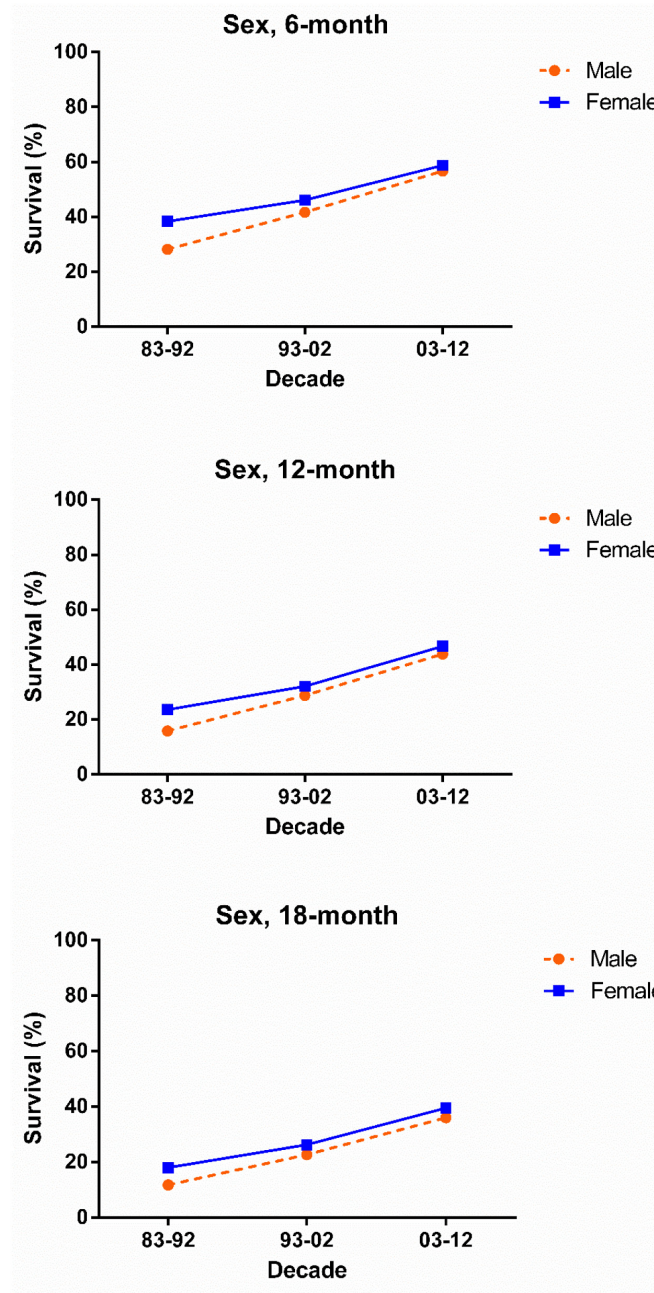
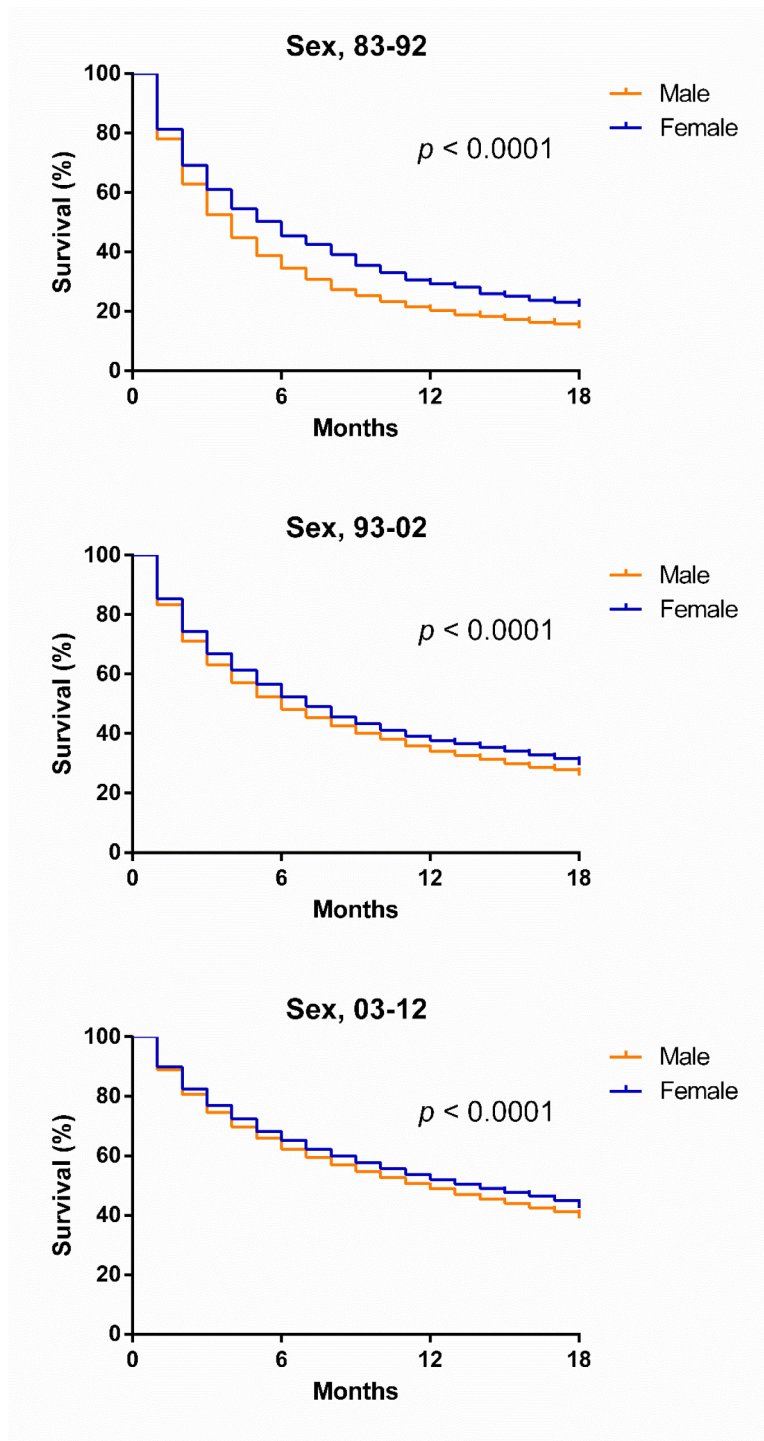


# Improved survival of patients with hepatocellular carcinoma and disparities by age, race, and socioeconomic status by decade, 1983–2012

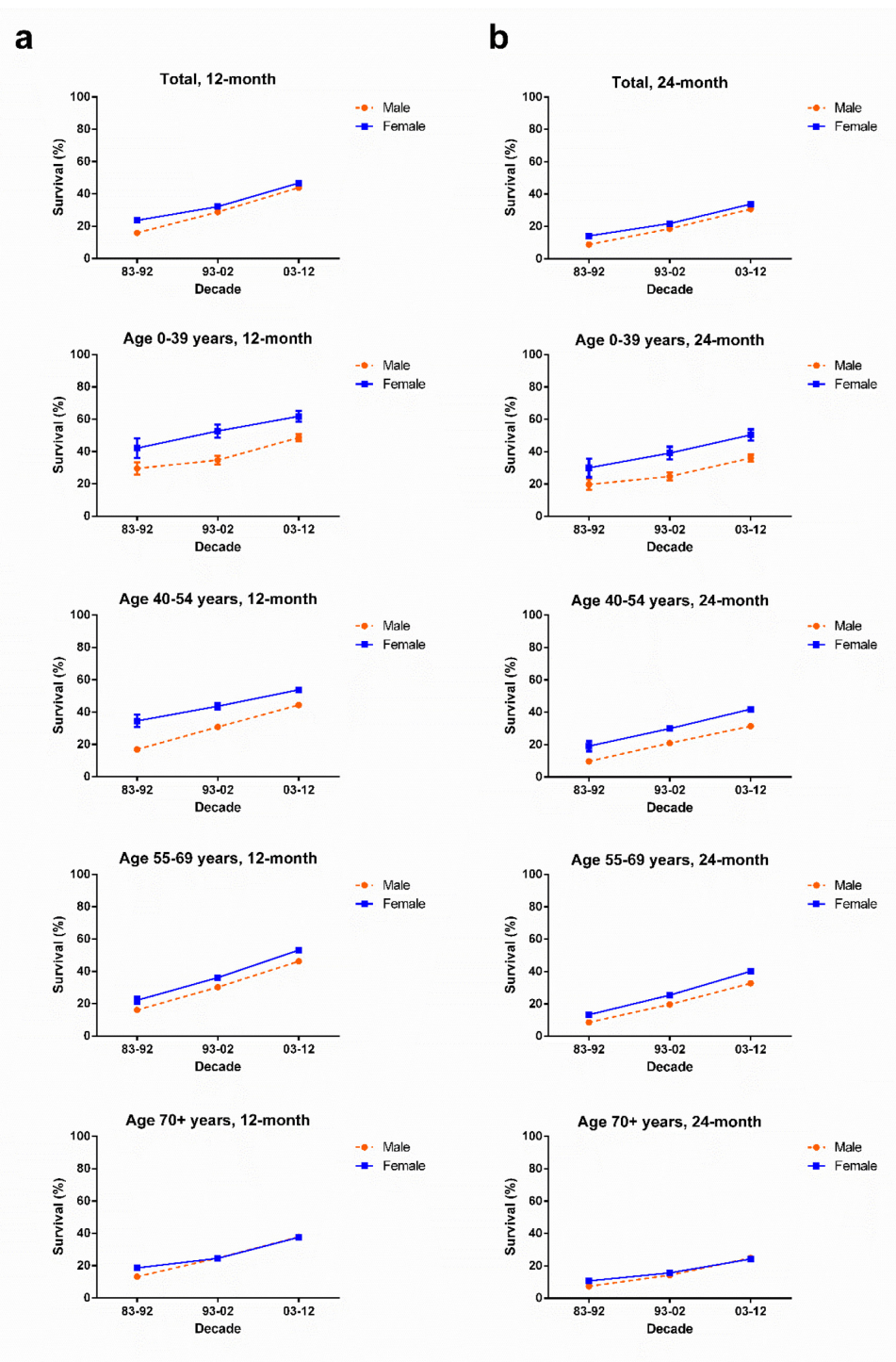
## SUPPLEMENTARY FIGURES AND TABLES



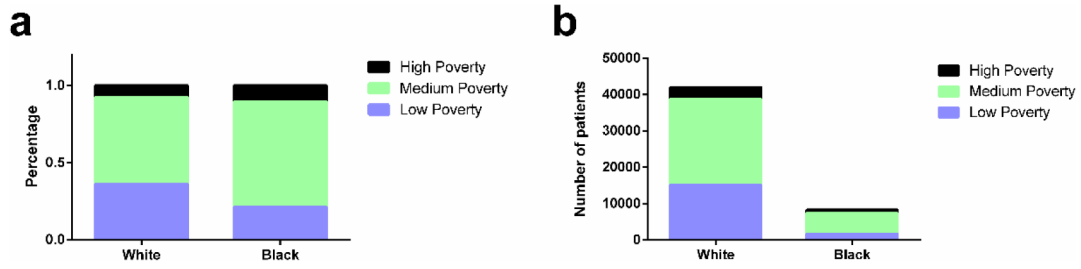
Supplementary Figure S1: 6-month, 12-month, and 18-month relative survival rates for male (orange) and female (blue) with HCC from 1983 to 2012 at eighteen SEER sites and calendar period.



Supplementary Figure S2: Kaplan-Meier survival analysis for male (orange) and female (blue) with HCC from eighteen SEER sites from 1983 to 2012 according to calendar period.



Supplementary Figure S3: 12 a. and 24-month b. relative survival rates for male (orange) and female (blue) with HCC at eighteen SEER sites from 1983 to 2012 according to age group (total and ages 0-39, 40-54, 55-69, and 70+ years).



**Supplementary Figure S4: Distribution of SES by race for patients with HCC at eighteen SEER sites from 1983 to 2012.** Percentage **a.** and number **b.** of patients with HCC in low-poverty, medium-poverty, and high-poverty groups.

**Supplementary Table S1: The incidence of HCC according to age group and decade within sex, SES, and race groups from 1983 to 2012 at the nine original SEER sites. Data are incidence per 100,000 people by year of diagnosis, with the number of patients in parentheses**

See Supplementary File 1

Supplementary Table S2: 12-month and 24-month relative survival rates of HCC patients according to sex, age group, and calendar period from 1983 to 2012 at eighteen SEER sites

| Decade    | Age Group | Sex                |                      |                      |
|-----------|-----------|--------------------|----------------------|----------------------|
|           |           | Male               | Female               |                      |
| 83-92     | 12-Mo RSR |                    |                      |                      |
|           | All       | 15.9 ± 0.7 (3145)  | 23.6 ± 1.2 (1188)*** |                      |
|           | 0-39      | 29.5 ± 3.8 (144)   | 42.1 ± 6.1 (67)***   |                      |
|           | 40-54     | 16.9 ± 1.7 (514)   | 34.5 ± 3.8 (160)***  |                      |
|           | 55-69     | 16.1 ± 1.0 (1416)  | 22.1 ± 2.1 (409)***  |                      |
|           | 70+       | 13.2 ± 1.1 (1071)  | 18.6 ± 1.7 (552)***  |                      |
|           | 24-Mo RSR |                    |                      |                      |
|           | All       | 8.8 ± 0.5          | 14.1 ± 1.0***        |                      |
|           | 0-39      | 19.7 ± 3.3         | 30.0 ± 5.8***        |                      |
|           | 40-54     | 9.6 ± 1.3          | 19.0 ± 3.1***        |                      |
|           | 55-69     | 8.5 ± 0.8          | 13.3 ± 1.7***        |                      |
|           | 70+       | 7.4 ± 0.9          | 10.7 ± 1.4***        |                      |
|           | 93-02     | 12-Mo RSR          |                      |                      |
|           |           | All                | 28.8 ± 0.4 (11637)   | 32.1 ± 0.7 (4168)*** |
| 0-39      |           | 34.7 ± 2.6 (255)   | 52.7 ± 4.1 (150)***  |                      |
| 40-54     |           | 30.8 ± 0.8 (3224)  | 43.6 ± 2.1 (587)***  |                      |
| 55-69     |           | 30.2 ± 0.7 (4493)  | 36.1 ± 1.3 (1397)*** |                      |
| 70+       |           | 24.7 ± 0.8 (3565)  | 24.5 ± 1.0 (2034)*** |                      |
| 24-Mo RSR |           |                    |                      |                      |
| All       |           | 18.5 ± 0.4         | 21.8 ± 0.7***        |                      |
| 0-39      |           | 24.7 ± 2.3         | 39.1 ± 4.0***        |                      |
| 40-54     |           | 20.9 ± 0.7         | 29.9 ± 1.9***        |                      |
| 55-69     |           | 19.6 ± 0.6         | 25.4 ± 1.2***        |                      |
| 70+       |           | 14.2 ± 0.6         | 15.6 ± 0.9***        |                      |
| 03-12     |           | 12-Mo RSR          |                      |                      |
|           |           | All                | 43.9 ± 0.3 (33662)   | 46.7 ± 0.5 (9840)*** |
|           | 0-39      | 48.6 ± 2.1 (584)   | 61.8 ± 3.3 (227)***  |                      |
|           | 40-54     | 44.4 ± 0.6 (8506)  | 53.8 ± 1.3 (1525)*** |                      |
|           | 55-69     | 46.2 ± 0.4 (16911) | 53.1 ± 0.8 (3852)*** |                      |
|           | 70+       | 37.8 ± 0.6 (7661)  | 37.5 ± 0.8 (4236)*** |                      |
|           | 24-Mo RSR |                    |                      |                      |
|           | All       | 30.7 ± 0.3         | 33.8 ± 0.5***        |                      |
|           | 0-39      | 36.0 ± 2.1         | 50.4 ± 3.5***        |                      |
|           | 40-54     | 31.4 ± 0.5         | 41.9 ± 1.4***        |                      |
|           | 55-69     | 32.7 ± 0.4         | 40.1 ± 0.9***        |                      |
|           | 70+       | 24.9 ± 0.6         | 24.2 ± 0.7***        |                      |

Data are means ± standard error of the mean, with number of patients in parentheses.

Abbreviations: Mo, month; RS, relative survival; SEM, standard error of the mean.

\* $p < 0.01$ , \*\* $p < 0.001$ , and \*\*\* $p < 0.0001$  for comparisons with the Male group.

**Supplementary Table S3: Summary data for Cox regression analysis of survival in patients with HCC in different age groups from 1983 to 2012 at eighteen SEER sites**

| <b>Variable</b>        | <b>Hazard Ratio (95% CI)</b> | <b>p-value</b> |
|------------------------|------------------------------|----------------|
| <b>Age 0-39 years</b>  |                              |                |
| Univariate             |                              |                |
| Sex                    | 0.799 (0.686 – 0.932)        | < 0.001        |
| Age                    | 1.026 (1.017 -1.034)         | < 0.001        |
| Race                   | 1.541 (1.311 – 1.812)        | < 0.001        |
| SES                    | 1.267 (1.086 – 1.477)        | = 0.003        |
| Multivariate           |                              |                |
| Sex                    | 0.823 (0.705 – 0.960)        | = 0.013        |
| Age                    | 1.023 (1.015 -1.032)         | < 0.001        |
| Race                   | 1.406 (1.193 – 1.656)        | < 0.001        |
| SES                    | 1.192 (1.020 – 1.392)        | = 0.027        |
| <b>Age 40-54 years</b> |                              |                |
| Univariate             |                              |                |
| Sex                    | 0.793 (0.748 – 0.841)        | < 0.001        |
| Age                    | 0.990 (0.985 – 0.996)        | = 0.001        |
| Race                   | 1.341 (1.275 – 1.411)        | < 0.001        |
| SES                    | 1.155 (1.104 – 1.207)        | < 0.001        |
| Multivariate           |                              |                |
| Sex                    | 0.782 (0.737 – 0.830)        | < 0.001        |
| Race                   | 1.343 (1.276 – 1.413)        | < 0.001        |
| SES                    | 1.129 (1.080 – 1.181)        | < 0.001        |
| <b>Age 55-69 years</b> |                              |                |
| Univariate             |                              |                |
| Sex                    | 0.843 (0.811 – 0.875)        | < 0.001        |
| Age                    | 1.017 (1.014 – 1.021)        | < 0.001        |
| Race                   | 1.200 (1.156 – 1.245)        | < 0.001        |
| SES                    | 1.100 (1.065 – 1.135)        | < 0.001        |
| Multivariate           |                              |                |
| Sex                    | 0.825 (0.794 – 0.858)        | < 0.001        |
| Age                    | 1.020 (1.016 – 1.023)        | < 0.001        |
| Race                   | 1.203 (1.159 – 1.249)        | < 0.001        |
| SES                    | 1.083 (1.050 – 1.118)        | < 0.001        |
| <b>Age 70+ years</b>   |                              |                |
| Univariate             |                              |                |
| Sex                    | 0.970 (0.935 – 1.005)        | = 0.096        |
| Age                    | 1.023 (1.020 – 1.026)        | < 0.001        |
| Race                   | 1.067 (1.008 – 1.130)        | = 0.026        |
| SES                    | 1.045 (1.009 – 1.083)        | = 0.015        |

Abbreviations: 95% CI, 95% confidence interval; SES, socioeconomic status.

Supplementary Table S4: 12-month and 24-month relative survival rates of HCC patients according to race, age group, and calendar period from 1983 to 2012 at eighteen SEER sites

| Decade    | Age Group | Race               |                      |                      |                      |
|-----------|-----------|--------------------|----------------------|----------------------|----------------------|
|           |           | White              | Black                | Other                |                      |
| 83-92     | 12-Mo RSR |                    |                      |                      |                      |
|           | All       | 18.2 ± 0.80 (2638) | 13.0 ± 1.5 (534)     | 19.8 ± 1.2 (1155)    |                      |
|           | 0-39      | 55.4 ± 5.1 (97)    | 16.2 ± 6.6 (31)**    | 19.3 ± 4.3 (83)***   |                      |
|           | 40-54     | 23.3 ± 2.4 (306)   | 13.6 ± 3.3 (111)     | 21.0 ± 2.6 (255)     |                      |
|           | 55-69     | 17.4 ± 1.1 (1112)  | 13.3 ± 2.3 (232)     | 19.9 ± 1.8 (478)     |                      |
|           | 70+       | 14.4 ± 1.1 (1123)  | 11.4 ± 2.6 (160)     | 19.1 ± 2.2 (339)     |                      |
|           | 24-Mo RSR |                    |                      |                      |                      |
|           | All       | 10.3 ± 0.6         | 6.8 ± 1.1            | 11.8 ± 1.0           |                      |
|           | 0-39      | 38.7 ± 5           | 9.7 ± 5.3            | 13.3 ± 3.7**         |                      |
|           | 40-54     | 13.7 ± 2           | 5.5 ± 2.2            | 12 ± 2.1             |                      |
|           | 55-69     | 9.6 ± 0.9          | 7.3 ± 1.8            | 10.6 ± 1.4           |                      |
|           | 70+       | 7.5 ± 0.8          | 6.3 ± 2.1            | 12.9 ± 1.9           |                      |
|           | 93-02     | 12-Mo RSR          |                      |                      |                      |
|           |           | All                | 28.3 ± 0.5 (9765)    | 23.7 ± 1.0 (1806)**  | 35.3 ± 0.8 (4183)*** |
| 0-39      |           | 49.2 ± 3.4 (221)   | 28.6 ± 5.4 (74)      | 34.2 ± 3.4 (207)     |                      |
| 40-54     |           | 34.1 ± 1.0 (2196)  | 23.7 ± 1.7 (612)***  | 35.4 ± 1.5 (988)     |                      |
| 55-69     |           | 29.7 ± 0.8 (3493)  | 25.8 ± 1.7 (704)     | 37.7 ± 1.2 (1670)*** |                      |
| 70+       |           | 22.6 ± 0.7 (3855)  | 19.2 ± 2 (416)       | 32.3 ± 1.3 (1318)*** |                      |
| 24-Mo RSR |           |                    |                      |                      |                      |
| All       |           | 18.2 ± 0.4         | 13.6 ± 0.8***        | 24.6 ± 0.7***        |                      |
| 0-39      |           | 35.4 ± 3.2         | 18.6 ± 4.7           | 26.0 ± 3.1           |                      |
| 40-54     |           | 23.8 ± 0.9         | 13.3 ± 1.4***        | 24.4 ± 1.4           |                      |
| 55-69     |           | 19.1 ± 0.7         | 15.4 ± 1.4           | 27.1 ± 1.1***        |                      |
| 70+       |           | 13.0 ± 0.6         | 10.0 ± 1.6           | 21.3 ± 1.2***        |                      |
| 03-12     |           | 12-Mo RSR          |                      |                      |                      |
|           |           | All                | 44.0 ± 0.3 (29121)   | 38.4 ± 0.7 (5840)*** | 50.4 ± 0.6 (8348)*** |
|           | 0-39      | 63.8 ± 2.5 (388)   | 40.9 ± 4.2 (156)***  | 42.4 ± 3.1 (263)***  |                      |
|           | 40-54     | 46.8 ± 0.6 (6725)  | 36.7 ± 1.3 (1448)*** | 48.9 ± 1.2 (1816)    |                      |
|           | 55-69     | 47.6 ± 0.4 (13848) | 40.2 ± 0.9 (3361)*** | 54.1 ± 0.9 (3448)*** |                      |
|           | 70+       | 34.6 ± 0.6 (8160)  | 33.8 ± 1.7 (875)     | 47.6 ± 1.0 (2821)*** |                      |
|           | 24-Mo RSR |                    |                      |                      |                      |
|           | All       | 30.4 ± 0.3         | 25.8 ± 0.6***        | 38.4 ± 0.6***        |                      |
|           | 0-39      | 47.7 ± 2.7         | 33.9 ± 4.1           | 32.5 ± 3.0**         |                      |
|           | 40-54     | 33.5 ± 0.6         | 24.1 ± 1.2***        | 37.7 ± 1.2           |                      |
|           | 55-69     | 33.6 ± 0.4         | 27.3 ± 0.9***        | 42.1 ± 0.9***        |                      |
|           | 70+       | 21.3 ± 0.5         | 21.4 ± 1.6           | 34.9 ± 1.0***        |                      |

Data are means ± standard error of the mean, with number of patients in parentheses.

Abbreviations: Mo, month; RS, relative survival; SEM, standard error of the mean.

\* $p < 0.01$ , \*\* $p < 0.001$ , and \*\*\* $p < 0.0001$  for comparisons with the White group.



Supplementary Table S5: 12-month and 18-month relative survival rates of HCC patients according to SES, age group, and calendar period from 1983 to 2012 at eighteen SEER sites

| Decade    | Age Group | SES               |                       |                       |                      |
|-----------|-----------|-------------------|-----------------------|-----------------------|----------------------|
|           |           | Low Poverty       | Medium Poverty        | High Poverty          |                      |
| 83-92     | 12-Mo RSR |                   |                       |                       |                      |
|           | All       | 18.9 ± 0.9 (1827) | 17.5 ± 0.8 (2435)     | 14.8 ± 4.3 (71)       |                      |
|           | 0-39      | 42.6 ± 5.5 (80)   | 30.9 ± 4.1 (131)      | 0.0 ± 0.0 (0)         |                      |
|           | 40-54     | 27.3 ± 2.7 (266)  | 17.2 ± 1.9 (403)      | 0.0 ± 0.0 (5)         |                      |
|           | 55-69     | 16.8 ± 1.4 (754)  | 18.1 ± 1.2 (1042)     | 10.5 ± 5.7 (29)       |                      |
|           | 70+       | 15.1 ± 1.4 (727)  | 14.8 ± 1.3 (859)      | 20.2 ± 6.9 (37)       |                      |
|           | 24-Mo RSR |                   |                       |                       |                      |
|           | All       | 10.6 ± 0.7        | 10.0 ± 0.6            | 12.0 ± 4.0            |                      |
|           | 0-39      | 30.1 ± 5.1        | 20.9 ± 3.6            | 0.0 ± 0.0             |                      |
|           | 40-54     | 14.7 ± 2.2        | 10.1 ± 1.5            | 0.0 ± 0.0             |                      |
|           | 55-69     | 8.7 ± 1.0         | 10.4 ± 1.0            | 3.5 ± 3.4             |                      |
|           | 70+       | 9.0 ± 1.1         | 7.6 ± 1.0             | 20.2 ± 6.9            |                      |
|           | 93-02     | 12-Mo RSR         |                       |                       |                      |
|           |           | All               | 31.2 ± 0.7 (5236)     | 29.0 ± 0.5 (9772)     | 28.6 ± 1.6 (795)     |
| 0-39      |           | 51.8 ± 3.8 (181)  | 33.0 ± 2.7 (302)***   | 43.4 ± 10.8 (22)      |                      |
| 40-54     |           | 35.8 ± 1.4 (1232) | 31.1 ± 1.0 (2360)***  | 33.6 ± 3.2 (218)***   |                      |
| 55-69     |           | 34.7 ± 1.1 (1881) | 30.3 ± 0.8 (3741)***  | 27.7 ± 2.8 (268)***   |                      |
| 70+       |           | 22.8 ± 1.0 (1942) | 25.7 ± 0.8 (3369)***  | 24.5 ± 2.6 (287)***   |                      |
| 24-Mo RSR |           |                   |                       |                       |                      |
| All       |           | 21.3 ± 0.6        | 18.5 ± 0.4***         | 18.1 ± 1.4***         |                      |
| 0-39      |           | 37.3 ± 3.7        | 24.1 ± 2.5***         | 29.0 ± 9.9***         |                      |
| 40-54     |           | 24.7 ± 1.2        | 20.7 ± 0.8***         | 24.8 ± 3.0            |                      |
| 55-69     |           | 24.3 ± 1.0        | 19.5 ± 0.7***         | 18.1 ± 2.4***         |                      |
| 70+       |           | 14.5 ± 0.9        | 15.0 ± 0.7***         | 11.8 ± 2.0***         |                      |
| 03-12     |           | 12-Mo RSR         |                       |                       |                      |
|           |           | All               | 48.3 ± 0.4 (14229)    | 43.8 ± 0.3 (25673)*** | 35.3 ± 0.8 (3594)*** |
|           | 0-39      | 57.9 ± 3.0 (279)  | 49.4 ± 2.4 (457)***   | 48.2 ± 6.0 (74)***    |                      |
|           | 40-54     | 50.6 ± 0.9 (3206) | 44.8 ± 0.7 (5882)***  | 35.8 ± 1.6 (941)***   |                      |
|           | 55-69     | 51.6 ± 0.6 (6677) | 46.8 ± 0.5 (12408)*** | 36.8 ± 1.2 (1676)***  |                      |
|           | 70+       | 40.3 ± 0.8 (4067) | 37.1 ± 0.6 (6926)***  | 30.7 ± 1.7 (903)***   |                      |
|           | 24-Mo RSR |                   |                       |                       |                      |
|           | All       | 35.3 ± 0.4        | 30.4 ± 0.3***         | 22.7 ± 0.8***         |                      |
|           | 0-39      | 44.9 ± 3.2        | 38.2 ± 2.4***         | 32.9 ± 5.7***         |                      |
|           | 40-54     | 38.2 ± 0.9        | 31.5 ± 0.6***         | 24.3 ± 1.5***         |                      |
|           | 55-69     | 37.8 ± 0.7        | 33.3 ± 0.5***         | 24.5 ± 1.2***         |                      |
|           | 70+       | 27.9 ± 0.8        | 23.8 ± 0.6***         | 16.6 ± 1.4***         |                      |

Data are means ± standard error of the mean, with number of patients in parenthesis.

Abbreviations: Mo, month; RS, relative survival; SEM, standard error of the mean.

\* $p < 0.01$ , \*\* $p < 0.001$ , and \*\*\* $p < 0.0001$  for comparisons with the Low Poverty group.

**Supplementary Table S6: Summary data for race distribution by SES and calendar period in patients with HCC from 1983 to 2012 at eighteen SEER sites**

| Period    | SES            | Number | Race  |       |       |
|-----------|----------------|--------|-------|-------|-------|
|           |                |        | White | Black | Other |
| 1983-2012 |                |        |       |       |       |
|           | Total          | 64095  | 65.5% | 12.9% | 21.5% |
|           | Low Poverty    | 21482  | 70.7% | 8.1%  | 21.2% |
|           | Medium Poverty | 38143  | 61.8% | 14.9% | 23.4% |
|           | High Poverty   | 4470   | 72.9% | 19.4% | 7.7%  |
| 1983-1992 |                |        |       |       |       |
|           | Total          | 4364   | 60.9% | 12.4% | 26.6% |
|           | Low Poverty    | 1846   | 81.2% | 6.1%  | 12.7% |
|           | Medium Poverty | 2447   | 45.2% | 17.6% | 37.2% |
|           | High Poverty   | 71     | 76.1% | 1.4%  | 22.5% |
| 1993-2002 |                |        |       |       |       |
|           | Total          | 15881  | 62.0% | 11.5% | 26.5% |
|           | Low Poverty    | 5258   | 69.9% | 6.8%  | 23.4% |
|           | Medium Poverty | 9826   | 56.8% | 13.7% | 29.5% |
|           | High Poverty   | 797    | 75.0% | 14.6% | 10.4% |
| 2003-2012 |                |        |       |       |       |
|           | Total          | 43850  | 67.3% | 13.5% | 19.2% |
|           | Low Poverty    | 14378  | 69.7% | 8.9%  | 21.4% |
|           | Medium Poverty | 25870  | 65.2% | 15.0% | 19.7% |
|           | High Poverty   | 3602   | 72.3% | 20.8% | 6.9%  |