

Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

eTable 1. Percentage of Treatment “Declined/Received” Missingness Across Patient Cohorts Over Time

| | Chemotherapy cohort | Hormone therapy cohort | Radiotherapy cohort | Surgery cohort |
|--------------------------|----------------------------|-------------------------------|----------------------------|---------------------------|
| Year of diagnosis | Missing, n (%) | Missing, n (%) | Missing, n (%) | Missing, n (%) |
| 2004 | 2,382 (3.9) | 2,920 (4.7) | 2,366 (3.4) | 330 (0.3) |
| 2005 | 2,382 (3.7) | 3,139 (4.7) | 2,205 (3.1) | 348 (0.3) |
| 2006 | 2,148 (3.3) | 2,964 (4.0) | 1,845 (2.5) | 318 (0.3) |
| 2007 | 2,005 (2.9) | 3,008 (3.7) | 1,824 (2.3) | 304 (0.2) |
| 2008 | 2,096 (2.9) | 3,234 (3.7) | 1,986 (2.4) | 461 (0.4) |
| 2009 | 1,939 (2.6) | 3,023 (3.1) | 1,819 (2.1) | 525 (0.4) |
| 2010 | 2,069 (2.7) | 2,947 (2.8) | 1,670 (1.9) | 582 (0.4) |
| 2011 | 2,029 (2.6) | 3,025 (2.7) | 1,731 (1.9) | 682 (0.5) |
| 2012 | 1,584 (2.0) | 3,091 (2.6) | 1,773 (1.8) | 722 (0.5) |
| 2013 | 1,501 (1.8) | 3,221 (2.5) | 1,782 (1.7) | 898 (0.6) |
| 2014 | 1,536 (1.8) | 3,742 (2.8) | 1,657 (1.5) | 1,032 (0.6) |
| 2015 | 1,491 (1.7) | 3,976 (2.9) | 1,575 (1.4) | 1,142 (0.7) |
| 2016 | 1,413 (1.6) | 4,110 (2.8) | 1,658 (1.4) | 1,331 (0.8) |
| 2017 | 1,560 (1.7) | 4,632 (3.1) | 1,653 (1.4) | 1,381 (0.8) |
| 2018 | 1,187 (1.4) | 3,419 (2.2) | 1,063 (0.9) | 975 (0.5) |
| 2019 | 1,088 (1.3) | 4,406 (2.8) | 1,269 (1.0) | 1,257 (0.7) |
| 2020 | 1,195 (1.6) | 4,637 (3.4) | 1,570 (1.5) | 1,530 (0.9) |

eTable 2. Distributions of Patient Characteristics by Chemotherapy Decision Comparing “Declined/Received” Not missing vs. Missing

| | Chemotherapy “declined/received” | | |
|---|---|---------------------------|-----------------------------|
| | NOT missing, n (%) | Missing, n (%) | P value ^a |
| Total | 1296488 (97.8) | 29521 (2.2) | |
| Age at diagnosis, mean (SD) | 56.5 (12.5) | 62.4 (13.6) | <0.001 |
| Age at diagnosis, median (IQR) | 56.0 (47.0, 65.0) | 62.0 (52.0, 73.0) | <0.001 |
| Sex | | | <0.001 |
| Male | 11455 (0.9) | 432 (1.5) | |
| Female | 1285033 (99.1) | 29089 (98.5) | |
| Race/ethnicity | | | <0.001 |
| White | 955135 (73.7) | 20478 (69.4) | |
| Black | 182706 (14.1) | 4390 (14.9) | |
| Asian or Pacific Islander | 50771 (3.9) | 1165 (3.9) | |
| Hispanic | 85661 (6.6) | 2518 (8.5) | |
| American India, Alaska Native, or Other | 22215 (1.7) | 970 (3.3) | |
| Type of health insurance | | | <0.001 |
| Uninsured | 33986 (2.6) | 1023 (3.5) | |
| Private or managed care | 770370 (59.4) | 13505 (45.7) | |
| Medicaid | 112960 (8.7) | 2022 (6.8) | |
| Medicare | 341275 (26.3) | 11578 (39.2) | |
| Other government or unknown | 37897 (2.9) | 1393 (4.7) | |
| Median household income quartiles ^b | | | <0.001 |
| <\$40,227 | 192080 (16.8) | 4867 (18.2) | |
| \$40,227–\$50,353 | 233812 (20.4) | 4957 (18.5) | |
| \$50,354–\$63,332 | 264318 (23.1) | 5584 (20.9) | |
| ≥\$63,333 | 453296 (39.6) | 11339 (42.4) | |
| Rural/urban area ^c | | | <0.001 |
| Metro | 1094444 (86.8) | 25882 (91.1) | |
| Urban | 147471 (11.7) | 2257 (7.9) | |
| Rural | 19247 (1.5) | 281 (1.0) | |
| Facility type | | | <0.001 |

| | | | |
|--|----------------|--------------|--------|
| Community | 86162 (7.3) | 2120 (7.5) | |
| Comprehensive community | 485796 (41.1) | 10357 (36.7) | |
| Academic or research | 361638 (30.6) | 9585 (34.0) | |
| Integrated network | 248832 (21.0) | 6170 (21.9) | |
| Charlson-Deyo comorbidity index | | | <0.001 |
| 0 | 1104887 (85.2) | 25080 (85.0) | |
| 1 | 149860 (11.6) | 3373 (11.4) | |
| ≥2 | 41741 (3.2) | 1068 (3.6) | |
| Histologic type | | | <0.001 |
| Ductal | 1044349 (80.6) | 22621 (76.6) | |
| Lobular | 102906 (7.9) | 2864 (9.7) | |
| Ductal and lobular | 58628 (4.5) | 1474 (5.0) | |
| Other | 90605 (7.0) | 2562 (8.7) | |
| AJCC stage group | | | <0.001 |
| 1 | 416538 (32.1) | 14224 (48.2) | |
| 2 | 547928 (42.3) | 9872 (33.4) | |
| 3 | 241718 (18.6) | 3044 (10.3) | |
| 4 | 90304 (7.0) | 2381 (8.1) | |
| Molecular subtype | | | <0.001 |
| HR+/ERBB2- | 454888 (52.5) | 9923 (66.6) | |
| HR+/ERBB2+ | 155969 (18.0) | 1781 (12.0) | |
| HR-/ERBB2+ | 69111 (8.0) | 884 (5.9) | |
| TNBC | 186855 (21.6) | 2308 (15.5) | |
| Tumor grade | | | <0.001 |
| 1 | 113085 (9.4) | 5118 (19.4) | |
| 2 | 479199 (39.7) | 11797 (44.7) | |
| 3 | 613850 (50.9) | 9482 (35.9) | |

Abbreviations: SD, standard deviation; IQR; interquartile range; AJCC, American Joint Committee on Cancer; HR, hormone receptor; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a *P* values were computed using Student's *t*, Wilcoxon rank-sum, or Pearson's Chi-square tests.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^c Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 3. Distributions of Patient Characteristics by Hormone Therapy Decision Comparing “Declined/Received” Not missing vs. Missing

| | Hormone therapy “declined/received” | | |
|---|--|---------------------------|-----------------------------|
| | NOT missing, n (%) | Missing, n (%) | P value ^a |
| Total | 1893339 (96.9) | 59494 (3.1) | |
| Age at diagnosis, mean (SD) | 61.8 (13.0) | 61.4 (13.4) | <0.001 |
| Age at diagnosis, median (IQR) | 62.0 (52.0, 71.0) | 62.0 (51.0, 71.0) | <0.001 |
| Sex | | | <0.001 |
| Male | 16914 (0.9) | 932 (1.6) | |
| Female | 1876425 (99.1) | 58562 (98.4) | |
| Race/ethnicity | | | <0.001 |
| White | 1524505 (80.5) | 44214 (74.3) | |
| Black | 174272 (9.2) | 6995 (11.8) | |
| Asian or Pacific Islander | 67835 (3.6) | 2471 (4.2) | |
| Hispanic | 97176 (5.1) | 4183 (7.0) | |
| American India, Alaska Native, or Other | 29551 (1.6) | 1631 (2.7) | |
| Type of health insurance | | | <0.001 |
| Uninsured | 30326 (1.6) | 1404 (2.4) | |
| Private or managed care | 953742 (50.4) | 29091 (48.9) | |
| Medicaid | 108128 (5.7) | 4132 (6.9) | |
| Medicare | 757349 (40.0) | 22817 (38.4) | |
| Other government or unknown | 43794 (2.3) | 2050 (3.4) | |
| Median household income quartiles ^b | | | <0.001 |
| <\$40,227 | 239816 (14.5) | 7866 (14.9) | |
| \$40,227–\$50,353 | 329905 (19.9) | 9336 (17.7) | |
| \$50,354–\$63,332 | 388322 (23.4) | 11210 (21.2) | |
| ≥\$63,333 | 698493 (42.2) | 24417 (46.2) | |
| Rural/urban area ^c | | | <0.001 |
| Metro | 1599687 (86.7) | 51824 (90.3) | |
| Urban | 217134 (11.8) | 4982 (8.7) | |
| Rural | 28610 (1.6) | 560 (1.0) | |
| Facility type | | | <0.001 |

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|--|----------------|--------------|--------|
| Community | 128834 (7.1) | 4214 (7.4) | |
| Comprehensive community | 760598 (41.9) | 21610 (38.2) | |
| Academic or research | 535287 (29.5) | 17512 (30.9) | |
| Integrated network | 391192 (21.5) | 13278 (23.5) | |
| Charlson-Deyo comorbidity index | | | <0.001 |
| 0 | 1574130 (83.1) | 50868 (85.5) | |
| 1 | 240913 (12.7) | 6617 (11.1) | |
| ≥2 | 78296 (4.1) | 2009 (3.4) | |
| Histologic type | | | <0.001 |
| Ductal | 1443493 (76.2) | 45976 (77.3) | |
| Lobular | 231266 (12.2) | 6233 (10.5) | |
| Ductal and lobular | 114214 (6.0) | 3410 (5.7) | |
| Other | 104366 (5.5) | 3875 (6.5) | |
| AJCC stage group | | | <0.001 |
| 1 | 1135275 (60.0) | 36126 (60.7) | |
| 2 | 520891 (27.5) | 15656 (26.3) | |
| 3 | 163500 (8.6) | 5665 (9.5) | |
| 4 | 73673 (3.9) | 2047 (3.4) | |
| ERBB2 status | | | <0.001 |
| Negative | 1250585 (88.8) | 33172 (84.2) | |
| Positive | 157103 (11.2) | 6241 (15.8) | |
| Tumor grade | | | <0.001 |
| 1 | 495152 (28.0) | 14279 (26.2) | |
| 2 | 904782 (51.2) | 27096 (49.7) | |
| 3 | 367167 (20.8) | 13194 (24.2) | |

Abbreviations: SD, standard deviation; IQR; interquartile range; AJCC, American Joint Committee on Cancer; ERBB2, human epidermal growth factor receptor 2.

^a *P* values were computed using Student's *t*, Wilcoxon rank-sum, or Pearson's Chi-square tests.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^c Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 4. Distributions of Patient Characteristics by Radiotherapy Decision Comparing “Declined/Received” Not missing vs. Missing

| | Radiotherapy “declined/received” | | <i>P</i> value ^a |
|---|----------------------------------|-------------------|-----------------------------|
| | NOT missing, n (%) | Missing, n (%) | |
| Total | 1635916 (98.2) | 29446 (1.8) | |
| Age at diagnosis , mean (SD) | 60.7 (12.4) | 60.9 (14.1) | 0.004 |
| Age at diagnosis , median (IQR) | 61.0 (52.0, 69.0) | 61.0 (50.0, 72.0) | 0.016 |
| Sex | | | <0.001 |
| Male | 9241 (0.6) | 354 (1.2) | |
| Female | 1626675 (99.4) | 29092 (98.8) | |
| Race/ethnicity | | | <0.001 |
| White | 1288646 (78.8) | 20585 (69.9) | |
| Black | 177711 (10.9) | 4238 (14.4) | |
| Asian or Pacific Islander | 56601 (3.5) | 1206 (4.1) | |
| Hispanic | 86865 (5.3) | 2552 (8.7) | |
| American India, Alaska Native, or Other | 26093 (1.6) | 865 (2.9) | |
| Type of health insurance | | | <0.001 |
| Uninsured | 27882 (1.7) | 998 (3.4) | |
| Private or managed care | 870694 (53.2) | 13713 (46.6) | |
| Medicaid | 100775 (6.2) | 2489 (8.5) | |
| Medicare | 597456 (36.5) | 10834 (36.8) | |
| Other government or unknown | 39109 (2.4) | 1412 (4.8) | |
| Median household income quartiles ^b | | | <0.001 |
| <\$40,227 | 211452 (14.7) | 4698 (17.9) | |
| \$40,227–\$50,353 | 285005 (19.8) | 5002 (19.1) | |
| \$50,354–\$63,332 | 335904 (23.4) | 5667 (21.6) | |
| ≥\$63,333 | 603645 (42.0) | 10825 (41.3) | |
| Rural/urban area ^c | | | <0.001 |
| Metro | 1390915 (87.2) | 25308 (89.6) | |
| Urban | 182008 (11.4) | 2658 (9.4) | |
| Rural | 23027 (1.4) | 288 (1.0) | |
| Facility type | | | <0.001 |
| Community | 114587 (7.3) | 2034 (7.4) | |

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|--|----------------|--------------|--------|
| Comprehensive community | 659995 (42.2) | 9331 (33.9) | |
| Academic or research | 451544 (28.9) | 10421 (37.8) | |
| Integrated network | 337154 (21.6) | 5769 (20.9) | |
| Charlson-Deyo comorbidity index | | | 0.059 |
| 0 | 1384008 (84.6) | 25016 (85.0) | |
| 1 | 194716 (11.9) | 3376 (11.5) | |
| ≥2 | 57192 (3.5) | 1054 (3.6) | |
| Histologic type | | | <0.001 |
| Ductal | 1296492 (79.3) | 22796 (77.4) | |
| Lobular | 157922 (9.7) | 2763 (9.4) | |
| Ductal and lobular | 82407 (5.0) | 1521 (5.2) | |
| Other | 99095 (6.1) | 2366 (8.0) | |
| AJCC stage group | | | <0.001 |
| 1 | 957249 (58.5) | 13135 (44.6) | |
| 2 | 472577 (28.9) | 11075 (37.6) | |
| 3 | 206090 (12.6) | 5236 (17.8) | |
| Molecular subtype | | | <0.001 |
| HR+/ERBB2- | 863080 (75.7) | 10763 (67.1) | |
| HR+/ERBB2+ | 108958 (9.6) | 1835 (11.4) | |
| HR-/ERBB2+ | 41298 (3.6) | 927 (5.8) | |
| TNBC | 126871 (11.1) | 2517 (15.7) | |
| Tumor grade | | | <0.001 |
| 1 | 379907 (24.8) | 5021 (18.6) | |
| 2 | 691374 (45.1) | 11571 (42.8) | |
| 3 | 462990 (30.2) | 10427 (38.6) | |

Abbreviations: SD, standard deviation; IQR; interquartile range; AJCC, American Joint Committee on Cancer; HR, hormone receptor; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a *P* values were computed using Student's *t*, Wilcoxon rank-sum, or Pearson's Chi-square tests.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^c Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 5. Distributions of Patient Characteristics by Surgery Decision Comparing “Declined/Received” Not missing vs. Missing

| | Surgery “declined/received” | | <i>P</i> value ^a |
|---|-----------------------------|-------------------|-----------------------------|
| | NOT missing, n (%) | Missing, n (%) | |
| Total | 2590963 (99.5) | 13818 (0.5) | |
| Age at diagnosis, mean (SD) | 61.3 (13.2) | 59.8 (14.6) | <0.001 |
| Age at diagnosis, median (IQR) | 62.0 (52.0, 71.0) | 59.0 (49.0, 70.0) | <0.001 |
| Sex | | | 0.67 |
| Male | 23000 (0.9) | 118 (0.9) | |
| Female | 2567963 (99.1) | 13700 (99.1) | |
| Race/ethnicity | | | <0.001 |
| White | 2039285 (78.7) | 8556 (61.9) | |
| Black | 275297 (10.6) | 2680 (19.4) | |
| Asian or Pacific Islander | 92069 (3.6) | 728 (5.3) | |
| Hispanic | 142294 (5.5) | 1344 (9.7) | |
| American India, Alaska Native, or Other | 42018 (1.6) | 510 (3.7) | |
| Type of health insurance | | | <0.001 |
| Uninsured | 43017 (1.7) | 772 (5.6) | |
| Private or managed care | 1324312 (51.1) | 6302 (45.6) | |
| Medicaid | 152744 (5.9) | 1468 (10.6) | |
| Medicare | 1005973 (38.8) | 4605 (33.3) | |
| Other government or unknown | 64917 (2.5) | 671 (4.9) | |
| Median household income quartiles ^b | | | <0.001 |
| <\$40,227 | 347712 (15.2) | 2253 (18.5) | |
| \$40,227–\$50,353 | 457134 (20.0) | 2217 (18.2) | |
| \$50,354–\$63,332 | 531045 (23.3) | 2547 (20.9) | |
| ≥\$63,333 | 946768 (41.5) | 5145 (42.3) | |
| Rural/urban area ^c | | | <0.001 |
| Metro | 2194393 (87.0) | 12255 (91.5) | |
| Urban | 290556 (11.5) | 1005 (7.5) | |
| Rural | 37793 (1.5) | 132 (1.0) | |
| Facility type | | | <0.001 |
| Community | 181025 (7.3) | 1049 (8.3) | |

| | | | |
|--|----------------|--------------|--------|
| Comprehensive community | 1036243 (42.0) | 4191 (33.1) | |
| Academic or research | 716357 (29.0) | 5003 (39.5) | |
| Integrated network | 533359 (21.6) | 2408 (19.0) | |
| Charlson-Deyo comorbidity index | | | <0.001 |
| 0 | 2161792 (83.4) | 12414 (89.8) | |
| 1 | 326811 (12.6) | 973 (7.0) | |
| ≥2 | 102360 (4.0) | 431 (3.1) | |
| Histologic type | | | <0.001 |
| Ductal | 2035573 (78.6) | 10931 (79.1) | |
| Lobular | 259520 (10.0) | 1209 (8.7) | |
| Ductal and lobular | 134918 (5.2) | 459 (3.3) | |
| Other | 160952 (6.2) | 1219 (8.8) | |
| AJCC stage group | | | <0.001 |
| 1 | 1538942 (59.4) | 5622 (40.7) | |
| 2 | 787987 (30.4) | 5456 (39.5) | |
| 3 | 264034 (10.2) | 2740 (19.8) | |
| Molecular subtype | | | <0.001 |
| HR+/ERBB2- | 1317276 (74.9) | 6523 (61.4) | |
| HR+/ERBB2+ | 171382 (9.7) | 1439 (13.5) | |
| HR-/ERBB2+ | 69822 (4.0) | 733 (6.9) | |
| TNBC | 201250 (11.4) | 1925 (18.1) | |
| Tumor grade | | | <0.001 |
| 1 | 588515 (24.3) | 2079 (17.0) | |
| 2 | 1093700 (45.2) | 5205 (42.5) | |
| 3 | 736619 (30.5) | 4971 (40.6) | |

Abbreviations: SD, standard deviation; IQR; interquartile range; AJCC, American Joint Committee on Cancer; HR, hormone receptor; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a *P* values were computed using Student's *t*, Wilcoxon rank-sum, or Pearson's Chi-square tests.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^c Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 6. Overall Characteristics of Patients With Breast Cancer in the National Cancer Database

| Variable | Total (N=2,837,446) |
|---|---------------------|
| | No. (row %) |
| Age at diagnosis (years) | |
| mean (SD) | 61.6 (13.4) |
| Median (IQR) | 62.0 (52.0, 71.0) |
| Sex | |
| Male | 26231 (0.9) |
| Female | 2811215 (99.1) |
| Race/Ethnicity | |
| White | 2213914 (78.0) |
| Black | 317258 (11.2) |
| Asian or Pacific Islander | 100251 (3.5) |
| Hispanic | 158428 (5.6) |
| American Indian, Alaska Native, or Other | 47595 (1.7) |
| Type of health insurance | |
| Uninsured | 53969 (1.9) |
| Private or managed care | 1414826 (49.9) |
| Medicaid | 177824 (6.3) |
| Medicare | 1115442 (39.3) |
| Other government or unknown | 75385 (2.7) |
| Median household income quartiles ^a | |
| <\$40,227 | 391557 (15.6) |
| \$40,227–\$50,353 | 503202 (20.1) |
| \$50,354–\$63,332 | 580650 (23.2) |
| ≥\$63,333 | 1026795 (41.0) |
| Rural/urban area ^b | |
| Metropolitan | 2405390 (87.1) |
| Urban | 316053 (11.4) |
| Rural | 41191 (1.5) |
| Type of cancer program | |
| Community | 200322 (7.4) |
| Comprehensive community | 1126191 (41.7) |
| Academic or research | 793875 (29.4) |

| | |
|--|----------------|
| Integrated network | 578752 (21.4) |
| Charlson-Deyo comorbidity score | |
| 0 | 2363067 (83.3) |
| 1 | 356281 (12.6) |
| ≥2 | 118098 (4.2) |
| Histologic type | |
| Ductal | 2200119 (77.5) |
| Lobular | 284305 (10.0) |
| Ductal and lobular | 143118 (5.0) |
| Other | 209904 (7.4) |
| AJCC stage group | |
| I | 1578116 (55.6) |
| II | 823827 (29.0) |
| III | 286572 (10.1) |
| IV | 148931 (5.2) |
| Molecular subtype | |
| HR+/ERBB2- | 1424349 (74.0) |
| HR+/ERBB2+ | 194496 (10.1) |
| HR-/ERBB2+ | 81870 (4.3) |
| TNBC | 225138 (11.7) |
| Tumor grade | |
| 1 | 612864 (23.5) |
| 2 | 1177279 (45.1) |
| 3 | 820978 (31.4) |

Abbreviations: No., number; SD, standard deviation; IQR; interquartile range; AJCC, American Joint Committee on Cancer; HR, hormone receptor; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^b Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 7. Sociodemographic and Clinicopathologic Factors Associated with Treatment Declination: Multivariable Logistic Regression after Inverse Probability Weighting adjusting for missingness of treatment decision

| | Chemotherapy cohort ^a | Hormone therapy cohort ^b | Radiotherapy cohort ^c | Surgery cohort ^c |
|---|---|--|---|------------------------------------|
| Variable | AOR (95% CI) ^d | AOR (95% CI) ^e | AOR (95% CI) ^d | AOR (95% CI) ^d |
| Race/Ethnicity | | | | |
| American Indian, Alaska Native, or Other ^f | 1.13 (1.05-1.21) | 1.04 (0.96-1.11) | 1.02 (0.94-1.09) | 1.47 (1.26-1.72) |
| Asian or Pacific Islander | 1.21 (1.16-1.27) | 0.81 (0.77-0.85) | 1.01 (0.96-1.06) | 1.29 (1.15-1.44) |
| Black | 1.03 (1.00-1.06) | 0.86 (0.83-0.89) | 1.05 (1.02-1.08) | 2.01 (1.89-2.14) |
| Hispanic | 0.78 (0.75-0.82) | 0.66 (0.63-0.69) | 0.74 (0.70-0.77) | 0.79 (0.71-0.89) |
| White | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Age at diagnosis (per 10-year increase) | 2.39 (2.36-2.42) | 1.44 (1.42-1.45) | 2.08 (2.05-2.10) | 2.83 (2.75-2.91) |
| Sex | | | | |
| Male | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Female | 1.35 (1.23-1.47) | 1.35 (1.22-1.49) | 1.04 (0.94-1.16) | 2.02 (1.59-2.57) |
| Type of health insurance | | | | |
| Uninsured | 1.60 (1.50-1.72) | 1.60 (1.49-1.73) | 1.96 (1.82-2.12) | 4.81 (4.20-5.51) |
| Private or managed care | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Medicaid | 1.51 (1.45-1.57) | 1.43 (1.38-1.50) | 1.86 (1.79-1.94) | 3.18 (2.90-3.49) |
| Medicare | 1.03 (1.01-1.06) | 1.02 (0.99-1.04) | 1.09 (1.07-1.12) | 0.94 (0.89-1.00) |
| Other government or unknown | 1.02 (0.96-1.09) | 1.00 (0.93-1.07) | 1.09 (1.02-1.16) | 1.17 (1.00-1.38) |
| Median household income quartiles ^g | | | | |
| <\$40,227 | 1.04 (1.01-1.07) | 0.87 (0.84-0.90) | 1.16 (1.13-1.20) | 1.14 (1.07-1.22) |
| \$40,227–\$50,353 | 1.06 (1.03-1.09) | 0.95 (0.92-0.97) | 1.11 (1.08-1.13) | 1.13 (1.07-1.20) |
| \$50,354–\$63,332 | 1.05 (1.03-1.08) | 1.00 (0.98-1.02) | 1.09 (1.07-1.12) | 1.06 (1.00-1.12) |
| ≥\$63,333 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Rural/urban area ^h | | | | |
| Metropolitan | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Urban | 0.94 (0.92-0.97) | 0.96 (0.93-0.99) | 1.01 (0.99-1.04) | 0.83 (0.77-0.89) |
| Rural | 0.92 (0.85-0.98) | 0.96 (0.90-1.03) | 1.05 (0.98-1.12) | 0.68 (0.55-0.83) |
| Type of cancer program | | | | |
| Community | 0.94 (0.91-0.98) | 1.07 (1.03-1.11) | 0.92 (0.89-0.95) | 0.89 (0.82-0.97) |

| | | | | |
|--|------------------|------------------|------------------|------------------|
| Comprehensive community | 1.10 (1.08-1.13) | 1.19 (1.16-1.22) | 1.00 (0.98-1.02) | 0.88 (0.83-0.92) |
| Academic or research | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Integrated network | 1.03 (1.00-1.05) | 1.13 (1.10-1.16) | 1.03 (1.01-1.06) | 0.90 (0.85-0.96) |
| Charlson-Deyo comorbidity index | | | | |
| 0 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| 1 | 0.98 (0.95-1.00) | 0.89 (0.87-0.91) | 1.06 (1.03-1.08) | 0.75 (0.70-0.80) |
| ≥2 | 1.24 (1.20-1.29) | 1.03 (0.99-1.07) | 1.38 (1.34-1.43) | 1.03 (0.96-1.11) |
| AJCC stage group | | | | |
| I | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| II | 0.49 (0.48-0.50) | 0.73 (0.71-0.75) | 1.26 (1.23-1.28) | 2.69 (2.56-2.83) |
| III | 0.26 (0.25-0.26) | 0.59 (0.56-0.61) | 1.20 (1.16-1.23) | 4.32 (4.06-4.61) |
| IV | 0.25 (0.24-0.26) | 0.31 (0.29-0.34) | — | — |
| Tumor grade | | | | |
| 1 | 2.30 (2.24-2.37) | 1.19 (1.16-1.22) | 1.21 (1.17-1.24) | 1.33 (1.24-1.43) |
| 2 | 1.51 (1.48-1.54) | 0.93 (0.91-0.96) | 1.04 (1.01-1.06) | 1.27 (1.20-1.34) |
| 3 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; AJCC, American Joint Committee on Cancer; ERBB2, human epidermal growth factor receptor 2.

^a among patients with stage I-IV breast cancer.

^b among patients with stage I-IV, hormone receptor-positive breast cancer.

^c among patients with stage I-III breast cancer.

^d Additionally adjusted for histologic type, molecular subtype, and year of initial diagnosis.

^e Additionally adjusted for histologic type, ERBB2 status, and year of initial diagnosis.

^f Other is a racial/ethnic group listed in the National Cancer Database (NCDB) and represents patients who were classified as Other by local cancer registries. The NCDB does not specifically define race/ethnicity classified into Other.

^g Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^h Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 8. Associated Characteristics with Decision on Chemotherapy in Patients With Stage I-IV Breast Cancer

| Variable | Decision on chemotherapy (N=1,296,488) | | P value ^a | Crude OR (95% CI) | Reduced Model AOR (95% CI) | Full Model AOR (95% CI) ^b |
|---|---|--|----------------------|----------------------|-------------------------------|---|
| | Received (n=1,171,767 [90.4%]) No. (row %) | Declined (n=124,721 [9.6%]) No. (row %) | | | | |
| Age at diagnosis (years), mean (SD) | 55.4 (11.9) | 66.5 (13.1) | <.001 | | | |
| Per 10-year increase | | | | 2.16 (2.15-2.17) | 2.21 (2.19-2.23) | 2.38 (2.35-2.40) |
| Sex | | | | | | |
| Male | 10,292 (89.9) | 1,163 (10.2) | .052 | 1.0 (reference) | — | 1.0 (reference) |
| Female | 1,161,475 (90.4) | 123,558 (9.6) | | 0.94 (0.89-1.001) | — | 1.34 (1.23-1.47) |
| Race/Ethnicity | | | | | | |
| White | 856,473 (89.7) | 98,662 (10.3) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 167,952 (91.9) | 14,754 (8.1) | | 0.76 (0.75-0.78) | 1.09 (1.06-1.11) | 1.03 (1.01-1.06) |
| Asian or Pacific Islander | 46,311 (91.2) | 4,460 (8.8) | | 0.84 (0.81-0.86) | 1.24 (1.19-1.29) | 1.21 (1.16-1.27) |
| Hispanic | 80,745 (94.3) | 4,916 (5.7) | | 0.53 (0.51-0.54) | 0.83 (0.80-0.87) | 0.78 (0.75-0.82) |
| American Indian, Alaska Native, or Other | 20,286 (91.3) | 1,929 (8.7) | | 0.83 (0.79-0.87) | 1.14 (1.07-1.21) | 1.13 (1.05-1.21) |
| Type of health insurance | | | | | | |
| Uninsured | 31,555 (92.9) | 2,431 (7.2) | <.001 | 1.21 (1.16-1.26) | — | 1.61 (1.51-1.72) |
| Private or managed care | 724,102 (94.0) | 46,268 (6.0) | | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 105,342 (93.3) | 7,618 (6.7) | | 1.13 (1.10-1.16) | — | 1.51 (1.46-1.57) |
| Medicare | 275,447 (80.7) | 65,828 (19.3) | | 3.74 (3.69-3.79) | — | 1.04 (1.01-1.06) |
| Other government or unknown | 35,321 (93.2) | 2,576 (6.8) | | 1.14 (1.10-1.19) | — | 1.02 (0.96-1.09) |
| Median household income quartiles ^c | | | | | | |
| <\$40,227 | 173,871 (90.5) | 18,209 (9.5) | <.001 | 1.04 (1.02-1.06) | — | 1.04 (1.01-1.07) |
| \$40,227–\$50,353 | 210,350 (90.0) | 23,462 (10.0) | | 1.11 (1.09-1.13) | — | 1.06 (1.03-1.09) |
| \$50,354–\$63,332 | 238,048 (90.1) | 26,270 (9.9) | | 1.10 (1.08-1.11) | — | 1.05 (1.03-1.08) |
| ≥\$63,333 | 411,837 (90.9) | 41,459 (9.2) | | 1.0 (reference) | — | 1.0 (reference) |
| Rural/urban area ^d | | | | | | |
| Metropolitan | 989,347 (90.4) | 105,097 (9.6) | <.001 | 1.0 (reference) | — | 1.0 (reference) |
| Urban | 132,679 (90.0) | 14,792 (10.0) | | 1.05 (1.03-1.07) | — | 0.94 (0.92-0.97) |
| Rural | 17,282 (89.8) | 1,965 (10.2) | | 1.07 (1.02-1.12) | — | 0.92 (0.85-0.98) |
| Type of cancer program | | | | | | |

| | | | | | | |
|---------------------------------|-------------------|---------------|-------|------------------|------------------|------------------|
| Community | 76,534 (88.8) | 9,628 (11.2) | <.001 | 1.29 (1.26-1.33) | — | 0.94 (0.91-0.98) |
| Comprehensive community | 431,000 (88.7) | 54,796 (11.3) | | 1.31 (1.29-1.33) | — | 1.10 (1.08-1.13) |
| Academic or research | 329,595 (91.1) | 32,043 (8.9) | | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 223,289 (89.7) | 25,543 (10.3) | | 1.18 (1.16-1.20) | — | 1.03 (1.00-1.05) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | 1,005,164 (91.0)) | 99,723 (9.0) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| 1 | 132,069 (88.1) | 17,791 (11.9) | | 1.36 (1.33-1.38) | 0.98 (0.96-1.00) | 0.98 (0.95-1.00) |
| ≥2 | 34,534 (82.7) | 7,027 (17.3) | | 2.10 (2.05-2.16) | 1.22 (1.17-1.26) | 1.24 (1.20-1.29) |
| Histologic type | | | | | | |
| Ductal | 948,541 (90.8) | 95,808 (9.2) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Lobular | 89,948 (87.4) | 12,958 (12.6) | | 1.43 (1.40-1.45) | 0.93 (0.90-0.95) | 0.93 (0.90-0.96) |
| Ductal and lobular | 51,984 (88.7) | 6,644 (11.3) | | 1.27 (1.23-1.30) | 1.07 (1.04-1.11) | 1.06 (1.02-1.10) |
| Other | 81,294 (89.7) | 9,311 (10.3) | | 1.13 (1.11-1.16) | 1.14 (1.10-1.18) | 1.10 (1.05-1.14) |
| AJCC stage group | | | | | | |
| I | 353,254 (84.8) | 63,284 (15.2) | <.001 | 2.24 (2.18-2.30) | 1.0 (reference) | 1.0 (reference) |
| II | 505,211 (92.2) | 42,717 (7.8) | | 1.06 (1.03-1.09) | 0.53 (0.52-0.53) | 0.49 (0.48-0.50) |
| III | 229,679 (95.0) | 12,039 (5.0) | | 0.66 (0.64-0.68) | 0.28 (0.27-0.29) | 0.26 (0.25-0.27) |
| IV | 83,623 (92.6) | 6,681 (7.4) | | 1.0 (reference) | 0.26 (0.25-0.27) | 0.25 (0.24-0.26) |
| Molecular subtype | | | | | | |
| HR+/ERBB2- | 392,012 (86.2) | 62,876 (13.8) | <.001 | 2.36 (2.31-2.41) | 2.26 (2.21-2.32) | 2.29 (2.23-2.35) |
| HR+/ERBB2+ | 147,645 (94.7) | 8,324 (5.3) | | 0.83 (0.81-0.85) | 0.70 (0.68-0.73) | 0.71 (0.68-0.73) |
| HR-/ERBB2+ | 65,958 (95.4) | 3,153 (4.6) | | 0.70 (0.68-0.73) | 0.71 (0.68-0.74) | 0.70 (0.67-0.74) |
| TNBC | 174,962 (93.6) | 11,893 (6.4) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Tumor grade | | | | | | |
| 1 | 91,256 (80.7) | 21,829 (19.3) | <.001 | 3.63 (3.57-3.70) | 2.27 (2.22-2.33) | 2.30 (2.24-2.37) |
| 2 | 423,678 (88.4) | 55,521 (11.6) | | 1.99 (1.96-2.02) | 1.48 (1.45-1.50) | 1.51 (1.48-1.54) |
| 3 | 575,910 (93.8) | 37,940 (6.2) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | | | | — | — | 0.96 (0.96-0.96) |

Abbreviations: No., number; SD, standard deviation; OR, odds ratio; AOR, adjusted odds ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a *P* values were computed using Student's *t* or Pearson's Chi-square tests.

^b Adjusted for all variables presented in the table.

^c Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^d Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 9. Distributions of Chemotherapy “Declined/Received” among Patients With Early-Stage, HR+/ERBB2- Breast Cancer Post-Surgery, by Multigene Assay Testing Result

| | Decision on chemotherapy (N=428571) | | |
|---|---|--------------------------------------|-----------------------------|
| | Received (n=367316 [85.7%]) | Declined (n=61255 [14.3%]) | P value ^a |
| | No. (row %) | No. (row %) | |
| Oncotype DX (Genomic Health thresholds; before 2018) | | | |
| Not tested | 221107 (88.1) | 29988 (11.9) | <.001 |
| Low RS (0-17) | 9863 (69.1) | 4416 (30.9) | |
| Intermediate RS(18-30) | 31732 (74.8) | 10702 (25.2) | |
| High RS (31-100) | 19010 (91.3) | 1811 (8.7) | |
| Oncotype DX (TAILORx thresholds; on/after 2018) | | | |
| Not tested | 81000 (89.0) | 10000 (11.0) | <.001 |
| Low-Intermediate RS (0-25) | 8384 (75.5) | 2721 (24.5) | |
| High RS (26-100) | 18306 (87.2) | 2688 (12.8) | |
| MammaPrint | | | |
| Not tested | 313654 (84.8) | 53851 (14.7) | <.001 |
| Low risk | 1785 (79.5) | 459 (20.5) | |
| High risk | 10123 (89.8) | 1149 (10.2) | |

Abbreviation: RS, recurrence score.

^a P values were computed using Pearson’s Chi-square tests.

eTable 10. Associated Characteristics with Decision on Hormone Therapy in Patients With Stage I-IV, Hormone Receptor-Positive Breast Cancer

| | Decision on hormone therapy (N=1,893,339) | | | | Reduced Model | Full Model |
|---|--|--|-----------------------------|------------------------------|----------------------|----------------------------------|
| Variable | Received (n=1,798,976 [95.0%]) No. (row %) | Declined (n=94,363 [5.0%]) No. (row %) | P value ^a | Crude OR (95% CI) | AOR (95% CI) | AOR (95% CI) ^b |
| Age at diagnosis (years), mean (SD) | 61.5 (12.9) | 66.7 (14.1) | <.001 | | | |
| Per 10-year increase | | | | 1.37 (1.36-1.38) | 1.37 (1.36-1.37) | 1.44 (1.42-1.45) |
| Sex | | | | | | |
| Male | 16,206 (95.8) | 708 (4.2) | <.001 | 1.0 (reference) | — | 1.0 (reference) |
| Female | 1,782,770 (95.0) | 93,655 (5.0) | | 1.20 (1.11-1.30) | — | 1.35 (1.22-1.49) |
| Race/Ethnicity | | | | | | |
| White | 1,444,596 (94.8) | 79,909 (5.2) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 166,915 (95.8) | 7,357 (4.2) | | 0.80 (0.78-0.82) | 0.88 (0.85-0.90) | 0.86 (0.83-0.89) |
| Asian or Pacific Islander | 65,082 (95.9) | 2,753 (4.1) | | 0.76 (0.74-0.79) | 0.86 (0.82-0.90) | 0.81 (0.77-0.85) |
| Hispanic | 94,248 (97.0) | 2,928 (3.0) | | 0.56 (0.54-0.58) | 0.68 (0.65-0.71) | 0.66 (0.63-0.69) |
| American Indian, Alaska Native, or Other | 28,135 (95.2) | 1,416 (4.8) | | 0.91 (0.86-0.96) | 1.05 (0.98-1.12) | 1.04 (0.96-1.11) |
| Type of health insurance | | | | | | |
| Uninsured | 28,906 (95.3) | 1,420 (4.7) | <.001 | 1.27 (1.20-1.34) | — | 1.61 (1.49-1.73) |
| Private or managed care | 918,139 (96.3) | 35,603 (3.7) | | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 103,273 (95.5) | 4,855 (4.5) | | 1.21 (1.18-1.25) | — | 1.44 (1.38-1.50) |
| Medicare | 706,663 (93.3) | 50,686 (6.7) | | 1.85 (1.82-1.88) | — | 1.02 (0.99-1.04) |
| Other government or unknown | 41,995 (95.9) | 1,799 (4.1) | | 1.10 (1.05-1.16) | — | 1.00 (0.93-1.07) |
| Median household income quartiles ^c | | | | | | |
| <\$40,227 | 228,986 (95.5) | 10,830 (4.5) | <.001 | 0.90 (0.88-0.92) | — | 0.87 (0.84-0.90) |
| \$40,227–\$50,353 | 313,471 (95.0) | 16,434 (5.0) | | 1.00 (0.98-1.02) | — | 0.95 (0.92-0.97) |
| \$50,354–\$63,332 | 368,086 (94.8) | 20,236 (5.2) | | 1.05 (1.03-1.07) | — | 1.00 (0.98-1.02) |
| ≥\$63,333 | 663,691 (95.0) | 34,802 (5.0) | | 1.0 (reference) | — | 1.0 (reference) |
| Rural/urban area ^d | | | | | | |
| Metropolitan | 1,519,662 (95.0) | 80,025 (5.0) | .390 | 1.0 (reference) | — | 1.0 (reference) |
| Urban | 206,420 (95.1) | 10,714 (4.9) | | 0.99 (0.97-1.01) | — | 0.96 (0.93-0.99) |
| Rural | 27,178 (95.0) | 1,432 (5.0) | | 1.00 (0.95-1.06) | — | 0.96 (0.89-1.03) |

| | | | | | | |
|--|------------------|--------------|-------|------------------|------------------|-------------------|
| Type of cancer program | | | | | | |
| Community | 122,254 (94.9) | 6,580 (5.1) | <.001 | 1.18 (1.14-1.21) | — | 1.07 (1.03-1.11) |
| Comprehensive community | 719,166 (94.6) | 41,432 (5.5) | | 1.26 (1.24-1.28) | — | 1.19 (1.16-1.22) |
| Academic or research | 511,853 (95.6) | 23,434 (4.4) | | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 371,173 (94.9) | 20,019 (5.1) | | 1.18 (1.16-1.20) | — | 1.13 (1.10-1.16) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | 1,496,908 (95.1) | 77,222 (4.9) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| 1 | 228,756 (95.0) | 12,157 (5.1) | | 1.03 (1.01-1.05) | 0.90 (0.88-0.92) | 0.89 (0.87-0.91) |
| ≥2 | 73,312 (93.6) | 4,984 (6.4) | | 1.32 (1.28-1.36) | 1.03 (1.00-1.07) | 1.03 (0.99-1.07) |
| Histologic type | | | | | | |
| Ductal | 1,370,914 (95.0) | 72,579 (5.0) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Lobular | 221,669 (95.9) | 9,597 (4.2) | | 0.82 (0.80-0.84) | 0.80 (0.78-0.82) | 0.81 (0.79-0.83) |
| Ductal and lobular | 109,441 (95.8) | 4,773 (4.2) | | 0.82 (0.80-0.85) | 0.85 (0.82-0.88) | 0.85 (0.81-0.88) |
| Other | 96,952 (92.9) | 7,414 (7.1) | | 1.44 (1.41-1.48) | 1.43 (1.38-1.47) | 1.41 (1.37-1.47) |
| AJCC stage group | | | | | | |
| I | 1,067,585 (94.0) | 67,690 (6.0) | <.001 | 3.04 (2.89-3.20) | 1.0 (reference) | 1.0 (reference) |
| II | 500,722 (96.1) | 20,169 (3.9) | | 1.93 (1.83-2.04) | 0.75 (0.74-0.77) | 0.73 (0.71-0.74) |
| III | 158,502 (96.9) | 4,998 (3.1) | | 1.51 (1.43-1.60) | 0.62 (0.60-0.64) | 0.59 (0.56-0.61) |
| IV | 72,167 (98.0) | 1,506 (2.0) | | 1.0 (reference) | 0.32 (0.30-0.34) | 0.31 (0.29-0.34) |
| ERBB2 status | | | | | | |
| Negative | 1,185,515 (94.8) | 65,070 (5.2) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Positive | 150,437 (95.8) | 6,666 (4.2) | | 0.81 (0.79-0.83) | 0.99 (0.97-1.02) | 1.01 (0.98-1.05) |
| Tumor grade | | | | | | |
| 1 | 463,468 (93.6) | 31,684 (6.4) | <.001 | 1.60 (1.56-1.63) | 1.16 (1.13-1.19) | 1.19 (1.16-1.22) |
| 2 | 863,633 (95.5) | 41,149 (4.6) | | 1.11 (1.09-1.13) | 0.91 (0.89-0.93) | 0.93 (0.91-0.96) |
| 3 | 352 (95.9) | 15,087 (4.1) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | | | | — | — | 0.99 (0.99-0.996) |

Abbreviations: No., number; SD, standard deviation; OR, odds ratio; AOR, adjusted odds ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2.

^a *P* values were computed using Student's *t* or Pearson's Chi-square tests.

^b Adjusted for all variables presented in the table.

^c Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^d Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 11. Associated Characteristics with Decision on Radiation Therapy in Patients With Stage I-III Breast Cancer

| | Decision on radiotherapy (N=1,635,916) | | | | Reduced Model | Full Model |
|---|--|--|-----------------------------|------------------------------|----------------------|----------------------------------|
| Variable | Received (n=1,536,640 [93.9%]) No. (row %) | Declined (n=99,276 [6.1%]) No. (row %) | P value ^a | Crude OR (95% CI) | AOR (95% CI) | AOR (95% CI) ^b |
| Age at diagnosis (years), mean (SD) | 60.1 (12.1) | 69.0 (13.9) | <.001 | | | |
| Per 10-year increase | | | | 1.88 (1.87-1.90) | 1.91 (1.90-1.92) | 2.08 (2.06-2.10) |
| Sex | | | | | | |
| Male | 8,524 (92.2) | 717 (7.8) | <.001 | 1.0 (reference) | — | 1.0 (reference) |
| Female | 1,528,116 (93.9) | 98,559 (6.1) | | 0.77 (0.71-0.83) | — | 1.04 (0.94-1.16) |
| Race/Ethnicity | | | | | | |
| White | 1,208,318 (93.8) | 80,328 (6.2) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 166,688 (93.8) | 11,023 (6.2) | | 0.99 (0.97-1.02) | 1.16 (1.13-1.19) | 1.05 (1.02-1.08) |
| Asian or Pacific Islander | 53,667 (94.8) | 2,934 (5.2) | | 0.82 (0.79-0.85) | 1.06 (1.02-1.11) | 1.01 (0.96-1.06) |
| Hispanic | 83,312 (95.9) | 3,553 (4.1) | | 0.64 (0.62-0.66) | 0.86 (0.82-0.89) | 0.74 (0.70-0.77) |
| American Indian, Alaska Native, or other | 24,655 (94.5) | 1,774 (5.5) | | 0.87 (0.83-0.93) | 1.08 (1.02-1.16) | 1.02 (0.94-1.09) |
| Type of health insurance | | | | | | |
| Uninsured | 26,164 (93.8) | 1,718 (6.2) | <.001 | 1.90 (1.81-2.00) | — | 1.97 (1.83-2.12) |
| Private or managed care | 841,589 (96.7) | 29,105 (3.3) | | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 94,715 (94.0) | 6,060 (6.0) | | 1.85 (1.80-1.90) | — | 1.87 (1.79-1.94) |
| Medicare | 536,907 (89.9) | 60,549 (10.1) | | 3.26 (3.21-3.31) | — | 1.09 (1.07-1.12) |
| Other government or unknown | 37,265 (95.3) | 1,844 (4.7) | | 1.43 (1.36-1.50) | — | 1.09 (1.02-1.16) |
| Median household income quartiles ^c | | | | | | |
| <\$40,227 | 197,226 (93.3) | 14,226 (6.7) | <.001 | 1.27 (1.24-1.29) | — | 1.16 (1.13-1.20) |
| \$40,227–\$50,353 | 266,656 (93.6) | 18,349 (6.4) | | 1.21 (1.19-1.23) | — | 1.11 (1.08-1.13) |
| \$50,354–\$63,332 | 314,999 (93.8) | 20,905 (6.2) | | 1.17 (1.15-1.19) | — | 1.09 (1.07-1.12) |
| ≥\$63,333 | 571,143 (94.6) | 32,502 (5.4) | | 1.0 (reference) | — | 1.0 (reference) |
| Rural/urban area ^d | | | | | | |
| Metropolitan | 1,307,452 (94.0) | 83,463 (6.0) | <.001 | 1.0 (reference) | — | 1.0 (reference) |
| Urban | 169,870 (93.3) | 12,138 (6.7) | | 1.12 (1.10-1.14) | — | 1.01 (0.99-1.04) |
| Rural | 21,446 (93.1) | 1,581 (6.9) | | 1.15 (1.10-1.22) | — | 1.05 (0.98-1.12) |
| Type of cancer program | | | | | | |

| | | | | | | |
|---------------------------------|------------------|--------------|-------|------------------|------------------|------------------|
| Community | 106,963 (93.4) | 7,624 (6.7) | <.001 | 1.16 (1.13-1.19) | — | 0.92 (0.89-0.95) |
| Comprehensive community | 618,469 (93.7) | 41,526 (6.3) | | 1.09 (1.08-1.11) | — | 1.00 (0.98-1.02) |
| Academic or research | 425,395 (94.2) | 26,149 (5.8) | | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 315,954 (93.7) | 21,200 (6.3) | | 1.09 (1.07-1.11) | — | 1.03 (1.01-1.06) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | 1,306,679 (94.4) | 77,329 (5.6) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| 1 | 179,774 (92.3) | 14,942 (7.7) | | 1.40 (1.38-1.43) | 1.06 (1.04-1.09) | 1.06 (1.03-1.08) |
| ≥2 | 50,187 (87.8) | 7,005 (12.3) | | 2.36 (2.30-2.42) | 1.45 (1.41-1.50) | 1.38 (1.34-1.43) |
| Histologic type | | | | | | |
| Ductal | 1,220,088 (94.1) | 76,404 (5.9) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Lobular | 147,650 (93.5) | 10,272 (6.5) | | 1.11 (1.09-1.13) | 0.88 (0.86-0.91) | 0.87 (0.85-0.90) |
| Ductal and lobular | 77,843 (94.5) | 4,564 (5.5) | | 0.94 (0.91-0.97) | 0.90 (0.87-0.93) | 0.92 (0.88-0.96) |
| Other | 91,059 (91.9) | 8,036 (8.1) | | 1.41 (1.38-1.44) | 1.23 (1.19-1.27) | 1.24 (1.19-1.28) |
| AJCC stage group | | | | | | |
| I | 898,821 (93.9) | 58,428 (6.1) | <.001 | 1.11 (1.09-1.13) | 1.0 (reference) | 1.0 (reference) |
| II | 443,139 (93.8) | 29,438 (6.2) | | 1.13 (1.11-1.16) | 1.23 (1.21-1.25) | 1.26 (1.23-1.28) |
| III | 194,680 (94.5) | 11,410 (5.5) | | 1.0 (reference) | 1.18 (1.15-1.21) | 1.20 (1.16-1.23) |
| Molecular subtype | | | | | | |
| HR+/ERBB2- | 800,295 (92.7) | 62,785 (7.3) | <.001 | 1.41 (1.37-1.44) | 1.32 (1.28-1.36) | 1.36 (1.31-1.41) |
| HR+/ERBB2+ | 102,541 (94.1) | 6,417 (5.9) | | 1.12 (1.08-1.16) | 1.29 (1.24-1.34) | 1.30 (1.25-1.36) |
| HR-/ERBB2+ | 38,979 (94.4) | 2,319 (5.6) | | 1.07 (1.02-1.12) | 1.21 (1.15-1.28) | 1.23 (1.16-1.31) |
| TNBC | 120,169 (94.7) | 6,702 (5.3) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Tumor grade | | | | | | |
| 1 | 353,460 (93.0) | 26,447 (7.0) | <.001 | 1.39 (1.36-1.41) | 1.17 (1.14-1.20) | 1.21 (1.17-1.24) |
| 2 | 648,874 (93.9) | 42,500 (6.2) | | 1.22 (1.20-1.24) | 1.02 (1.00-1.05) | 1.04 (1.01-1.06) |
| 3 | 439,331 (94.9) | 23,659 (5.1) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | | | | — | — | 1.05 (1.05-1.06) |

Abbreviations: No., number; SD, standard deviation; OR, odds ratio; AOR, adjusted odds ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a *P* values were computed using Student's *t* or Pearson's Chi-square tests.

^b Adjusted for all variables presented in the table.

^c Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^d Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 12. Associated Characteristics with Decision on Surgery in Patients With Stage I-III Breast Cancer

| | Decision on surgery (N=2,590,963) | | | | Reduced Model | Full Model |
|---|---|---|-----------------------------|------------------------------|----------------------|----------------------------------|
| Variable | Received (n=2,575,117 [99.4%]) No. (row %) | Declined (n=15,846 [0.6%]) No. (row %) | P value ^a | Crude OR (95% CI) | AOR (95% CI) | AOR (95% CI) ^b |
| Age at diagnosis (years), mean (SD) | 61.3 (13.2) | 74.2 (15.0) | <.001 | | | |
| Per 10-year increase | | | | 2.34 (2.30-2.37) | 2.43 (2.39-2.47) | 2.83 (2.77-2.90) |
| Sex | | | | | | |
| Male | 22,859 (99.4) | 141 (0.6) | .977 | 1.0 (reference) | — | 1.0 (reference) |
| Female | 2,552,258 (99.4) | 15,705 (0.6) | | 0.998 (0.84-1.18) | — | 2.02 (1.59-2.57) |
| Race/Ethnicity | | | | | | |
| White | 2,027,960 (99.4) | 11,325 (0.6) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 272,282 (98.9) | 3,015 (1.1) | | 1.98 (1.90-2.06) | 2.41 (2.29-2.54) | 2.01 (1.89-2.14) |
| Asian or Pacific Islander | 91,476 (99.4) | 593 (0.6) | | 1.16 (1.07-1.27) | 1.68 (1.52-1.85) | 1.29 (1.15-1.44) |
| Hispanic | 141,672 (99.6) | 622 (0.4) | | 0.79 (0.73-0.85) | 1.13 (1.02-1.24) | 0.80 (0.71-0.89) |
| American Indian, Alaska Native, or other | 41,727 (99.3) | 291 (0.7) | | 1.25 (1.11-1.40) | 1.78 (1.55-2.04) | 1.47 (1.26-1.72) |
| Type of health insurance | | | | | | |
| Uninsured | 42,509 (98.8) | 508 (1.2) | <.001 | 5.17 (4.70-5.68) | — | 4.83 (4.22-5.51) |
| Private or managed care | 1,321,257 (99.8) | 3,055 (0.2) | | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 151,451 (99.2) | 1,293 (0.9) | | 3.69 (3.46-3.94) | — | 3.19 (2.91-3.48) |
| Medicare | 995,327 (98.9) | 10,646 (1.1) | | 4.63 (4.44-4.82) | — | 0.94 (0.89-1.00) |
| Other government or unknown | 64,573 (99.5) | 344 (0.5) | | 2.30 (2.06-2.58) | — | 1.17 (1.00-1.38) |
| Median household income quartiles ^c | | | | | | |
| <\$40,227 | 345,057 (99.2) | 2,655 (0.8) | <.001 | 1.48 (1.41-1.55) | — | 1.14 (1.07-1.22) |
| \$40,227–\$50,353 | 454,096 (99.3) | 3,038 (0.7) | | 1.28 (1.23-1.34) | — | 1.13 (1.07-1.20) |
| \$50,354–\$63,332 | 527,852 (99.4) | 3,193 (0.6) | | 1.16 (1.11-1.21) | — | 1.06 (1.01-1.12) |
| ≥\$63,333 | 941,860 (99.5) | 4,908 (0.5) | | 1.0 (reference) | — | 1.0 (reference) |
| Rural/urban area ^d | | | | | | |
| Metropolitan | 2,180,549 (99.4) | 13,844 (0.6) | <.001 | 1.0 (reference) | — | 1.0 (reference) |
| Urban | 288,969 (99.5) | 1,587 (0.6) | | 0.87 (0.82-0.91) | — | 0.83 (0.77-0.89) |
| Rural | 37,613 (99.5) | 180 (0.5) | | 0.75 (0.65-0.87) | — | 0.68 (0.55-0.83) |
| Type of cancer program | | | | | | |

| | | | | | | |
|---------------------------------|-------------------|--------------|-------|------------------|------------------|------------------|
| Community | 179,701 (99.3) | 1,324 (0.7) | <.001 | 1.15 (1.08-1.22) | — | 0.89 (0.82-0.97) |
| Comprehensive community | 1,029,939 (99.4) | 6,304 (0.6) | | 0.95 (0.92-0.99) | — | 0.88 (0.83-0.92) |
| Academic or research | 711,786 (99.4) | 4,571 (0.6) | | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 530,036 (99.4) | 3,323 (0.6) | | 0.98 (0.93-1.02) | — | 0.90 (0.85-0.96) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | 2,149,328 (99..4) | 12,464 (0.6) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| 1 | 324,786 (99.4) | 2,025 (0.6) | | 1.08 (1.03-1.13) | 0.72 (0.68-0.76) | 0.75 (0.70-0.80) |
| ≥2 | 101,003 (98.7) | 1,357 (1.3) | | 2.32 (2.19-2.45) | 1.15 (1.07-1.23) | 1.03 (0.96-1.11) |
| Histologic type | | | | | | |
| Ductal | 2,024,200 (99.4) | 11,373 (0.6) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Lobular | 257,696 (99.3) | 1,824 (0.7) | | 1.26 (1.20-1.32) | 0.83 (0.79-0.89) | 0.84 (0.79-0.90) |
| Ductal and lobular | 134,351 (99.6) | 567 (0.4) | | 0.75 (0.69-0.82) | 0.66 (0.60-0.73) | 0.75 (0.67-0.83) |
| Other | 158,870 (98.7) | 2,082 (1.3) | | 2.33 (2.23-2.44) | 0.98 (0.91-1.06) | 1.00 (0.92-1.09) |
| AJCC stage group | | | | | | |
| I | 1,532,818 (99.6) | 6,124 (0.4) | <.001 | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| II | 781,682 (99.2) | 6,305 (0.8) | | 2.02 (1.95-2.09) | 2.42 (2.32-2.54) | 2.69 (2.56-2.83) |
| III | 260,617 (98.7) | 3,417 (1.3) | | 3.28 (3.15-3.42) | 4.11 (3.89-4.35) | 4.32 (4.06-4.61) |
| Molecular subtype | | | | | | |
| HR+/ERBB2- | 1,308,031 (99.3) | 9,245 (0.7) | <.001 | 1.39 (1.30-1.48) | 1.55 (1.44-1.68) | 1.67 (1.54-1.81) |
| HR+/ERBB2+ | 170,210 (99.3) | 1,172 (0.7) | | 1.35 (1.24-1.47) | 1.75 (1.59-1.91) | 1.76 (1.59-1.95) |
| HR-/ERBB2+ | 69,341 (99.3) | 481 (0.7) | | 1.36 (1.22-1.52) | 1.53 (1.36-1.71) | 1.54 (1.35-1.75) |
| TNBC | 200,229 (99.5) | 1,021 (0.5) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Tumor grade | | | | | | |
| 1 | 585,439 (99.5) | 3,076 (0.5) | <.001 | 1.16 (1.12-1.22) | 1.30 (1.22-1.39) | 1.33 (1.24-1.43) |
| 2 | 1,087,047 (99.4) | 6,653 (0.6) | | 0.94 (0.90-0.99) | 1.28 (1.21-1.35) | 1.27 (1.20-1.34) |
| 3 | 732,995 (99.5) | 3,624 (0.5) | | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | | | | — | — | 1.12 (1.11-1.13) |

Abbreviations: No., number; SD, standard deviation; OR, odds ratio; AOR, adjusted odds ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a *P* values were computed using Student's *t* or Pearson's Chi-square tests.

^b Adjusted for all variables presented in the table.

^c Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

^d Measured by matching the state and county FIPS code of the patient recorded at the time of diagnosis against 2013 files published by the United States Department of Agriculture Economic Research Service.

eTable 13. Kaplan-Meier Estimates of Median Overall Survival Time in Breast Cancer Patients Stratified By Treatment Decision and Race/Ethnicity

| Cohort | Treatment decision | Race/Ethnicity | Median follow-up time in months (IQR) | No. of subjects | No. of events | Median survival time in months ^a (95% CI) | P value ^b |
|-------------------------------------|---------------------------------------|----------------|---------------------------------------|-----------------|---------------|--|----------------------|
| Chemotherapy cohort ^c | Among patents who declined treatment | | 59.7 (31.7-99.0) | | | | |
| | | White | | 94,056 | 32,007 | 142.4 (140.7-144.0) | <.001 |
| | | Black | | 13,924 | 4,779 | 139.3 (133.3-147.6) | |
| | | API | | 4,223 | 785 | 213.1 (202.4-.) | |
| | | Hispanic | | 4,652 | 1,024 | NR | |
| | | AIANO | | 1,821 | 514 | 163.4 (152.4-188.4) | |
| | Among patients who received treatment | | 73.4 (39.4-119.7) | | | | |
| | | White | | 808,992 | 173,026 | 217.0 (215.8-.) | <.001 |
| | | Black | | 156,734 | 42,382 | 216.2 (210.9-.) | |
| | | API | | 42,769 | 5,479 | NR | |
| | | Hispanic | | 74,707 | 12,385 | NR | |
| | | AIANO | | 18,781 | 3,272 | NR | |
| Hormone therapy cohort ^d | Among patents who declined treatment | | 59.5 (33.5-96.8) | | | | |
| | | White | | 74,779 | 19,842 | 155.7 (153.0-158.4) | <.001 |
| | | Black | | 6,909 | 1,937 | 154.1 (141.5-159.8) | |
| | | API | | 2,587 | 374 | NR (202.4-.) | |
| | | Hispanic | | 2,738 | 492 | NR | |
| | | AIANO | | 1,300 | 243 | NR | |
| | Among patients who received treatment | | 70.4 (40.2-111.5) | | | | |
| | | White | | 1,347,194 | 252,339 | 212.4 (211.3-213.7) | <.001 |
| | | Black | | 154,328 | 33,472 | 208 (201.8-210.9) | |
| | | API | | 59,455 | 5,503 | NR (213.1-.) | |
| | | Hispanic | | 86,435 | 10,299 | NR | |
| | | AIANO | | 25,853 | 3,666 | NR | |

| | | | | | | | |
|---|--|----------|-------------------|-----------|---------|---------------------|-------|
| | | | | | | | |
| Radiotherapy cohort ^e | Among patents who declined treatment | | 50.8 (29.4-82.6) | | | | |
| | | White | | 74,178 | 23,492 | 119.6 (118.2-121.2) | <.001 |
| | | Black | | 10,199 | 3,256 | 123.3 (119.3-130.5) | |
| | | API | | 2,709 | 464 | 213.1 (174.4-.) | |
| | | Hispanic | | 3,274 | 681 | 173.9 (161.7-.) | |
| | | AIANO | | 1,316 | 332 | 143.1 (134.8-157.1) | |
| | Among patients who received treatment | | 75.9 (43.5-119.9) | | | | |
| | | White | | 1,133,156 | 186,822 | 215.8 (215.0-216.2) | <.001 |
| | | Black | | 155,200 | 30,008 | NR | |
| | | API | | 49,361 | 4,326 | NR | |
| | | Hispanic | | 76,685 | 8,634 | NR | |
| | | AIANO | | 22,786 | 2,826 | NR | |
| | | | | | | | |
| Surgery cohort ^e | Among patents who declined treatment | | 31.5 (15.0-54.8) | | | | |
| | | White | | 10,332 | 6,014 | 44.7 (43.5-46.1) | <.001 |
| | | Black | | 2,789 | 1,410 | 54.3 (51.4-58.3) | |
| | | API | | 543 | 171 | 97.9 (85.8-123.3) | |
| | | Hispanic | | 581 | 235 | 69.7 (61.3-81.0) | |
| | | AIANO | | 258 | 130 | 60.6 (45.6-68.7) | |
| | Among patients who received treatment | | 73.2 (41.1-116.6) | | | | |
| | | White | | 1,905,253 | 378,074 | 212.4 (211.4-213.4) | <.001 |
| | | Black | | 253,982 | 55,874 | 212.6 (209.9-.) | |
| | | API | | 84,204 | 8,052 | NR | |
| | | Hispanic | | 130,993 | 16,647 | NR | |
| | | AIANO | | 38,594 | 5,575 | NR | |

Abbreviations: IQR, interquartile range; No., number; CI, confidence interval; NR=not reached; API, Asian or Pacific Islander; AIANO, American Indian, Alaska Native, or Other.

^a Median survival time and 95% CIs were estimated using the Kaplan-Meier method.

^b *P* value was calculated using the log-rank test.

^c among patients with stage I-IV breast cancer.

^d among patients with stage I-IV, hormone receptor-positive breast cancer.

^e among patients with stage I-III breast cancer.

eTable 14. Kaplan-Meier Estimated 5-Year and 10-Year Overall Survival of Breast Cancer Patients Stratified by Treatment Decision

| | Among patients who declined treatment | | Among patients who received treatment | |
|---|---------------------------------------|----------------------------------|---------------------------------------|----------------------------------|
| | 5-Year OS (95% CI) ^a | 10-Year OS (95% CI) ^a | 5-Year OS (95% CI) ^a | 10-Year OS (95% CI) ^a |
| Chemotherapy cohort^b | | | | |
| Race/Ethnicity | | | | |
| White | 74.8 (74.5-75.1) | 56.0 (55.6-56.4) | 85.1 (85.0-85.2) | 74.2 (74.1-74.3) |
| Black | 70.8 (70.0-71.6) | 54.5 (53.3-55.6) | 77.7 (77.5-77.9) | 66.3 (66.0-66.6) |
| Asian or Pacific Islander | 84.6 (83.3-85.6) | 71.6 (70.0-73.6) | 90.0 (89.7-90.3) | 82.6 (82.1-83.0) |
| Hispanic | 81.4 (80.1-82.6) | 66.3 (64.2-68.3) | 86.5 (86.2-86.7) | 77.3 (76.9-77.7) |
| American Indian, Alaska Native, or Other | 76.3 (74.0-78.4) | 60.3 (57.0-63.4) | 86.9 (86.3-87.4) | 77.6 (76.8-78.4) |
| | | | | |
| Hormone therapy cohort^c | | | | |
| Race/Ethnicity | | | | |
| White | 81.4 (81.1-81.7) | 61.0 (60.4-61.5) | 88.5 (88.4-88.5) | 74.7 (74.6-74.8) |
| Black | 77.3 (76.2-78.4) | 57.8 (56.0-59.5) | 84.2 (84.0-84.4) | 69.4 (69.0-69.7) |
| Asian or Pacific Islander | 88.1 (86.6-89.5) | 74.5 (71.7-77.1) | 93.6 (93.4-93.8) | 85.3 (84.8-85.7) |
| Hispanic | 85.1 (83.4-86.6) | 68.2 (65.3-70.9) | 91.4 (91.2-91.6) | 80.6 (80.1-81.0) |
| American Indian, Alaska Native, or Other | 84.1 (81.7-86.3) | 70.5 (66.6-74.0) | 90.6 (90.2-91.0) | 79.3 (78.6-80.0) |
| | | | | |
| Radiotherapy cohort^d | | | | |
| Race/Ethnicity | | | | |
| White | 74.0 (73.7-74.4) | 49.8 (49.3-50.4) | 91.1 (91.0-91.1) | 78.8 (78.7-78.9) |
| Black | 71.9 (70.9-72.9) | 51.2 (49.7-52.7) | 86.6 (86.4-86.8) | 74.1 (73.8-74.3) |
| Asian or Pacific Islander | 85.2 (83.5-86.7) | 69.7 (66.7-72.4) | 94.4 (94.2-94.6) | 86.8 (86.4-87.2) |
| Hispanic | 81.1 (79.4-82.6) | 61.0 (57.9-64.0) | 92.2 (91.9-92.4) | 82.6 (82.2-83.0) |
| American Indian, Alaska Native, or Other | 78.6 (75.8-81.1) | 58.7 (54.3-62.8) | 92.5 (92.1-92.9) | 82.8 (82.1-83.4) |
| | | | | |
| Surgery cohort^d | | | | |
| Race/Ethnicity | | | | |
| White | 38.5 (37.4-39.6) | 16.3 (15.1-17.5) | 88.2 (88.1-88.2) | 74.3 (74.3-74.4) |
| Black | 47.2 (45.0-49.4) | 22.6 (20.0-25.3) | 84.2 (84.1-84.4) | 70.6 (70.3-70.8) |
| Asian or Pacific Islander | 65.0 (59.7-69.7) | 43.2 (35.1-50.9) | 93.6 (93.4-93.8) | 85.5 (85.2-85.9) |
| Hispanic | 55.8 (50.7-60.5) | 36.3 (29.8-42.9) | 90.9 (90.7-91.0) | 80.8 (80.5-81.1) |

| | | | | |
|--|------------------|------------------|------------------|------------------|
| American Indian, Alaska Native, or Other | 50.8 (43.4-57.7) | 20.7 (12.3-30.7) | 90.9 (90.5-91.2) | 80.0 (79.5-80.6) |
|--|------------------|------------------|------------------|------------------|

Abbreviations: OS, overall survival; CI, confidence interval.

^a Estimated 5-year and 10-year rates and 95% CIs were calculated using the Kaplan-Meier method.

^b among patients with stage I-IV breast cancer.

^c among patients with stage I-IV, hormone receptor-positive breast cancer.

^d among patients with stage I-III breast cancer.

eTable 15. Associated Factors with Overall Survival in Patients With Stage I-IV Breast Cancer by Treatment Decision on Chemotherapy

| | Among patients who declined treatment | | | Among patients who received treatment | | |
|--|---------------------------------------|------------------|---------------------------|---------------------------------------|---------------------------|---------------------------|
| Variable | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a | aHR (95% CI) ^a | aHR (95% CI) ^a | aHR (95% CI) ^b |
| Age at diagnosis (per 10-year increase) | 1.81 (1.78-1.83) | 1.52 (1.50-1.54) | 1.59 (1.56-1.62) | 1.43 (1.43-1.44) | 1.29 (1.29-1.30) | 1.31 (1.30-1.32) |
| Sex | | | | | | |
| Male | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Female | 0.76 (0.69-0.78) | — | 0.98 (0.85-1.13) | 0.75 (0.72-0.78) | — | 0.82 (0.77-0.87) |
| Race/Ethnicity | | | | | | |
| White | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 1.25 (1.20-1.29) | 1.13 (1.08-1.18) | 1.07 (1.02-1.13) | 1.33 (1.32-1.35) | 1.26 (1.24-1.28) | 1.15 (1.13-1.17) |
| Asian or Pacific Islander | 0.73 (0.67-0.78) | 0.66 (0.60-0.73) | 0.68 (0.61-0.75) | 0.74 (0.71-0.76) | 0.71 (0.68-0.73) | 0.73 (0.70-0.76) |
| Hispanic | 0.80 (0.75-0.86) | 0.75 (0.69-0.82) | 0.70 (0.63-0.77) | 0.81 (0.79-0.83) | 0.89 (0.87-0.91) | 0.77 (0.75-0.80) |
| American Indian, Alaska Native, or Other | 1.05 (0.95-1.15) | 0.90 (0.79-1.03) | 0.86 (0.75-1.00) | 0.89 (0.86-0.93) | 0.89 (0.84-0.94) | 0.88 (0.83-0.93) |
| Type of health insurance | | | | | | |
| Uninsured | 2.48 (2.30-2.68) | — | 1.75 (1.56-1.97) | 2.01 (1.96-2.06) | — | 1.56 (1.50-1.62) |
| Private or managed care | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 2.09 (1.98-2.20) | — | 1.54 (1.43-1.66) | 1.88 (1.85-1.90) | — | 1.48 (1.45-1.51) |
| Medicare | 1.21 (1.18-1.25) | — | 1.10 (1.05-1.15) | 1.37 (1.35-1.38) | — | 1.27 (1.25-1.30) |
| Other government or unknown | 1.24 (1.14-1.34) | — | 1.10 (0.97-1.26) | 1.28 (1.25-1.32) | — | 1.20 (1.15-1.25) |
| Median household income quartiles^b | | | | | | |
| <\$40,227 | 1.22 (1.19-1.26) | — | 1.20 (1.14-1.25) | 1.33 (1.31-1.35) | — | 1.29 (1.26-1.31) |
| \$40,227–\$50,353 | 1.15 (1.11-1.18) | — | 1.12 (1.08-1.17) | 1.23 (1.22-1.25) | — | 1.20 (1.18-1.22) |
| \$50,354–\$63,332 | 1.10 (1.07-1.13) | — | 1.09 (1.05-1.14) | 1.14 (1.13-1.15) | — | 1.12 (1.10-1.14) |
| ≥\$63,333 | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Type of cancer program | | | | | | |
| Community | 1.26 (1.21-1.32) | — | 1.27 (1.19-1.35) | 1.15 (1.13-1.17) | — | 1.18 (1.15-1.21) |
| Comprehensive community | 1.12 (1.09-1.15) | — | 1.12 (1.07-1.16) | 1.07 (1.06-1.08) | — | 1.11 (1.10-1.13) |
| Academic or research | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 1.13 (1.09-1.17) | — | 1.08 (1.03-1.13) | 1.05 (1.04-1.06) | — | 1.05 (1.03-1.07) |
| Charlson-Deyo comorbidity score | | | | | | |

| | | | | | | |
|----------------------------------|---|---------------------|---------------------|---|---------------------|---------------------|
| 0 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| 1 | — | 1.27 (1.23-1.32) | 1.28 (1.23-1.33) | — | 1.27 (1.25-1.30) | 1.24 (1.22-1.26) |
| ≥2 | — | 1.83 (1.74-1.92) | 1.83 (1.73-1.93) | — | 1.90 (1.85-1.94) | 1.78 (1.73-1.83) |
| Histologic type | | | | | | |
| Ductal | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Lobular | — | 0.92 (0.88-0.97) | 0.95 (0.90-1.00) | — | 1.09 (1.06-1.11) | 1.11 (1.08-1.14) |
| Ductal and lobular | — | 0.84 (0.78-0.90) | 0.87 (0.80-0.93) | — | 1.00 (0.97-1.03) | 1.02 (0.99-1.06) |
| Other | — | 1.22 (1.15-1.29) | 1.20 (1.13-1.28) | — | 1.35 (1.32-1.38) | 1.35 (1.32-1.38) |
| AJCC stage group | | | | | | |
| I | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| II | — | 1.86 (1.79-1.92) | 1.78 (1.72-1.85) | — | 1.77 (1.74-1.81) | 1.73 (1.69-1.76) |
| III | — | 4.11 (3.94-4.30) | 3.80 (3.63-3.99) | — | 4.03 (3.95-4.11) | 3.76 (3.68-3.85) |
| IV | — | 15.78 (14.98-16.63) | 14.82 (14.00-15.68) | — | 15.76 (15.43-16.10) | 14.74 (14.39-15.09) |
| Molecular subtype | | | | | | |
| HR+/ERBB2- | — | 0.62 (0.60-0.65) | 0.63 (0.60-0.66) | — | 0.60 (0.60-0.61) | 0.61 (0.60-0.62) |
| HR+/ERBB2+ | — | 0.77 (0.73-0.82) | 0.78 (0.73-0.82) | — | 0.46 (0.45-0.47) | 0.48 (0.47-0.49) |
| HR-/ERBB2+ | — | 0.98 (0.91-1.05) | 0.98 (0.91-1.05) | — | 0.52 (0.51-0.53) | 0.54 (0.52-0.55) |
| TNBC | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Tumor grade | | | | | | |
| 1 | — | 0.64 (0.61-0.67) | 0.65 (0.61-0.68) | — | 0.60 (0.59-0.62) | 0.61 (0.59-0.63) |
| 2 | — | 0.73 (0.71-0.76) | 0.74 (0.71-0.77) | — | 0.74 (0.73-0.75) | 0.75 (0.74-0.76) |
| 3 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | — | — | 1.00 (0.99-1.01) | — | — | 0.99 (0.9-0.99) |

Abbreviations: CI, confidence interval; aHR, adjusted hazard ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a Adjusted for all variables presented in the table.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

eTable 16. Associated Factors with Overall Survival in Patients With Stage I-IV, HR-Positive Breast Cancer by Treatment Decision on Hormone Therapy

| | Among patients who declined treatment | | | Among patients who received treatment | | |
|--|---------------------------------------|------------------|---------------------------|---------------------------------------|------------------|---------------------------|
| Variable | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a |
| Age at diagnosis (per 10-year increase) | 1.87 (1.84-1.90) | 1.79 (1.76-1.82) | 1.90 (1.86-1.95) | 1.92 (1.91-1.93) | 1.82 (1.82-1.83) | 1.90 (1.89-1.91) |
| Sex | | | | | | |
| Male | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Female | 0.66 (0.58-0.76) | — | 0.82 (0.69-0.99) | 0.61 (0.59-0.63) | — | 0.78 (0.74-0.81) |
| Race/Ethnicity | | | | | | |
| White | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 1.41 (1.34-1.49) | 1.15 (1.08-1.23) | 1.05 (0.97-1.13) | 1.30 (1.28-1.32) | 1.26 (1.24-1.28) | 1.15 (1.13-1.17) |
| Asian or Pacific Islander | 0.86 (0.77-0.96) | 0.74 (0.65-0.85) | 0.73 (0.63-0.84) | 0.71 (0.69-0.73) | 0.68 (0.66-0.70) | 0.68 (0.66-0.71) |
| Hispanic | 0.95 (0.86-1.05) | 0.86 (0.77-0.97) | 0.81 (0.71-0.92) | 0.80 (0.78-0.82) | 0.86 (0.82-0.91) | 0.75 (0.73-0.77) |
| American Indian, Alaska Native, or Other | 1.02 (0.89-1.17) | 0.79 (0.66-0.95) | 0.78 (0.64-0.95) | 0.92 (0.88-0.95) | 0.86 (0.82-0.91) | 0.87 (0.82-0.91) |
| Type of health insurance | | | | | | |
| Uninsured | 2.39 (2.123-2.70) | — | 1.71 (1.45-2.02) | 2.18 (2.12-2.25) | — | 1.72 (1.64-1.79) |
| Private or managed care | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 2.17 (2.02-2.34) | — | 1.79 (1.62-1.98) | 2.16 (2.12-2.20) | — | 1.75 (1.70-1.79) |
| Medicare | 1.11 (1.06-1.16) | — | 1.04 (0.98-1.10) | 1.20 (1.18-1.21) | — | 1.16 (1.14-1.18) |
| Other government or unknown | 1.20 (1.07-1.35) | — | 1.11 (0.94-1.31) | 1.21 (1.18-1.24) | — | 1.22 (1.17-1.27) |
| Median household income quartiles^b | | | | | | |
| <\$40,227 | 1.33 (1.28-1.39) | — | 1.22 (1.15-1.29) | 1.33 (1.31-1.34) | — | 1.30 (1.28-1.32) |
| \$40,227–\$50,353 | 1.19 (1.15-1.24) | — | 1.14 (1.09-1.21) | 1.23 (1.22-1.25) | — | 1.21 (1.19-1.23) |
| \$50,354–\$63,332 | 1.10 (1.06-1.14) | — | 1.07 (1.02-1.21) | 1.15 (1.13-1.16) | — | 1.13 (1.11-1.15) |
| ≥\$63,333 | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Type of cancer program | | | | | | |
| Community | 1.31 (1.24-1.38) | — | 1.19 (1.10-1.28) | 1.19 (1.17-1.21) | — | 1.21 (1.18-1.24) |
| Comprehensive community | 1.11 (1.07-1.16) | — | 1.07 (1.02-1.13) | 1.08 (1.07-1.09) | — | 1.12 (1.10-1.13) |
| Academic or research | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 1.11 (1.06-1.26) | — | 1.03 (0.97-1.09) | 1.07 (1.06-1.08) | — | 1.07 (1.05-1.09) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| 1 | — | 1.37 (1.31-1.43) | 1.33 (1.27-1.41) | — | 1.38 (1.36-1.40) | 1.35 (1.33-1.37) |

| | | | | | | |
|----------------------------------|---|---------------------|---------------------|---|---------------------|---------------------|
| ≥2 | — | 2.10 (1.98-2.23) | 2.07 (1.94-2.21) | — | 2.29 (2.25-2.34) | 2.20 (2.16-2.25) |
| Histologic type | | | | | | |
| Ductal | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Lobular | — | 1.01 (0.95-1.07) | 1.03 (0.97-1.10) | — | 1.00 (0.98-1.01) | 1.02 (1.01-1.04) |
| Ductal and lobular | — | 0.87 (0.80-0.95) | 0.89 (0.81-0.97) | — | 0.92 (0.90-0.94) | 0.95 (0.93-0.97) |
| Other | — | 0.92 (0.86-0.99) | 0.90 (0.84-0.97) | — | 1.15 (1.13-1.18) | 1.14 (1.12-1.17) |
| AJCC stage group | | | | | | |
| I | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| II | — | 1.95 (1.87-2.03) | 1.85 (1.76-1.93) | — | 1.63 (1.61-1.65) | 1.60 (1.58-1.62) |
| III | — | 4.48 (4.22-4.76) | 4.21 (3.94-4.51) | — | 3.28 (3.23-3.23) | 3.11 (3.06-3.17) |
| IV | — | 28.45 (25.95-31.19) | 29.32 (26.53-32.41) | — | 12.65 (12.45-12.86) | 11.85 (11.64-12.06) |
| ERBB2 status | | | | | | |
| Negative | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Positive | — | 1.06 (1.00-1.12) | 1.07 (1.00-1.13) | — | 0.86 (0.84-0.87) | 0.87 (0.86-0.89) |
| Tumor grade | | | | | | |
| 1 | — | 0.57 (0.54-0.60) | 0.57 (0.54-0.61) | — | 0.63 (0.62-0.64) | 0.65 (0.64-0.66) |
| 2 | — | 0.71 (0.68-0.74) | 0.72 (0.68-0.75) | — | 0.72 (0.71-0.73) | 0.73 (0.72-0.74) |
| 3 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | — | — | 1.01 (1.00-1.01) | — | — | 1.00 (1.00-1.01) |

Abbreviations: CI, confidence interval; aHR, adjusted hazard ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2.

^a Adjusted for all variables presented in the table.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

eTable 17. Associated Factors with Overall Survival in Patients With Stage I-III Breast Cancer by Treatment Decision on Radiotherapy

| | Among patients who declined treatment | | | Among patients who received treatment | | |
|--|---------------------------------------|------------------|---------------------------|---------------------------------------|------------------|---------------------------|
| Variable | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a |
| Age at diagnosis (per 10-year increase) | 1.71 (1.68-1.73) | 1.64 (1.62-1.66) | 1.72 (1.69-1.75) | 1.70 (1.69-1.71) | 1.60 (1.59-1.61) | 1.66 (1.65-1.68) |
| Sex | | | | | | |
| Male | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Female | 0.73 (0.64-0.83) | — | 0.85 (0.72-1.01) | 0.58 (0.56-0.61) | — | 0.80 (0.74-0.85) |
| Race/Ethnicity | | | | | | |
| White | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 1.21 (1.16-1.26) | 1.03 (0.98-1.09) | 0.98 (0.92-1.04) | 1.37 (1.35-1.39) | 1.22 (1.20-1.24) | 1.13 (1.11-1.16) |
| Asian or Pacific Islander | 0.74 (0.67-0.82) | 0.70 (0.62-0.78) | 0.71 (0.62-0.80) | 0.75 (0.73-0.78) | 0.68 (0.65-0.71) | 0.70 (0.66-0.73) |
| Hispanic | 0.86 (0.79-0.93) | 0.80 (0.72-0.88) | 0.74 (0.66-0.82) | 0.86 (0.84-0.88) | 0.90 (0.87-0.93) | 0.79 (0.76-0.81) |
| American Indian, Alaska Native, or Other | 1.04 (0.92-1.16) | 0.92 (0.79-1.07) | 0.95 (0.81-1.12) | 0.92 (0.88-0.95) | 0.88 (0.84-0.94) | 0.88 (0.83-0.94) |
| Type of health insurance | | | | | | |
| Uninsured | 1.83 (1.64-2.03) | — | 1.50 (1.28-1.74) | 1.81 (1.75-1.87) | — | 1.55 (1.47-1.63) |
| Private or managed care | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 1.85 (1.74-1.97) | — | 1.62 (1.49-1.76) | 1.95 (1.91-1.98) | — | 1.60 (1.56-1.65) |
| Medicare | 1.08 (1.04-1.12) | — | 1.07 (1.02-1.13) | 1.25 (1.24-1.27) | — | 1.22 (1.20-1.24) |
| Other government or unknown | 1.15 (1.04-1.27) | — | 1.04 (0.90-1.20) | 1.18 (1.15-1.22) | — | 1.17 (1.11-1.23) |
| Median household income quartiles^b | | | | | | |
| <\$40,227 | 1.30 (1.25-1.35) | — | 1.23 (1.17-1.30) | 1.36 (1.34-1.38) | — | 1.29 (1.27-1.32) |
| \$40,227–\$50,353 | 1.18 (1.14-1.22) | — | 1.15 (1.10-1.20) | 1.26 (1.24-1.27) | — | 1.22 (1.20-1.24) |
| \$50,354–\$63,332 | 1.09 (1.05-1.13) | — | 1.06 (1.02-1.11) | 1.16 (1.15-1.18) | — | 1.14 (1.12-1.16) |
| ≥\$63,333 | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Type of cancer program | | | | | | |
| Community | 1.39 (1.33-1.46) | — | 1.28 (1.19-1.36) | 1.21 (1.19-1.23) | — | 1.22 (1.19-1.26) |
| Comprehensive community | 1.20 (1.16-1.24) | — | 1.16 (1.11-1.21) | 1.11 (1.10-1.12) | — | 1.13 (1.11-1.15) |
| Academic or research | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 1.18 (1.13-1.22) | — | 1.10 (1.04-1.16) | 1.09 (1.08-1.10) | — | 1.07 (1.05-1.09) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| 1 | — | 1.34 (1.30-1.40) | 1.34 (1.28-1.40) | — | 1.35 (1.33-1.37) | 1.32 (1.30-1.35) |

| | | | | | | |
|----------------------------------|---|------------------|------------------|---|------------------|------------------|
| ≥2 | — | 1.94 (1.84-2.03) | 1.96 (1.85-2.06) | — | 2.21 (2.16-2.26) | 2.12 (2.07-2.18) |
| Histologic type | | | | | | |
| Ductal | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Lobular | — | 0.97 (0.92-1.02) | 0.99 (0.94-1.05) | — | 1.00 (0.98-1.03) | 1.02 (1.00-1.04) |
| Ductal and lobular | — | 0.90 (0.83-0.97) | 0.93 (0.86-1.01) | — | 0.98 (0.95-1.01) | 1.00 (0.97-1.04) |
| Other | — | 1.03 (0.97-1.09) | 1.03 (0.96-1.10) | — | 1.27 (1.24-1.30) | 1.25 (1.22-1.29) |
| AJCC stage group | | | | | | |
| I | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| II | — | 1.74 (1.78-1.81) | 1.67 (1.61-1.74) | — | 1.76 (1.74-1.79) | 1.72 (1.70-1.75) |
| III | — | 3.27 (3.13-3.42) | 3.08 (2.93-3.23) | — | 3.89 (3.83-3.96) | 3.69 (3.62-3.76) |
| Molecular subtype | | | | | | |
| HR+/ERBB2- | — | 0.64 (0.60-0.67) | 0.64 (0.60-0.68) | — | 0.63 (0.61-0.64) | 0.63 (0.62-0.64) |
| HR+/ERBB2+ | — | 0.69 (0.64-0.74) | 0.69 (0.64-0.74) | — | 0.51 (0.50-0.52) | 0.53 (0.51-0.54) |
| HR-/ERBB2+ | — | 0.70 (0.63-0.76) | 0.70 (0.64-0.78) | — | 0.56 (0.54-0.58) | 0.58 (0.55-0.60) |
| TNBC | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Tumor grade | | | | | | |
| 1 | — | 0.64 (0.61-0.67) | 0.65 (0.62-0.69) | — | 0.61 (0.60-0.63) | 0.63 (0.61-0.64) |
| 2 | — | 0.74 (0.71-0.77) | 0.75 (0.72-0.78) | — | 0.71 (0.70-0.72) | 0.72 (0.71-0.74) |
| 3 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | — | — | 1.00 (0.99-1.01) | — | — | 0.99 (0.99-0.99) |

Abbreviations: CI, confidence interval; aHR, adjusted hazard ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

^a Adjusted for all variables presented in the table.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

eTable 18. Associated Factors with Overall Survival in Patients With Stage I-III Breast Cancer by Treatment Decision on Surgery

| | Among patients who declined treatment | | | Among patients who received treatment | | |
|--|---------------------------------------|------------------|---------------------------|---------------------------------------|------------------|---------------------------|
| Variable | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a | aHR (95% CI) | aHR (95% CI) | aHR (95% CI) ^a |
| Age at diagnosis (per 10-year increase) | 1.36 (1.33-1.39) | 1.36 (1.33-1.40) | 1.41 (1.36-1.46) | 1.87 (1.86-1.87) | 1.79 (1.78-1.80) | 1.86 (1.85-1.87) |
| Sex | | | | | | |
| Male | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Female | 0.79 (0.63-0.995) | — | 0.78 (0.56-1.08) | 0.67 (0.65-0.68) | — | 0.76 (0.73-0.79) |
| Race/Ethnicity | | | | | | |
| White | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) | 1.0 (reference) |
| Black | 0.95 (0.88-1.01) | 0.83 (0.77-0.90) | 0.82 (0.75-0.91) | 1.31 (1.30-1.33) | 1.19 (1.17-1.21) | 1.10 (1.09-1.12) |
| Asian or Pacific Islander | 0.57 (0.48-0.68) | 0.58 (0.47-0.71) | 0.56 (0.44-0.71) | 0.71 (0.69-0.73) | 0.66 (0.64-0.68) | 0.68 (0.66-0.71) |
| Hispanic | 0.73 (0.64-0.85) | 0.71 (0.60-0.84) | 0.69 (0.57-0.84) | 0.83 (0.81-0.84) | 0.86 (0.84-0.88) | 0.76 (0.74-0.78) |
| American Indian, Alaska Native, or Other | 0.87 (0.72-1.06) | 0.79 (0.63-0.99) | 0.80 (0.62-1.03) | 0.90 (0.87-0.92) | 0.87 (0.83-0.90) | 0.87 (0.83-0.91) |
| Type of health insurance | | | | | | |
| Uninsured | 1.30 (1.11-1.53) | — | 0.96 (0.76-1.20) | 1.80 (1.75-1.85) | — | 1.58 (1.51-1.64) |
| Private or managed care | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Medicaid | 1.29 (1.15-1.45) | — | 1.12 (0.96-1.31) | 1.99 (1.96-2.02) | — | 1.69 (1.65-1.73) |
| Medicare | 1.10 (1.02-1.19) | — | 0.99 (0.89-1.11) | 1.20 (1.19-1.21) | — | 1.17 (1.15-1.19) |
| Other government or unknown | 1.00 (0.83-1.21) | — | 0.72 (0.54-0.97) | 1.16 (1.14-1.19) | — | 1.18 (1.14-1.23) |
| Median household income quartiles^b | | | | | | |
| <\$40,227 | 1.08 (1.01-1.16) | — | 1.14 (1.03-1.25) | 1.34 (1.33-1.36) | — | 1.30 (1.29-1.32) |
| \$40,227–\$50,353 | 1.03 (0.96-1.10) | — | 1.09 (1.00-1.19) | 1.24 (1.23-1.25) | — | 1.21 (1.20-1.23) |
| \$50,354–\$63,332 | 1.04 (0.97-1.10) | — | 1.01 (0.92-1.10) | 1.15 (1.14-1.16) | — | 1.14 (1.12-1.15) |
| ≥\$63,333 | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Type of cancer program | | | | | | |
| Community | 1.27 (1.16-1.39) | — | 1.27 (1.11-1.45) | 1.25 (1.24-1.27) | — | 1.23 (1.21-1.26) |
| Comprehensive community | 1.22 (1.15-1.29) | — | 1.27 (1.17-1.37) | 1.14 (1.13-1.15) | — | 1.14 (1.13-1.16) |
| Academic or research | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) |
| Integrated network | 1.18 (1.10-1.27) | — | 1.25 (1.14-1.38) | 1.12 (1.10-1.13) | — | 1.09 (1.08-1.11) |
| Charlson-Deyo comorbidity score | | | | | | |
| 0 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| 1 | — | 1.21 (1.11-1.31) | 1.23 (1.12-1.35) | — | 1.40 (1.38-1.41) | 1.37 (1.35-1.39) |
| ≥2 | — | 1.71 (1.55-1.88) | 1.63 (1.47-1.81) | — | 2.28 (2.24-2.32) | 2.21 (2.18-2.25) |

| Histologic type | | | | | | |
|----------------------------------|---|------------------|------------------|---|------------------|------------------|
| Ductal | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Lobular | — | 0.97 (0.88-1.07) | 0.96 (0.86-1.06) | — | 0.94 (0.93-0.96) | 0.97 (0.95-0.98) |
| Ductal and lobular | — | 0.94 (0.81-1.09) | 1.00 (0.85-1.17) | — | 0.93 (0.90-0.95) | 0.95 (0.93-0.98) |
| Other | — | 0.99 (0.89-1.11) | 1.03 (0.92-1.16) | — | 1.18 (1.16-1.20) | 1.16 (1.13-1.18) |
| AJCC stage group | | | | | | |
| I | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| II | — | 1.31 (1.22-1.41) | 1.28 (1.18-1.38) | — | 1.67 (1.65-1.68) | 1.62 (1.60-1.64) |
| III | — | 1.75 (1.61-1.90) | 1.72 (1.57-1.88) | — | 3.55 (3.50-3.59) | 3.33 (3.28-3.37) |
| Molecular subtype | | | | | | |
| HR+/ERBB2- | — | 0.50 (0.45-0.55) | 0.48 (0.43-0.54) | — | 0.66 (0.65-0.67) | 0.66 (0.66-0.67) |
| HR+/ERBB2+ | — | 0.59 (0.52-0.67) | 0.59 (0.51-0.68) | — | 0.59 (0.58-0.60) | 0.60 (0.59-0.62) |
| HR-/ERBB2+ | — | 0.61 (0.52-0.72) | 0.57 (0.47-0.69) | — | 0.62 (0.60-0.63) | 0.64 (0.62-0.65) |
| TNBC | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Tumor grade | | | | | | |
| 1 | — | 0.65 (0.59-0.72) | 0.66 (0.60-0.74) | — | 0.65 (0.64-0.66) | 0.66 (0.65-0.67) |
| 2 | — | 0.77 (0.71-0.83) | 0.78 (0.72-0.85) | — | 0.72 (0.72-0.73) | 0.74 (0.73-0.75) |
| 3 | — | 1.0 (reference) | 1.0 (reference) | — | 1.0 (reference) | 1.0 (reference) |
| Year of initial diagnosis | | | | | | |
| | — | — | 0.99 (0.98-1.00) | — | — | 0.99 (0.99-0.99) |

Abbreviations: CI, confidence interval; aHR, adjusted hazard ratio; AJCC, American Joint Committee on Cancer; HR, hormone receptors; ERBB2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer.

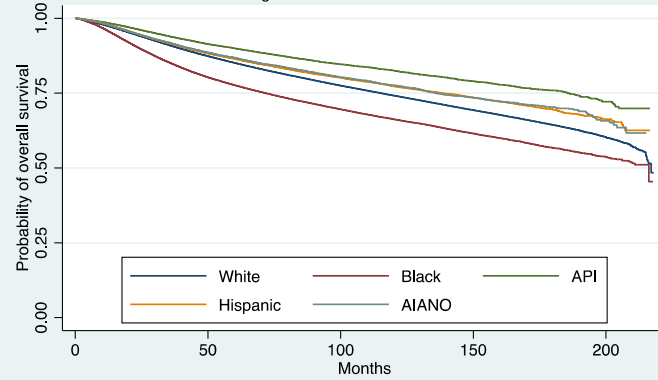
^a Adjusted for all variables presented in the table.

^b Based on the 2016 American Community Survey data, spanning years 2012–2016 and adjusted for 2016 inflation.

eFigure. Kaplan-Meier Curves for Overall Survival Stratified by Race and Ethnicity in Patients Who Received Treatment

Chemotherapy cohort

Patients with stage I-IV breast cancer who received treatment

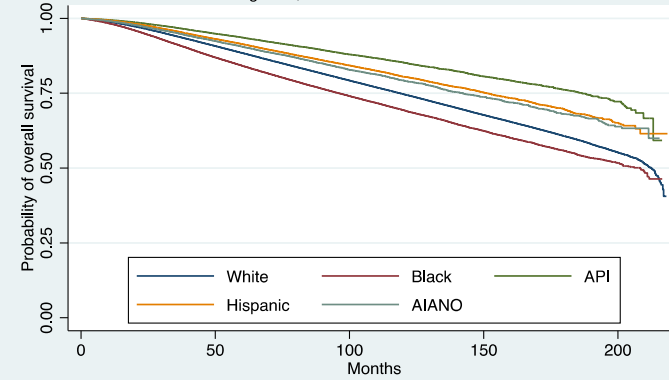


Number at risk

| | | | | | |
|----------|--------|--------|--------|--------|------|
| White | 808992 | 555550 | 294139 | 109437 | 7639 |
| Black | 156734 | 94126 | 44676 | 14269 | 945 |
| API | 42769 | 27401 | 13120 | 4385 | 275 |
| Hispanic | 74707 | 46331 | 21256 | 6572 | 292 |
| AIANO | 18781 | 12113 | 6288 | 2430 | 134 |

Hormone therapy cohort

Patients with stage I-IV, HR+ breast cancer who received treatment

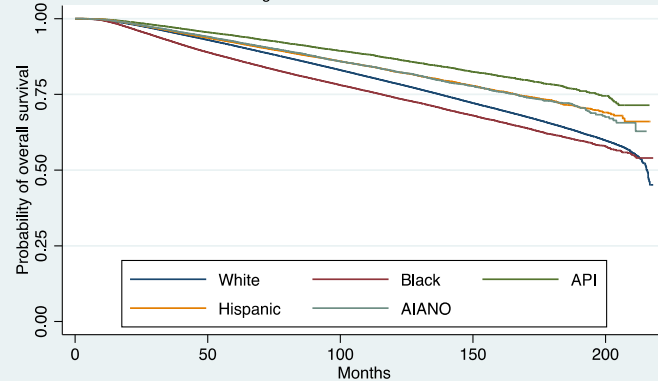


Number at risk

| | | | | | |
|----------|--------|--------|--------|--------|------|
| White | 347194 | 909690 | 431099 | 137411 | 8427 |
| Black | 154328 | 96490 | 41104 | 11159 | 618 |
| API | 59455 | 37674 | 15990 | 4626 | 272 |
| Hispanic | 86435 | 53068 | 21869 | 5706 | 250 |
| AIANO | 25853 | 16575 | 7699 | 2528 | 137 |

Radiotherapy cohort

Patients with stage I-III breast cancer who received treatment

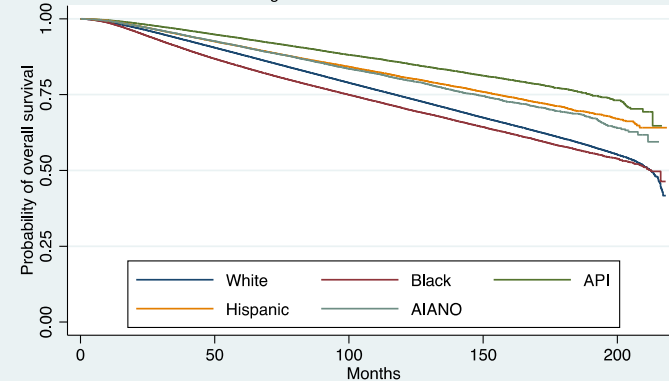


Number at risk

| | | | | | |
|----------|---------|--------|--------|--------|------|
| White | 1133156 | 804280 | 413120 | 146262 | 9895 |
| Black | 155200 | 102304 | 48215 | 14959 | 973 |
| API | 49361 | 32255 | 15096 | 4963 | 304 |
| Hispanic | 76685 | 48740 | 21730 | 6484 | 295 |
| AIANO | 22786 | 15323 | 7664 | 2812 | 162 |

Surgery cohort

Patients with stage I-III breast cancer who received treatment



Number at risk

| | | | | | |
|----------|--------|---------|--------|--------|-------|
| White | 905253 | 1309979 | 655445 | 225175 | 14544 |
| Black | 253982 | 162683 | 75590 | 23331 | 1462 |
| API | 84204 | 54346 | 24882 | 7908 | 460 |
| Hispanic | 130993 | 82402 | 36866 | 11055 | 523 |
| AIANO | 38594 | 25400 | 12762 | 4588 | 238 |