-1.05)	0.87 (0.73-1.02)	0.73 (0.61-0.87)	0.89 (0.84-0.95)	0.85 (0.75-0.96)

[a] Cox proportional hazard (PH) models were implemented for neighborhood walkability as predictor of first incident obesity-related cancer adjusted for baseline age, race/ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood, and ever moving from baseline residence at any time during the study follow-up. Covariates alcohol, smoking status, education level, and race/ethnicity had missing observations and were included in the model using multiple imputation with 10 iterations for missing covariates. All models using an average neighborhood walkability exposure implemented a carried forward measure of population density after 2010 and a carried forward measure of destination accessibility after 2014. Only all obesity related cancers as well as postmenopausal breast cancer, which were the outcomes with greater sample sizes, were included in the table.

[b] Continuous neighborhood walkability variable scaled to the SD of the population (SD=5.9368709).

[c] Time-on-study as the time-scale, with two slopes for age, to allow different effects for younger (below or equal to the median age, 51) and older ages (greater than the median age, 51).

[d] Any first incident obesity-related cancer.

[e] Postmenopausal breast cancer.

[f] Time-on-study as the time-scale, with two slopes for age, to allow different effects for younger (below or equal to the median age, 60) and older ages (greater than the median age, 60).

[g] Age as the time-scale, stratifying the model by birth cohort (10-year intervals as follows: 1915-1925, 1925-1935, 1935-1945, 1945-1956), which adjusts for calendar effects.

Table S8. Obesity-related Cancer Hazard Ratios based on Median and Continuous (Per IQR) Neighborhood Walkability (n=13,240). [a]

	Cases (n)	Per IQR (Continuous NW) HR (95% CI) [b]	NW Above Median (>3.3) HR (95% CI)
Overall (Any First Incident Obesity-related Cancer)	2,411	0.86 (0.82-0.91)	0.86 (0.79-0.94)
Postmenopausal Breast Cancer [c]	1,269	0.86 (0.80-0.94)	0.84 (0.74-0.96)
Colorectal Cancer	343	0.89 (0.77-1.04)	0.92 (0.72-1.17)
Colon Cancer	275	0.91 (0.77-1.08)	1.00 (0.77-1.31)
Rectal Cancer	68	0.83 (0.59-1.17)	0.65 (0.37-1.12)
Cancer of the Uterus (including Endometrium)	282	0.84 (0.72-0.99)	0.85 (0.65-1.11)
Ovarian Cancer	138	0.78 (0.62-0.99)	1.03 (0.70-1.51)
Pancreatic Cancer	108	0.84 (0.63-1.10)	0.78 (0.51-1.20)
Multiple Myeloma and Malignant Plasma Cell Neoplasms	73	0.62 (0.42-0.93)	0.51 (0.30-0.87)
Renal Cancer	73	0.80 (0.56-1.13)	0.58 (0.34-0.99)
Thyroid Cancer	70	1.03 (0.76-1.39)	1.30 (0.76-2.21)

[a] Cox proportional hazard (PH) models were implemented for neighborhood walkability dichotomized by the median and continuous NW (scaled by the interquartile range, IQR) as predictor of first incident obesity-related cancer adjusted for baseline age, race/ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood, and ever moving from baseline residence at any time during the study follow-up. Covariates alcohol, smoking status, education level, and race/ethnicity had missing observations and were included in the model using multiple imputation with 10 iterations for missing covariates. All models using an average neighborhood walkability exposure implemented a carried forward measure of population density after 2010 and a carried forward measure of destination accessibility after 2014. Only cancer subtypes with a number of first obesity-related malignant cancer cases n>30 were included in the table.

[b] Continuous neighborhood walkability variable scaled to the interquartile range (IQR=7.2213454).

[c] Breast cancer diagnosed in menopause. 21 women had unknown menopausal status at breast cancer diagnosis that were treated as a postmenopausal diagnosis if age at diagnosis was greater than 50 and treated as premenopausal if age at diagnosis was lower than 50 years of age.

Abbreviations: HR, hazard ratio; CI, confidence interval; and NW, neighborhood walkability.

Table S9. Stratified Analyses by Age, BMI, and Parity for Additional Frequent Cancer Subtypes (n=13,240). [a]

Cancer Subtypes	Median BMI <24 (n=6,644)		Median BMI ≥24 (n=6,596)			Median Age ≤51 (n=6,809)		Median Age >51 (n=6,431)			Non-Parous (n=4,212)		Parous (n=9,028)		
	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	p-interaction	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	p-interaction	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	p-interaction
Colorectal Cancer	158	0.89 (0.75-1.05)	185	0.94 (0.78-1.14)	0.393	110	0.96 (0.79-1.18)	233	0.89 (0.76-1.04)	0.770	94	0.96 (0.79-1.17)	249	0.89 (0.75-1.04)	0.741
Colon Cancer	129	0.92 (0.76-1.10)	146	0.94 (0.76-1.16)	0.631	82	1.04 (0.83-1.30)	193	0.88 (0.73-1.05)	0.479	75	0.98 (0.79-1.22)	200	0.90 (0.75-1.08)	0.926
Rectal Cancer	29	0.79 (0.52-1.18)	39	0.97 (0.65-1.43)	0.343	28	0.76 (0.49-1.18)	40	0.95 (0.67-1.36)	0.533	19	0.89 (0.58-1.38)	49	0.82 (0.57-1.19)	0.610
Cancer of the Uterus (including Endometrium)	104	0.91 (0.75-1.11)	178	0.88 (0.72-1.07)	0.790	148	0.84 (0.70-1.00)	134	0.92 (0.75-1.12)	0.318	98	0.90 (0.75-1.08)	184	0.81 (0.66-1.00)	0.399
Ovarian Cancer	75	0.86 (0.68-1.08)	63	0.75 (0.53-1.06)	0.878	64	0.91 (0.71-1.16)	74	0.73 (0.53-1.00)	0.229	51	0.77 (0.59-1.01)	87	0.88 (0.67-1.16)	0.566

[a] Stratified survival models were conducted to assess the association between continuous NW (SD-scaled, SD=5.9368709) and obesity-related cancer subtype risk by potential effect modifiers. Models adjusted for all covariates (age, race–ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood at baseline, and ever moving from baseline residence at any time during follow-up) except for the stratifying variable. Age was adjusted as a continuous variable in all models (including models stratified by median age). *P*-value of the coefficient for the cross-product of continuous NW and the effect modifier is shown. Interaction models were computed treating effect modifiers as dichotomized variables.

Abbreviations: BMI indicates body mass index; HR, hazard ratio; CI, confidence interval; SD, standard deviation; and NW, neighborhood walkability.

Table S10. Stratified Analyses by Poverty, DASH Diet, and Smoking Status for Additional Frequent Cancer Subtypes (n=13,240). [a]

Cancer Subtypes	Below Median Poverty (n=6,653)		Above Median Poverty (n=6,587)			Below Median DASH [b] (n=7,077)		Above Median DASH [b] (n=5,919)			Never Smokers [c] (n=5,692)		Ever Smokers [c] (n=6,304)		
	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	p-interaction	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	p-interaction	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	p-interaction
Colorectal Cancer	171	0.95 (0.81-1.13)	172	0.82 (0.68-0.99)	0.409	185	0.86 (0.73-1.03)	150	0.96 (0.80-1.15)	0.576	150	0.87 (0.71-1.06)	171	0.92 (0.77-1.08)	0.612
Colon Cancer	129	0.96 (0.79-1.17)	146	0.82 (0.66-1.01)	0.468	157	0.91 (0.76-1.10)	112	0.93 (0.75-1.15)	0.956	122	0.82 (0.65-1.04)	136	0.98 (0.81-1.17)	0.177
Rectal Cancer	42	0.93 (0.67-1.30)	26	0.85 (0.53-1.36)	0.738	28	0.62 (0.36-1.06)	38	1.06 (0.76-1.47)	0.170	28	1.05 (0.71-1.56)	35	0.68 (0.44-1.05)	0.110
Cancer of the Uterus (including Endometrium)	139	0.89 (0.74-1.06)	143	0.80 (0.65-0.98)	0.445	145	0.92 (0.76-1.11)	134	0.82 (0.67-0.99)	0.410	139	0.85 (0.70-1.04)	117	0.90 (0.74-1.09)	0.496
Ovarian Cancer	75	0.97 (0.77-1.23)	63	0.61 (0.44-0.85)	0.068	75	0.68 (0.51-0.91)*	62	1.00 (0.77-1.30)	0.240	55	0.81 (0.60-1.09)	72	0.83 (0.64-1.07)	0.686

[a] Stratified survival models were conducted to assess the association between continuous NW (SD-scaled, SD=5.9368709) and obesity-related cancer subtype risk by potential effect modifiers. Models adjusted for all covariates (age, race–ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level (FPL) living in neighborhood at baseline, and ever moving from baseline residence at any time during follow-up) except for the stratifying variable. Age was adjusted as a continuous variable in all models (including models stratified by median age). P-value of the coefficient for the cross-product of continuous NW and the effect modifier is shown. Interaction models were computed treating effect modifiers as dichotomized variables. Pancreatic cancer, multiple myeloma, renal cancer, and thyroid cancer were not included due to low sample size across categories of effect modifiers.

[b] DASH diet was available in n=12,996 women.

[c] Smoking was available in n=11,996 women.

Abbreviations: HR, hazard ratio; CI, confidence interval; FPL, federal poverty level; SD, standard deviation; and NW, neighborhood walkability.

Table S11. Stratified Analyses by Race for Additional Frequent Cancer Subtypes in the NYUWHS (n=11,608). [a]

Cancer Subtypes	NH White (ref.; n=9,115)		NH Black (n=1,370)			Hispanic (n=726)			Other (n=397)		
	Cases (n)	NW Continuous Hazard Ratio (CI)	Cases (n)	NW Continuous Hazard Ratio (CI)	p-interaction	Cases (n)	NW Continuous Hazard Ratio (CI)	p-interaction	Cases (n)	NW Continuous Hazard Ratio (CI)	p-interaction
Colorectal Cancer	257	0.92 (0.80-1.05)	33	0.77 (0.43-1.36)	0.965	13	0.91 (0.46-1.82)	0.578	7	1.12 (0.47-2.68)	0.922
Colon Cancer	208	0.93 (0.80-1.08)	27	0.72 (0.37-1.38)	0.894	7	1.59 (0.78-3.26)	0.812	5	1.27 (0.44-3.60)	0.996
Rectal Cancer	49	0.90 (0.66-1.23)	6	1.03 (0.30-3.63)	0.881	6	0.16 (0.02-1.40)	0.341	2	-	-
Cancer of the Uterus (including Endometrium)	205	0.90 (0.78-1.07)	25	0.94 (0.50-1.76)	0.933	15	0.46 (0.19-1.15)	0.099	7	0.52 (0.17-1.65)	0.465
Ovarian Cancer	107	0.81 (0.66-1.01)	8	0.67 (0.18-2.47)	0.894	5	0.65 (0.20-2.14)	0.820	0	-	-

[a] Stratified survival models were conducted to assess the association between continuous NW (SD-scaled, SD=5.9368709) and obesity-related cancer subtype risk by race/ethnicity, using multiple imputation with 10 iterations for missing covariates. Models adjusted for all covariates (age, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood at baseline, and ever moving from baseline residence at any time during follow-up) except for the stratifying variable. P-value of the coefficient for the cross-product of continuous NW and the effect modifier is shown. Interaction models were computed treating the effect modifiers as dummy variables. Race/ethnicity was available in n=11,608 women. Pancreatic cancer, multiple myeloma, renal cancer, and thyroid cancer were not included due to low sample size across categories of effect modifiers.

Abbreviations: HR, hazard ratio; CI, confidence interval; SD, standard deviation; and NW, neighborhood walkability.

Table S12. Stratified Analyses by Education for Additional Frequent Cancer Subtypes in the NYUWHS (n=10,842). [a]

Cancer Subtypes	High School or Less (ref.; n=3,379)		College, Vocational School, or Other (n=4,402)			Graduate School (n=3,061)		
	Cases (n)	NW Continuous Hazard Ratio (CI)	Cases (n)	NW Continuous Hazard Ratio (CI)	p-interaction	Cases (n)	NW Continuous Hazard Ratio (CI)	p-interaction
Colorectal Cancer	105	0.86 (0.66-1.13)	109	0.96 (0.78-1.18)	0.978	65	0.87 (0.69-1.11)	0.524
Colon Cancer	84	0.88 (0.64-1.19)	87	1.02 (0.82-1.28)	0.678	52	0.82 (0.63-1.08)	0.513
Rectal Cancer	21	0.80 (0.45-1.42)	22	0.74 (0.44-1.23)	0.453	13	1.09 (0.67-1.79)	0.970
Cancer of the Uterus (including Endometrium)	67	0.85 (0.58-1.24)	101	0.84 (0.67-1.04)	0.991	61	0.89 (071-1.13)	0.508
Ovarian Cancer	32	0.55 (0.29-1.05)	47	0.93 (0.68-1.26)	0.685	31	0.75 (0.53-1.05)	0.733

[a] Stratified survival models were conducted to assess the association between continuous NW (SD-scaled, SD=5.9368709) and obesity-related cancer subtype risk by race/ethnicity, using multiple imputation with 10 iterations for missing covariates. Models adjusted for all covariates (age, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood at baseline, and ever moving from baseline residence at any time during follow-up) except for the stratifying variable. P-value of the coefficient for the cross-product of continuous NW and the effect modifier is shown. Interaction models were computed treating the effect modifiers as dummy variables. Educational level was available in n=10,842 women. Pancreatic cancer, multiple myeloma, renal cancer, and thyroid cancer were not included due to low sample size across categories of effect modifiers.

Abbreviations: HR, hazard ratio; CI, confidence interval; SD, standard deviation; and NW, neighborhood walkability.

Table S13. Stratified Analyses by Median Outdoor Walking at Baseline and History of Diabetes for Most Frequent Cancer Subtypes in the NYUWHS (n=13,240). [a]

Cancer Subtypes	Below Median Outdoor Walking [b] (n=5,601)		Above Median Outdoor Walking [b] (n=4,960)		Diabetes [c] (n=2,009)		No Diabetes [c] (n=10,173)	
	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)	Cases (n)	NW HR (95% CI)
Overall (Any First Incident Obesity-related Cancer)	1,059	0.88 (0.82-0.95)	867	0.90 (0.84-0.96)	395	0.82 (0.72-0.94)	1,831	0.90 (0.86-0.95)
Breast Cancer (Postmenopausal)	552	0.86 (0.77-0.95)	478	0.91 (0.83-0.99)	211	0.88 (0.74-1.05)	975	0.89 (0.83-0.96)
Colorectal Cancer	170	0.93 (0.77-1.12)	99	0.94 (0.77-1.15)	53	0.54 (0.33-0.89)	267	0.96 (0.84-1.09)
Colon Cancer	140	0.90 (0.73-1.12)	81	0.93 (0.74-1.17)	44	0.46 (0.25-0.84)	215	0.98 (0.84-1.13)
Rectal Cancer	30	1.03 (0.69-1.54)	18	0.99 (0.62-1.57)	9	0.93 (0.41-2.09)	52	0.88 (0.64-1.20)
Cancer of the Uterus (including Endometrium)	116	0.87 (0.69-1.09)	115	0.88 (0.73-1.07)	55	0.76 (0.54-1.07)	208	0.93 (0.80-1.08)
Ovarian Cancer	60	0.77 (0.55-1.06)	52	0.82 (0.60-1.10)	12	0.94 (0.45-1.93)	113	0.79 (0.64-0.97)

[a] Stratified survival models were conducted to assess the association between continuous NW (SD-scaled, SD=5.9368709) and obesity-related cancer subtype risk by potential effect modifiers. Models adjusted for all covariates (age, race–ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level (FPL) living in neighborhood at baseline, and ever moving from baseline residence at any time during follow-up) except for the stratifying variable. Age was adjusted as a continuous variable in all models (including models stratified by median age). Pancreatic cancer, multiple myeloma, renal cancer, and thyroid cancer were not included due to low sample size across categories of effect modifiers.

[b] Outdoor walking was available in n=10,561 women.

[c] Diabetes information was available in n=12,182 women.

Abbreviations: HR, hazard ratio; CI, confidence interval; SD, standard deviation; and NW, neighborhood walkability.

Table S14. Postmenopausal Breast Cancer Competing Risk Hazard Ratios based on Neighborhood Walkability by ER/PR Status. [a]

Postmenopausal Breast Cancer Subtype	n	Cases, n	NW Q1 [-0.8, 0.9] Reference	NW Q2 [0.9, 3.3] HR (95% CI)	NW Q3 [3.3, 8.1] HR (95% CI)	NW Q4 [8.1, 44.6] HR (95% CI)	Per SD [b] (Continuous NW) HR (95% CI)	NW Above Median (>3.3) HR (95% CI)
Postmenopausal Breast Cancer	13,240	1,269	ref.	0.89 (0.76-1.04)	0.86 (0.73-1.02)	0.75 (0.63-0.90)	0.90 (0.85-0.96)	0.86 (0.76-0.98)
ER+/PR-	13,240	173	ref.	1.20 (0.78-1.85)	1.06 (0.65-1.71)	0.84 (0.50-1.40)	0.90 (0.76-1.07)	0.85 (0.59-1.22)
ER-/PR+	13,240	20	ref.	1.16 (0.30-4.48)	1.22 (0.32-4.60)	0.71 (0.19-2.61)	0.78 (0.54-1.17)	0.88 (0.34-2.30)
ER+/PR+	13,240	508	ref.	0.83 (0.65-1.05)	0.74 (0.57-0.98)	0.67 (0.51-0.88)	0.88 (0.80-0.97)	0.78 (0.64-0.96)
ER-/PR-	13,240	133	ref.	0.81 (0.50-1.31)	0.65 (0.39-1.08)	0.74 (0.45-1.23)	0.92 (0.76-1.10)	0.78 (0.55-1.11)

[a] Competing risk cox proportional hazard (PH) models were implemented for neighborhood walkability as predictor of first incident postmenopausal breast cancer adjusted for baseline age, race/ethnicity, education level, smoking status, alcohol intake, menopausal status, parity, percent below the poverty level living in neighborhood, and ever moving from baseline residence at any time during the study follow-up. Covariates alcohol, smoking status, education level, and race/ethnicity had missing observations and were included in the model using multiple imputation with 10 iterations for missing covariates. All models using an average neighborhood walkability exposure implemented a carried forward measure of population density after 2010 and a carried forward measure of destination accessibility after 2014. Individuals who had an unknown ER/PR status were included in the analyses.

[b] Continuous neighborhood walkability variable scaled to the standard deviation of the population (SD=5.9368709).

Abbreviations: ER+, estrogen receptor-positive); ER-, estrogen receptor-negative; PR+, progesterone receptor-positive; PR-, progesterone receptor-negative; HR, hazard ratio; CI, confidence interval; SD, standard deviation; and NW, neighborhood walkability.

Figure S1. Follow-up Questionnaires' Timeline in the NYUWHS. [a]
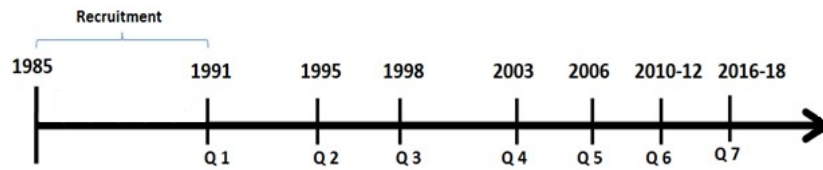
[a] Follow-up time in the NYUWHS until censoring of study (end of 2016). Recruitment took place between 1985 and 1991 at a mammography screening center in NYC. At enrollment (Q1), subjects completed a questionnaire that captured socio-demographic, medical, lifestyle, and reproductive information, height and weight, family history of breast cancer, recent medication use, and a validated, semi-quantitative Food Frequency Questionnaire (FFQ). Active cohort contact is achieved through questionnaires mailed every 3–5 years and, for non-respondents, telephone calls (Q1-Q7). All changes of address with the associated dates, as reported by the participant or identified in the NCOA, are recorded in the NYUWHS database. A high response rate has been maintained over the years. For instance, of the alive participants at the Q7, 1,140 had previously withdrawn from active follow-up, and thus, were not contacted. Of the 8,450 remaining participants, 6,398 (76%) completed the questionnaire.

Figure S2. Time-varying Exposure Characterization Scenario for NYUWHS Participant with Long Follow-Up. [a]
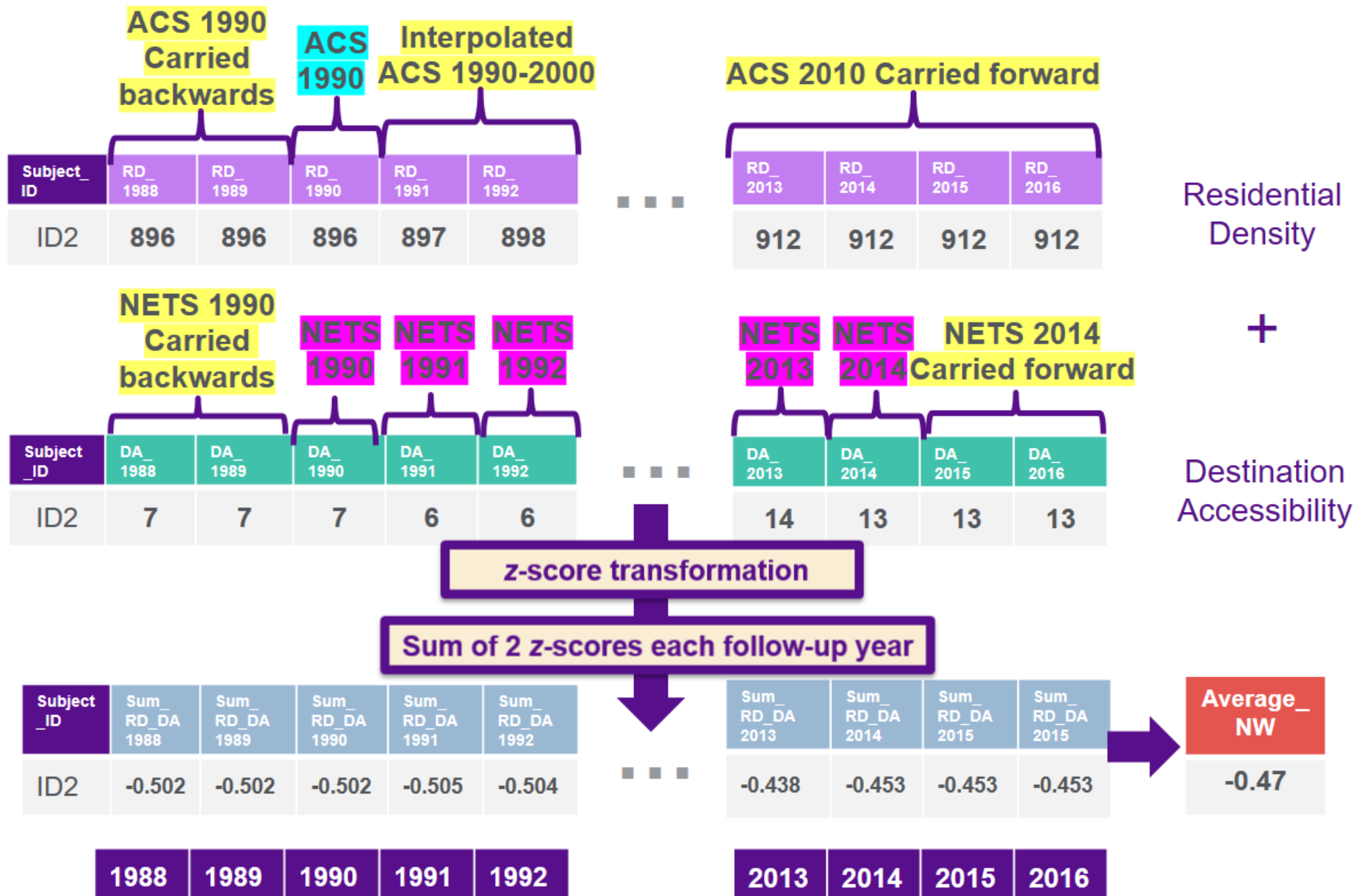
[a] Example for estimating average annual neighborhood walkability in a scenario where a women was followed up from 1988 (recruitment year) through 2016 (end of study). The National Establishment Time-Series (NETS) database, which contains information on business listings, was used to extract data for destination accessibility from 1990 through 2014, and the ACS from 1990, 2000, and 2010 were used to extract data for residential density. Interpolated residential density values were used for non-decennial years after 1990, carried backward destination accessibility and residential density values were used for years prior to 1990, and carried forward destination accessibility values were used for years after 2014. In order to create the z-score values, we used the US national mean value and standard deviation (SD) in year 2010 for each of the two items as follows: density of walkable destinations (mean=37.03 per km^2, SD= 117.76) and population density (2029.42 per km^2, SD= 4543.81). Once we z-scored-transformed data across all years and all women by subtracting the national average from each woman's value and dividing the value by the national SD, we summed the two z-scores for each year. Then, we averaged the value across years of follow-up for each woman by taking the sum of the z scores of the follow-up years and divided the sum by follow-up years.

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