# Cox Regression Estimates

The following pages present Cox Regression estimates for sex-and-year cohorts of Medicare beneficiaries hospitalized for AMI. The first and second pages present estimates for men and women, respectively, of the hazard ratio for black patients post-AMI relative to white patients.

The model with no covariates in column 1 indicates black men had an instantaneous risk of death between 10% and 25% higher than white men for most of the time period. Similarly, black women had a risk of death between 5% and 12% higher than white women. The hazard ratio for both black men and women trended upwards in the late 90’s and early 2000’s before dropping off in the late 2010’s. Neither estimate is significant in 2013, and the point estimates are smaller than those of 2012. The lack of statistical significance may be partially due to less follow-up data in 2013 (because most observations are censored).

Controlling for age yields a larger hazard ratio for both men and women, as well as a much larger and statistically significant coefficient in 2013. Moreover, this result is robust to different specifications of the age-control variable.

One concern is that the proportional hazard assumption of the Cox model may not be met. If the PH assumption (black hazard is equal to white hazard multiplied by a constant) is not satisfied and black hazard increases proportionally to white over time, the hazard ratio in later years may be biased down because data extends to a shorter time horizon. Proportional hazards may be a difficult assumption to make if, for example, white patients suffer relatively higher early mortality and lower mid-to-long-term mortality due to greater use of surgical treatment.

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| Cox Survival Model: Estimated Hazard Ratios for Race = Black | | | | | |  |  |  |
|  | Men: Unconditioned |  | Men: 5-year age group controls |  | Men: Quadratic age control |  | Men: Fractional poly age control |  |
| 1993 | 1.204\*\*\* | (0.0164) | 1.210\*\*\* | (0.0165) | 1.211\*\*\* | (0.0165) | 1.211\*\*\* | (0.0165) |
| 1994 | 1.192\*\*\* | (0.0159) | 1.187\*\*\* | (0.0158) | 1.194\*\*\* | (0.0159) | 1.194\*\*\* | (0.0159) |
| 1995 | 1.191\*\*\* | (0.0161) | 1.189\*\*\* | (0.0160) | 1.192\*\*\* | (0.0161) | 1.193\*\*\* | (0.0161) |
| 1996 | 1.218\*\*\* | (0.0163) | 1.227\*\*\* | (0.0164) | 1.232\*\*\* | (0.0165) | 1.232\*\*\* | (0.0165) |
| 1997 | 1.222\*\*\* | (0.0165) | 1.255\*\*\* | (0.0169) | 1.261\*\*\* | (0.0170) | 1.262\*\*\* | (0.0170) |
| 1998 | 1.229\*\*\* | (0.0167) | 1.275\*\*\* | (0.0174) | 1.280\*\*\* | (0.0174) | 1.281\*\*\* | (0.0174) |
| 1999 | 1.191\*\*\* | (0.0162) | 1.266\*\*\* | (0.0173) | 1.271\*\*\* | (0.0173) | 1.271\*\*\* | (0.0173) |
| 2000 | 1.232\*\*\* | (0.0165) | 1.280\*\*\* | (0.0172) | 1.286\*\*\* | (0.0173) | 1.287\*\*\* | (0.0173) |
| 2001 | 1.234\*\*\* | (0.0165) | 1.295\*\*\* | (0.0173) | 1.299\*\*\* | (0.0173) | 1.300\*\*\* | (0.0173) |
| 2002 | 1.236\*\*\* | (0.0165) | 1.319\*\*\* | (0.0176) | 1.327\*\*\* | (0.0177) | 1.327\*\*\* | (0.0177) |
| 2003 | 1.219\*\*\* | (0.0161) | 1.308\*\*\* | (0.0173) | 1.310\*\*\* | (0.0173) | 1.311\*\*\* | (0.0174) |
| 2004 | 1.199\*\*\* | (0.0165) | 1.311\*\*\* | (0.0181) | 1.316\*\*\* | (0.0181) | 1.316\*\*\* | (0.0181) |
| 2005 | 1.187\*\*\* | (0.0171) | 1.298\*\*\* | (0.0187) | 1.306\*\*\* | (0.0188) | 1.306\*\*\* | (0.0188) |
| 2006 | 1.237\*\*\* | (0.0188) | 1.371\*\*\* | (0.0209) | 1.374\*\*\* | (0.0209) | 1.373\*\*\* | (0.0209) |
| 2007 | 1.192\*\*\* | (0.0195) | 1.324\*\*\* | (0.0217) | 1.328\*\*\* | (0.0218) | 1.328\*\*\* | (0.0218) |
| 2008 | 1.140\*\*\* | (0.0196) | 1.274\*\*\* | (0.0219) | 1.275\*\*\* | (0.0220) | 1.275\*\*\* | (0.0220) |
| 2009 | 1.151\*\*\* | (0.0210) | 1.306\*\*\* | (0.0239) | 1.307\*\*\* | (0.0239) | 1.308\*\*\* | (0.0240) |
| 2010 | 1.147\*\*\* | (0.0223) | 1.302\*\*\* | (0.0253) | 1.304\*\*\* | (0.0254) | 1.305\*\*\* | (0.0254) |
| 2011 | 1.109\*\*\* | (0.0230) | 1.273\*\*\* | (0.0265) | 1.277\*\*\* | (0.0266) | 1.278\*\*\* | (0.0266) |
| 2012 | 1.090\*\*\* | (0.0257) | 1.222\*\*\* | (0.0289) | 1.224\*\*\* | (0.0289) | 1.225\*\*\* | (0.0289) |
| 2013 | 1.043 | (0.0355) | 1.181\*\*\* | (0.0402) | 1.183\*\*\* | (0.0403) | 1.183\*\*\* | (0.0403) |
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| Exponentiated coefficients; Standard errors in parentheses | | | | | | \* p<0.05 | \*\* p<0.01 | \*\*\* p<0.001 |

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| Cox Survival Model: Estimated Hazard Ratios for Race = Black | | | | | |  |  |  |
|  | Women: Unconditioned |  | Women: 5-year age group controls |  | Women: Quadratic age control |  | Women: Fractional poly age control |  |
| 1993 | 1.071\*\*\* | (0.0126) | 1.128\*\*\* | (0.0133) | 1.133\*\*\* | (0.0133) | 1.133\*\*\* | (0.0133) |
| 1994 | 1.064\*\*\* | (0.0123) | 1.113\*\*\* | (0.0128) | 1.116\*\*\* | (0.0129) | 1.117\*\*\* | (0.0129) |
| 1995 | 1.083\*\*\* | (0.0123) | 1.136\*\*\* | (0.0129) | 1.138\*\*\* | (0.0130) | 1.139\*\*\* | (0.0130) |
| 1996 | 1.108\*\*\* | (0.0125) | 1.165\*\*\* | (0.0132) | 1.166\*\*\* | (0.0132) | 1.165\*\*\* | (0.0132) |
| 1997 | 1.092\*\*\* | (0.0124) | 1.163\*\*\* | (0.0132) | 1.168\*\*\* | (0.0133) | 1.167\*\*\* | (0.0133) |
| 1998 | 1.109\*\*\* | (0.0125) | 1.170\*\*\* | (0.0132) | 1.173\*\*\* | (0.0133) | 1.175\*\*\* | (0.0133) |
| 1999 | 1.117\*\*\* | (0.0122) | 1.191\*\*\* | (0.0130) | 1.196\*\*\* | (0.0131) | 1.197\*\*\* | (0.0131) |
| 2000 | 1.121\*\*\* | (0.0122) | 1.188\*\*\* | (0.0129) | 1.192\*\*\* | (0.0130) | 1.191\*\*\* | (0.0130) |
| 2001 | 1.120\*\*\* | (0.0121) | 1.193\*\*\* | (0.0128) | 1.194\*\*\* | (0.0129) | 1.194\*\*\* | (0.0129) |
| 2002 | 1.106\*\*\* | (0.0119) | 1.218\*\*\* | (0.0131) | 1.216\*\*\* | (0.0131) | 1.216\*\*\* | (0.0131) |
| 2003 | 1.098\*\*\* | (0.0119) | 1.182\*\*\* | (0.0128) | 1.179\*\*\* | (0.0128) | 1.179\*\*\* | (0.0128) |
| 2004 | 1.095\*\*\* | (0.0124) | 1.180\*\*\* | (0.0134) | 1.178\*\*\* | (0.0134) | 1.179\*\*\* | (0.0134) |
| 2005 | 1.104\*\*\* | (0.0131) | 1.212\*\*\* | (0.0144) | 1.213\*\*\* | (0.0144) | 1.214\*\*\* | (0.0144) |
| 2006 | 1.095\*\*\* | (0.0137) | 1.197\*\*\* | (0.0150) | 1.195\*\*\* | (0.0150) | 1.196\*\*\* | (0.0150) |
| 2007 | 1.119\*\*\* | (0.0149) | 1.220\*\*\* | (0.0162) | 1.214\*\*\* | (0.0162) | 1.215\*\*\* | (0.0162) |
| 2008 | 1.093\*\*\* | (0.0153) | 1.208\*\*\* | (0.0169) | 1.202\*\*\* | (0.0168) | 1.204\*\*\* | (0.0168) |
| 2009 | 1.099\*\*\* | (0.0164) | 1.202\*\*\* | (0.0180) | 1.197\*\*\* | (0.0179) | 1.199\*\*\* | (0.0179) |
| 2010 | 1.086\*\*\* | (0.0174) | 1.210\*\*\* | (0.0194) | 1.201\*\*\* | (0.0193) | 1.203\*\*\* | (0.0193) |
| 2011 | 1.065\*\*\* | (0.0183) | 1.179\*\*\* | (0.0203) | 1.175\*\*\* | (0.0202) | 1.176\*\*\* | (0.0203) |
| 2012 | 1.075\*\*\* | (0.0207) | 1.192\*\*\* | (0.0230) | 1.189\*\*\* | (0.0230) | 1.190\*\*\* | (0.0230) |
| 2013 | 1.042 | (0.0283) | 1.171\*\*\* | (0.0319) | 1.167\*\*\* | (0.0318) | 1.168\*\*\* | (0.0318) |
|  |  |  |  |  |  |  |  |  |
| Exponentiated coefficients; Standard errors in parentheses | | | | | | \* p<0.05 | \*\* p<0.01 | \*\*\* p<0.001 |