

THE STATE OF SOUTH CAROLINA
In The Supreme Court

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APPEAL FROM CHARLESTON COUNTY
Court of General Sessions
Honorable Kristi Lea Harrington, Circuit Court Judge

S.C. SUPREME COURT

APPELLATE CASE NO. 2017-001178

THE STATE,

Respondent,

v.

TERRELL ARTHEITH SMITH,

Appellant.

**BRIEF OF JUSTICE 360 & CORNELL JUVENILE JUSTICE PROJECT
AS AMICI CURIAE IN SUPPORT OF APPELLANT**

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STATEMENT OF INTEREST OF AMICI

Amici are advocates and academics who work on behalf of juveniles in South Carolina facing life without parole, life with parole and other sentences that effectively result in death by incarceration. The Cornell Juvenile Justice Project is an outgrowth of the Cornell Death Penalty Project, which is a program housed at Cornell Law School in Ithaca, New York. Over the last twenty years, the Death Penalty and Juvenile Justice Projects have been actively involved in academic research, legislative reform efforts, and individual case representation in South Carolina and other jurisdictions. The Director of the Cornell Juvenile Justice Project, John Blume, was lead counsel for the petitioners in *Aiken v. Byars*, 410 S.C. 534, 765 S.E.2d 572 (2014), in which this Court vacated the sentences of all juveniles then-serving life without parole in South Carolina. Justice 360 is a nonprofit organization based in Columbia, South Carolina, whose mission is to promote fair and just process for individuals facing extreme criminal sentences (such as the death penalty and life without parole and its equivalent). As part of that mission, Justice 360 attorneys represent juvenile clients in criminal proceedings in South Carolina and have been involved in litigation and criminal justice reform efforts on behalf of juvenile clients since the Supreme Court of the United States' decision in *Miller v. Alabama*, 567 U.S. 460, 471 (2012).

Both the Cornell Juvenile Justice Project and Justice 360 are currently involved in individual cases involving juvenile clients facing life without parole and sentences that are the functional equivalent of life without parole. Additionally, the two projects are involved in gathering data, developing training materials, and serving as resource counsel to court-appointed counsel in cases where juveniles have been sentenced to life without parole or other similar punishments, or who are at risk of being sentenced to life without parole or a functional

equivalent. Accordingly, *amici* have a vested interest in promoting a legal system in South Carolina that takes account of academic and scientific research regarding juvenile sentencing and that protects the interests of juvenile offenders in the State.

ARGUMENT

The thirty-year mandatory minimum sentence for murder, contained in S.C. Code § 16-3-20(A), violates the Eighth Amendment to the United States Constitution and Article I, Section 15 of the South Carolina Constitution when applied to juveniles. The crux of the issue is straightforward: the mandatory-minimum treats juveniles the same as adults and thus violates the Eighth Amendment's recognition that "children are different" for sentencing purposes. *Graham v. Florida*, 560 U.S. 48, 74-75 (2010); *Miller v. Alabama*, 567 U.S. 460, 471 (2012); *Montgomery v. Louisiana*, 136 S. Ct. 718 (2016). Additionally, S.C. Code § 16-3-20(A) is unconstitutional because reliable actuarial data establishes that a significant number of juveniles sentenced even to the minimum term of thirty years will die in prison. Thus judges need to have the discretion to impose a lower sentence to deserving juvenile offenders convicted of murder and this Court should hold that the mandatory minimum sentence of thirty years is unconstitutional.

Mr. Terrell Smith is one such juvenile impermissibly sentenced under S.C. Code § 16-3-20(A). On May 9, 2017, Terrell was sentenced to 35 years for murder, 30 years for attempted murder, and 5 years for possession of a weapon during the commission of a violent crime. All sentences were to be served concurrently. R. 511, 11, 1-14. Although Terrell received an individualized sentencing hearing pursuant to *Aiken v. Byars*, 410 S.C. 534, 765 S.E.2d 572 (2014), his sentence violates the United States and South Carolina Constitutions because the sentencer, Judge Harrington, was impermissibly constrained to the same sentencing range prescribed for adult offenders.

I. THE EIGHTH AMENDMENT TO THE UNITED STATES CONSTITUTION AND ARTICLE I § 15 OF THE SOUTH CAROLINA CONSTITUTION PROHIBIT THE IMPOSITION OF THE SAME MANDATORY MINIMUM SENTENCE ON BOTH ADULTS AND JUVENILES BECAUSE JUVENILES HAVE DIMINISHED CULPABILITY AND GREATER PROSPECTS FOR REFORM

In *Graham v. Florida*, the Supreme Court held that juveniles may not be sentenced to life without the possibility of parole for non-homicide offenses; rather, they must have “some meaningful opportunity to obtain release based on demonstrated maturity and rehabilitation.” 560 U.S. 48, 74-75 (2010). In doing so, the Court relied on principles established in *Roper v. Simmons*, 543 U.S. 551 (2005) (holding that the Eighth Amendment’s prohibition against cruel and unusual punishment prevented states from sentencing juveniles to death): juveniles have both “diminished culpability and greater prospects for reform” and are thus “less deserving of the most severe punishments.” *Graham*, 560 U.S. at 68. The *Graham* court explained that a constitutional violation would not arise when “persons convicted of nonhomicide crimes committed before adulthood . . . remain behind bars for life.” *Id.* at 75. Instead, the Court emphasized that, by “making the judgment at the outset” which juveniles will never reenter society, Florida violated the ban against cruel and unusual punishment. *Id.* This holding, the Court noted, incentivized growth, maturity, and rehabilitation during the juvenile offender’s term of imprisonment.

Life in prison without the possibility of parole gives no chance for fulfillment outside prison walls, no chance for reconciliation with society, no hope. Maturity can lead to that considered reflection which is the foundation for remorse, renewal, and rehabilitation. A young person who knows that he or she has no chance to leave prison before life’s end has little incentive to become a responsible individual.

Id. at 79.

Two years after *Graham*, in *Miller v. Alabama*, the Court, relying on the now accepted constitutional maxim that “children are constitutionally different from adults for the purposes of sentencing,” declared that mandatory life sentences for juveniles convicted of homicide

constituted cruel and unusual punishment. 567 U.S. 460, 471 (2012). *Miller*, like *Simmons* and *Graham*, reflected the Court’s view that given the scientifically established differences between juvenile and adult offenders, subjecting juveniles to the harshest penalties created “too great a risk of disproportionate punishment.” *Id.* at 479. This key sentencing principle was reinforced when the Court gave *Miller* retroactive effect in *Montgomery v. Louisiana*, 136 S. Ct. 718 (2016). In the final sentence of the opinion, the Court highlighted the significance of giving “someone like Montgomery, who submits that he has evolved from a troubled, misguided youth to a model member of the prison community, the opportunity to demonstrate the truth of *Miller*’s central intuition—that children who commit even heinous crimes are capable of change.” *Id.* at 724.

This Court embraced the Supreme Court’s new juvenile sentencing jurisprudence in *Aiken v. Byars*, 410 S.C. 534, 765 S.E.2d 572 (2014), when it held that all South Carolina juvenile offenders serving life without parole sentences were entitled to new *de novo* sentencing hearings. The constitutional defect identified by this Court was not that the life without parole sentences imposed on the juveniles were mandatory (because the sentences before the Court were for the most part not), but rather that the sentencer failed to individualize, *i.e.*, to “fully explore the impact of the defendant’s juvenility on the sentence rendered.” *Id.* at 576–77 (declaring such exploration an “affirmative requirement” for an Eighth Amendment-compliant sentencing scheme).

Viewed collectively, the relevant decisions of this Court and the Supreme Court of the United States establish that absent proof of “irreparable corruption” in homicide cases, juveniles must be afforded a realistic opportunity to demonstrate maturity and reform well within his or her life expectancy to provide a “meaningful opportunity” to live part of his or her adult life

outside of prison walls. *Graham*, 560 U.S. at 73 (quoting *Roper v. Simmons*, 543 U.S. 551, 570 (2005)). The current mandatory minimum scheme for the crime of murder is inconsistent with the foundational Eighth Amendment principle of juvenile sentencing that juvenile offenders must be treated differently, i.e., more leniently, than adults. Under S.C. Code § 16-3-20(A), a judge must, as a matter of law, give the least culpable juvenile the exact same sentence as the least culpable adult — 30 years day for day imprisonment. Accordingly, the sentencing scheme ignores scientific and constitutional differences between juveniles and adults. The United States Constitution and the South Carolina Constitution mandate that the mandatory minimum, as applied to juveniles, must be held unconstitutional.

II. THE SOUTH CAROLINA MANDATORY MINIMUM SENTENCING SCHEME FOR MURDER REMOVES THE ABILITY FOR THE SENTENCER TO EXERCISE ITS DISCRETION AND ADEQUATELY IMPLEMENT AN INDIVIDUALIZED SENTENCE AS REQUIRED BY THE UNITED STATES AND SOUTH CAROLINA SUPREME COURTS.

The mandatory minimum sentence in S.C. Code § 16-3-20(A), as applied to juveniles, violates the Eighth Amendment in another way: it removes the ability for a sentencer to exercise discretion and implement a truly individualized sentence. Regardless of mitigating factors affecting a juvenile offender's culpability, they are subject to the same mandatory minimum of 30 years imprisonment as adult offenders. The individual characteristics of a particular juvenile offender are, as a result, completely irrelevant to the selection of the minimum term of imprisonment.

As discussed previously, *Miller* established that individualized-sentencing jurisprudence applies to juveniles. 567 U.S. at 480-81. In its holding, the Court clarified that, before a juvenile is sentenced to a particular punishment, courts should “follow a certain process—considering an offender's youth and attendant characteristics—before imposing a particular penalty.” *Id.* at 483. As such, a juvenile shall not be sentenced to life imprisonment without the possibility of parole

unless the court does so after accounting for differences between adults and juveniles as a class, the individual characteristics of the child, the criminal offense, and the presumption that those differences counsel against irrevocably sentencing a juvenile to a lifetime in prison. *See id.* at 476-78. Thus *Miller* suggests that mandatory schemes for juveniles “run[] afoul [of the Court’s] cases’ requirement of individualized sentencing” by eliminating the sentencer’s discretion to impose a lesser, more appropriate punishment when deemed necessary. *See id.* at 465.

At least two jurisdictions, Florida and Iowa, have recently held that mandatory minimum schemes for juveniles violate *Miller*’s rationale because they deprive the sentencer of the discretion to consider youth and its attendant characteristics. In *State v. Lyle*, 854 N.W.2d 378 (Iowa 2014), *Lyle*, the seventeen-year-old defendant, was found guilty of assaulting a man and stealing his marijuana. *Id.* at 381. *Lyle* was sentenced to the mandatory minimum of ten years in prison, of which he would need to serve seventy percent before he would have been eligible for parole. *Id.* The Supreme Court of Iowa held that the mandatory sentencing schemes for juvenile offenders deprive a sentencing court of the discretion to consider the youth of the defendant under *Miller*. This reasoning was echoed in *Florida v. Burton*, No. 94-10478 (Fla Cir. Ct. Sept. 23, 2016), where the court declared the mandatory minimum sentence for juveniles convicted of murder in adult court unconstitutional because it effectively barred individualized sentencing as required by *Miller*.

The lengthy mandatory minimum sentence at issue here, by definition, prevents trial judges from imposing a true individualized sentence as required by the “children are different” principle. Thus, as applied to juvenile offenders, the 30-year minimum is arbitrary as it ties the sentencer’s hands, eliminating all forms of discretion when fitting the appropriate punishment to the specific crime and defendant. S.C. Code § 16-3-20(A) treats juveniles and adults identically,

mandating 30 years (day for day) to life in prison, regardless of mitigating evidence and the applicability of sentencing factors outlined by the court in *Miller* and *Aiken*. vitiates a sentencer's ability to craft a lesser sentence even if the judge is firmly convinced that a lesser sentence is appropriate under all the circumstances.¹ For example, a juvenile who is involved in a crime that results in death along with adult, more culpable defendants and is found guilty of murder under this State's "hand of one, hand of all" doctrine could be sentenced to the same term of years sentence as the adult-trigger person. That should not be the case.

Therefore, because the mandatory minimum removes the sentencer's discretion and mandates that the least culpable juvenile be treated identically to the least culpable adult, disregarding the distinction drawn between juveniles and adults by both the South Carolina Supreme Court and the Supreme Court of the United States, regardless of the judgment or desire of the sentencer, the mandatory minimum set forth in S.C. Code § 16-3-20(A) violates the Eighth Amendment and Article I, Section 15 of the South Carolina Constitution as applied to juvenile offenders.

¹ The Supreme Court's decision in *Penry v. Lynaugh*, 492 U.S. 302 (1989), which held that individualized sentencing requires a vehicle through which it can give effect to mitigating evidence, further supports this position. In *Penry*, the Court found that Texas's capital sentencing scheme failed to give effect to Penry's mitigating evidence because the scheme did not allow for the consideration of his intellectual disability and history of abuse with regard to the special issues in the statutory scheme. The special issues presented to the sentencer made it impossible to know whether or not the jury was able to give effect to the mitigating evidence of Penry's intellectual disability and history of abuse. In ordering that the state court resentence Penry, the Court expressed its concerns with sentencing schemes that provide the sentencer with the ability to consider mitigation evidence, but not with a vehicle to give it effect. *Id.* at 328. Similarly, Section 16-3-20(A)—because it does not distinguish between juveniles and adults—prevents a sentencer from giving effect to the recognized inherently mitigating aspects of youth. The mandatory 30-year minimum bars a sentencer from giving the least culpable juvenile defendant a lesser punishment than a comparable adult offender. This constraint of a sentencer's consideration and application of a juvenile offender's individual and class characteristics, as the Court found in *Penry*, violates the Eighth Amendment requirement of individualized sentencing.

III. A LIFE EXPECTANCY STUDY BASED ON DATA PROVIDED BY THE SOUTH CAROLINA DEPARTMENT OF CORRECTIONS SUPPORTS A MODIFIED MANDATORY-MINIMUM SENTENCE FOR JUVENILE OFFENDERS

An additional reason that trial judges, in appropriate cases, should have discretion to impose sentences less than the current mandatory-minimum term of thirty years is the fact that for many juvenile offenders such a sentence condemns them to die in prison. While the issue of whether, and when, a term of years sentence that exceeds a juvenile offender's reasonable life expectancy is the functional equivalent of a life without parole sentence is not before the Court in this case, a number of state courts have concluded that there is no practical difference between the two categories of punishment.² Regardless, in deciding the issue that is before the Court – the constitutionality of the thirty-year mandatory minimum – life expectancy data further cements the constitutional defect in treating juveniles identically to adults.³

² See, e.g., *Casiano v. Com'r of Corr.*, 115 A.3d 1031, 1046 (Conn. 2015) (finding that life “a juvenile offender sentenced to a fifty year term of imprisonment may never experience freedom”); *People v. Caballero*, 282 P.3d 291, 295 (Cal. 2012) (concluding “that sentencing a juvenile offender for a nonhomicide offense to a term of years with a parole eligibility date that falls outside the juvenile offender’s natural life expectancy constitutes cruel and unusual punishment in violation of the Eighth Amendment”); *State v. Pearson*, 826 N.W.2d 88, 98 (Iowa 2013) (holding that parole eligibility after 35 years of imprisonment violated state constitutional principles). This Court’s recent decision in *State v. Slocumb*, 426 S.C. 297, 827 S.E.2d 148, (2019), is not to the contrary. *Slocumb* did not address mandatory-minimum sentences and was very much driven by, and thus limited to, the facts of that particular case Justice Kittredge’s opinion for a 3-2 majority leaned heavily on the fact that “Slocumb committed multiple crimes at two different points in time ” as making the case “factually distinct” from *Graham* and due to this “critical difference” Slocumb’s sentence beyond its reach. *Id.* at 310. Like *Graham*, Terrell’s criminal charges stemmed from one action. Further, the Court stated that “[this] holding should in no way be read to signal the end of the debate on the underlying issues raised by aggregate term-of-years sentences imposed on juvenile offenders, whether for homicide or nonhomicide offenses,” leaving the question open for future cases. *Slocumb*, 426 S.C. at 313. The Court also found un-preserved, and thus did not address, whether Slocumb’s sentence violated the South Carolina Constitution. *Id.* at 302.

³ Many state courts have used life expectancy information to further differentiate the sentencing treatment of juvenile offenders from their adult counterparts. *State v. Zuber*, 152 A.3d 197 (N.J. 2017) (holding that a 55-year minimum sentence for one defendant and a 68.25-year minimum sentence for another defendant were *de facto* life sentences that constituted cruel and unusual

Fortunately for this Court, South Carolina has existing data on life expectancy for those children and adults who spend time in its prisons that is relevant to the question presented in this case. In the aftermath of this Court's decision in *Aiken v. Byars*, a life expectancy study of male inmates in the South Carolina Department of Corrections (SCDC) was commissioned and funded by the Commission on Indigent Defense.⁴ The study, attached as Exhibit A, was conducted by prominent epidemiologist Vera Dolan and determined the average life expectancy for men who had at any time been incarcerated by SCDC. Ex. A. at A-1. Using information provided by SCDC, Dolan determined that juveniles incarcerated within SCDC have significantly higher mortality rates than the general population: a 17-year-old who spends time behind the walls of a SCDC facility has a reasonable life expectancy of 55, Ex. A at A-45, approximately 22 years younger than his peers who have not been incarcerated, Ex. A at A-36. The fact that the average imprisoned juvenile will not live more than 38 additional years demonstrates the important role that discretion should play in sentencing. By preventing use of discretion through the 30-year mandatory minimum for murder proscribed by S.C. Code § 16-3-20(A), the current sentencing

punishment without an individualized sentencing hearing); *People v. Reyes*, 63 N.E.3d 884 (Ill. 2016) (holding that a 97-year sentence for a juvenile offender convicted of homicide offense was a *de facto* life sentence that constituted cruel and unusual punishment without an individualized sentencing hearing); *State v. Null*, 836 N.W.2d 41, 72 (Iowa 2013) (holding that 52.5-year minimum sentence for a juvenile offender convicted of a homicide offense was a *de facto* life sentence); *Bear Cloud v. State*, 334 P.3d 132 (Wyo. 2014) (holding that aggregate sentence of 45-years was a *de facto* equivalent of a life sentence without parole and prohibited by *Miller*); *People v. Franklin*, 370 P.3d 1053, 1059 (Cal. 2016) (holding that *Graham* and *Miller* apply to cases that are the functional equivalent of a sentence of life without parole).

⁴ The Study was specifically conducted in the case of *State v. Haigler*, No. 1996-GS-38-0349 who was one of the named petitioners granted a new sentencing hearing in *Aiken v. Byars*, 410 S.C. 534, 765 S.E.2d 572 (2014), *cert. denied*, 135 S. Ct. 2379 (2015). However, it was funded by the Office of Indigent Defense with the expectation that it would be available for general use in all juvenile sentencing cases.

scheme fails to distinguish between adults and children in violation of the Eighth Amendment to the United States Constitution and Article 1, Section 15 of the South Carolina Constitution.

i. STUDY METHODOLOGY

Vera Dolan was retained to do the life expectancy study because of her training and experience doing similar studies. She is a Fellow of the Academy of Life Underwriting, which is the highest credential that one can obtain in life underwriting. Ex. A at A-1. Ms. Dolan received her Bachelor's degree in public health from John Hopkins University and her Master's of Science in Public Health in epidemiology from the University of North Carolina, Chapel Hill. *Id.* She has prepared life tables for over 35 years, and she has published over 33 peer reviewed articles in which she has prepared a mortality ratio analysis from raw population data. *Id.* Dolan has been qualified as an expert in life expectancy and epidemiology in state and federal courts throughout the country, including in both the Calhoun County and Williamsburg County Courts of General Sessions where she testified on the results of this study. Ex. A at A-1.

For this study, Dolan was provided with 68,000 inmate records which she used to assess the life expectancy of a juvenile entering SCDC.⁵ She examined these anonymous records of men who had been incarcerated in SCDC from 1996-2015, as well as follow up records from the first half of 2016. Ex. A. at A-2. After removing duplicate records, Ms. Dolan had a sample of 64,204 inmate records who had at one point been in SCDC custody. *Id.* Using information from the Department of Health and Environmental Control, Ms. Dolan was able to determine the age of death for each individual. *Id.* This created the raw mortality rates, from which Dolan was able to extract the smoothed mortality rates, Ex. A. at A-3, to create an accurate prediction of life

⁵ Life expectancy is defined here as “the statistical calculation of the average length of life expected for an individual a certain age, sex, race, and/or other risk factor;” *id.*, it is not the age of predicted death but rather the average total number of additional years a person will live.

expectancy at each age, Ex. A. at A-4–5. A mortality ratio compares two mortality rates: here, Dolan compared the rates of morality for the SCDC incarcerated population with those of the general United States population published each year by the Centers for Disease Control. *Id.* Using this data, Ms. Dolan created a life table for the entire SCDC population and separate tables for the non-Hispanic Black population and for the non-Hispanic White population, as race is a significant factor in life expectancy. *Id.*

The life expectancy tables were completed in 2016. Ex. A. at A-8. The study is currently up to date and reflects accurate predictions of the life expectancy of the male inmates incarcerated in SCDC.⁶

ii. STUDY RESULTS

Dolan found that fifteen-year old juveniles entering SCDC have an additional life expectancy of 40.2 years; sixteen-year old juveniles have an additional life expectancy of 39.2 years; and seventeen-year-old juveniles have an additional life expectancy of 38.3 years. Ex. A at A-45. There is natural variation in these findings; as these are averages, approximately half of the inmates in each age group would be predicted to die before their forecasted life expectancy and the other half after. *Tr. of R., State v. Mack*, No. 2009-GS-45-00180, 37: 22-24 (Feb. 17, 2017) (“Well, the point of having an average is that it is average and there will always be people above and below that.”). Viewed collectively, juveniles sent into SCDC custody are predicted to die shortly after their 55th birthday. Ex. A at A-45. In contrast, young men of the same age in the general United States population are expected to survive until age 77. Ex. A at A-36. Put differently, the study discovered that a juvenile incarcerated in SCDC for any amount of time is

⁶ Dolan’s study remains valid for another two years. Dolan recommends updating the mortality data and mortality ratios every five years (*i.e.*, in 2021) and conducting a second full-scale study using a fresh set of a data in ten years (*i.e.*, in 2026) using inmate records from the 2005-2025 period. Ex. A. at A-8.

predicted to die approximately 22 years sooner than his peers in the general population. Ex. A at A-36.

Dolan also observed that juveniles who received a life sentence fared far worse than those who were incarcerated for a term of years: these individuals died an average of 31.8 years earlier than predicted by the United States Population Life Tables. Ex. A. at A-7. Although there were not enough deaths among juveniles serving a life sentence during this period to create a full life table similar to those above, the comparison provided here is still a highly relevant data point, as Dolan was able to gather this data from SCDC records over a period of twenty years.

iii. BECAUSE MANY JUVENILES WILL DIE BEFORE THEIR RELEASE, THE THIRTY-YEAR MANDATORY MINIMUM FOR MURDER CANNOT BE MAINTAINED

When sentencing a juvenile under S.C. Code § 16-3-20(A), a judge is powerless, no matter how sympathetic the juvenile offender may be or how mitigated his role in the homicide was, to impose something less than thirty years. Because most juveniles incarcerated in SCDC are expected to die at age 55, Ex. A at A-45, this mandatory minimum constitutes a *de facto* life sentence for many juvenile offenders as it fails to provide the constitutionally required “meaningful opportunity to obtain release.” *Graham v. Florida*, 560 U.S. 48, 74–75 (2010).

Dolan’s findings revealing significantly lower life expectancies for incarcerated individuals are corroborated by other state studies. Those who have spent time in prisons tend to live shorter lives, and those who were incarcerated at an early age generally die even sooner. In Michigan, a study found that while the average life expectancy was 77.8 years, a juvenile sentenced to life in their prisons is not expected to survive past 50.6 years old. Campaign for the Fair Sentencing of Youth, *Michigan Life Expectancy Data for Youth Serving Natural Life Sentences*, available at <http://fairsentencingofyouth.org/>

wpcontent/uploads/2010/02/Michigan-LifeExpectancy-Data-Youth-Serving-Life.pdf. Michigan adults did not fare much better: a non-incarcerated Black male is expected to live until 71 years old while an incarcerated Black male under a life sentence is expected to die at 58. *Id.* Similarly, a study out of New York—the state with the largest correctional population—found that for every year spent in prison, an offender loses two years of life expectancy. Evelyn Patterson, *The Dose-Response of Time Served in Prison on Mortality: New York State, 1989-2003*, *Am. J. Pub. Health*, 103(3): 523-28 (March 2013). Researchers in North Carolina and Georgia examined their prison systems and discovered similar patterns linking incarceration to decreased outcomes in health and mortality rates when compared to the general populations of their states. *See* David L. Rosen et al., *All-Cause and Cause-Specific Mortality Among Men Released From State Prison, 1980–2005*, 98 *Am. J. Pub. Health* PAGE (2008) (finding “excess deaths” of inmates examined during the 1980 to 2005 period compared to the general North Carolina resident population); Anne C. Spaulding et al., *Prisoner Survival Inside and Outside of the Institution: Implications for HealthCare Planning*, 173 *AM. J. EPIDEMIOLOG.* 479, 479–87 (conducting a 15-year study to track outcomes of inmates and discovering that the mortality rates for the entire period were reached in only 11 years, and that the “the 2,650 observed deaths represented a mortality rate 43% higher than expected”).⁷

⁷ This problem has been studied abroad as well: Dutch offenders are three times more likely to die than their cohort in the general population, while male offenders in Ontario suffer from a 7-year life expectancy deficiency. Anja Dirkzwager et al., *Effects of First-Time Imprisonment on Post-prison Mortality: A 25-Year Follow-Up Study with a Matched Control Group*, 49 *J. Res. Crime & Delinquency* 383 (2011); Fiona G. Kouyoumdjian et al., *Do people who experience incarceration age more quickly? Exploratory analyses using retrospective cohort data on mortality from Ontario, Canada*, 12 *PLoS ONE* e0175837 (2017). The outcomes for incarcerated South Carolinians comport with these national and international findings.

The Dolan study demonstrates that many of the children sentenced under South Carolina's murder statute will have no meaningful chance at life outside prison walls. The average 17-year-old incarcerated in SCDC is expected to live for 38.3 years; with a 30-year mandatory minimum, the average juvenile will be expected to live only the last eight years of his life outside of SCDC custody. Ex. A at A-45. Terrell is not expected to live past age 57, Ex. A at A-50, but the earliest he could expect to be released is in May 2049, when he is 52 years old, *see* Inmate Search Detail Report for Smith, Terrell Artieth (00372430), available at <https://public.doc.state.sc.us/scdc-public/>. Terrell is predicted to spend, at a maximum, just five years of his life outside SCDC custody.

To fulfill *Graham's* promise of "a meaningful opportunity for release," all but the rare juvenile whose crimes reflected "irreparable corruption" must be offered "hope" for a life beyond their incarceration. 560 U.S. at 79. They must be given "a chance for fulfillment outside prison walls," and an opportunity for "reconciliation with society." *Id.* Six years later, the Supreme Court reinforced these propositions in *Montgomery*. 136 S. Ct. at 736-37. South Carolina's 30-year mandatory minimum for juveniles sentenced for murder violates these constitutional principles by incarcerating children for terms that are only a few years shy of their life expectancies. With natural variation in life expectancies, many will die in prison before their release. Many others will only see a few short years outside prison walls before they die. These brief periods at the end of their lives cannot live up to the guarantees provided in *Graham*, *Montgomery*, and *Aiken*.

Given Dolan's rigorous process, it is possible that this study *overestimates* the life expectancies of the juvenile population at issue before the court. The Dolan study encompassed a large sample of individuals were involved with SCDC for any amount of time; however Dolan

also observed a small number of juveniles serving de jure life sentences in SCDC, that, while not enough data to create full life tables, is still relevant to this analysis. Dolan found that those individuals died approximately 32 years earlier than predicted, around age 45. Ex. A at A-7. These findings of increased mortality for juveniles serving life in SCDC are supported by the reality of violence in this State's prisons⁸ and the exceptional danger juveniles face when housed in adult prisons due to exposure to physical assaults, sexual assaults, and the increased risk of suicide.⁹ This data is perhaps more accurate for the Court's purposes, as it examines the effects

⁸ See, e.g., Meg Kinnard, *South Carolina's prisons among the deadliest in the US*, Associated Press, April 17, 2018 (reporting that it took guards five hours to respond to "the staggering amount of gang-fueled bloodshed that left seven prisoners dead and 22 injured this week at Lee Correctional Institution," which according to Fordham Professor John Pfaff, is "staggeringly out of proportion" and "makes a prison that is supposed to be a secure facility - a place with no weapons, a place where you can't leave - as dangerous as living in the most dangerous city in America"); Michael Sainato, *Why are so many people dying in US prisons and jails?* *The Guardian*, May 26, 2019 (reporting that "a record number of prisoners committed suicide in South Carolina in 2018 as homicides within the state prison system are on the rise"); Emily Bohatch, *Corrupt guards run amok at understaffed, underfunded SC prison*, *The State*, April 11, 2019 (detailing reports of physical assaults by guards, sexual assaults by guards, smuggling activity between prisoners and guards, failure to render medical care in dire situations, violations of civil rights or due process, and negligent supervision); Laura Strickler, *Video shows man left to die in South Carolina prison yard*, *NBC News*, April 17, 2019 (conceding that "the system failed [inmate] Allen Capers" who was left to die of stab wounds outside in the freezing cold while guards walked past him reporting Rep. Bamberg's statement that "just because you go to prison doesn't mean you have been sentenced to death."); Vaidya Gullapalli, *As It Prepares For A Hurricane, South Carolina (Once Again) Does Not Evacuate A Prison*, *The Appeal*, Sep 04, 2019 (writing that the abandonment of the inmates in the face of a hurricane was part of a culture of "silent epidemic of suicides" where inmates "live in conditions of extreme violence and despair" and the death rate from homicides climbs every year); Glen Smith, *A sampling of violence at South Carolina prisons*, *The Post and Courier*, April 16, 2018 (documenting nine years of violent assaults and murders within the prison system); Mark Berman, *How often do prisoners die behind bars?* *Washington Post*, July 23, 2015 (reporting that an average of about a dozen inmates die each day and about 4,400 jail and prison inmates die every year).

⁹ See, e.g., Andrea Wood, *Cruel And Unusual Punishment: Confining Juveniles With Adults After Graham And Miller*, *Emory Law Journal*, Vol. 61, 1445, 1490 (2012) (arguing housing juveniles alongside adults violates the Eighth Amendment because of the "significant and known dangers faced by juveniles confined in adult facilities" such as physical and sexual assault and high rates of suicide); Maddy Troilo, *Locking up youth with adults: An update*, Prison Policy

of long-term incarceration on a juvenile's life expectancy – Dolan's observed data supports the conclusion that a juvenile in SCDC custody will die ten years earlier if he is serving a life sentence than if he is serving a sentence for a term of years. Ex. A at A-7; Ex. A at A-45.

It is certainly conceivable that juveniles serving thirty-year sentences may be much closer to the juvenile population serving life sentences than the juvenile population as a whole. This possibility reinforces the unconstitutionality of the mandatory minimum. Terrell is not expected to be released until he is 52. If his life expectancy falls closer to the estimates for those juveniles that have any sort of interaction with the criminal system, he will only have a few brief years outside prison walls; but if it falls closer to the estimates for those serving de jure life sentences, he will never have the opportunity for release that the constitution guarantees him. His sentence, and the mandatory sentencing scheme for murder under S.C. Code § 16-3-20(A) runs afoul of *Graham, Miller, and Montgomery*.

IV. IN LIGHT OF THE DOLAN STUDY AND ESTABLISHED CONSTITUTIONAL PRINCIPLES SET FORTH IN *GRAHAM, MILLER, AND AIKEN*, THIS COURT SHOULD HOLD THAT THE MANDATORY MINIMUM FOR JUVENILES CONVICTED OF MURDER IS IN VIOLATION OF BOTH THE UNITED STATES AND SOUTH CAROLINA CONSTITUTIONS

The Dolan study illuminates the fact that many of the juveniles sentenced under S.C. Code § 16-3-20(A) to the 30-year mandatory minimum will die in prison before that sentence is served. Their time outside prison walls, if any, will be brief and at the end of their lives, rendering *Graham's* promises of hope for a fulfilling life in society meaningless. No matter how inappropriate a judge in any individual case thinks such a sentence is; they are powerless do anything about it. This Court should hold that the sentencing structure set forth under S.C. Code § 16-3-20(A) is unconstitutional as applied to juvenile offenders under the Eighth Amendment of

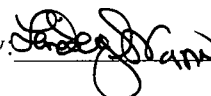
Initiative, Feb. 27, 2018 (“Of all incarcerated people, youth held with adults are at the highest risk of sexual abuse; they are also 36 times more likely to commit suicide than youth in juvenile facilities, and are at a greater risk of being held in solitary confinement than they would be in juvenile facilities.”)

the United States Constitution and Article I, Section 15 of the South Carolina Constitution. After doing so, this Court may choose to defer additional remedial action until the General Assembly enacts a sentencing scheme that comports with current constitutional principles; however, if the legislature does not act in a timely manner to pass a constitutional sentencing scheme, this court could temporarily apply the sentencing scheme for voluntary manslaughter contained in S.C. Code § 16-3-50 to juveniles convicted of murder. This option provides the sentencing authority with a range of sentencing options, thus providing the opportunity for the constitutionally required individualized sentencing under *Graham*, *Miller*, *Montgomery*, and *Aiken*. Under this temporary solution, a juvenile would face a sentence of two to thirty years of imprisonment based on a determination of their personal culpability through the lens of the “mitigating qualities of youth,” 567 U.S. at 476, avoiding the problems inherent in the current sentencing scheme for juveniles.

Respectfully submitted,

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By:  _____

October 8, 2019

ATTORNEYS FOR AMICI CURAIE

EXHIBIT A

**Affidavit of Vera Dolan
with Accompanying Exhibits**

- c. **Mortality rate:** the rate at which people die within a given age, sex, race and/or other risk factor group. A mortality rate is calculated by dividing the number of deaths occurring within a given population by the total number of that population at risk of death.
7. *South Carolina Code Life Expectancy Tables:* The South Carolina legislature adopted life expectancy tables, which are contained in S.C. Code § 19-1-150. The tables found in the South Carolina Code were derived from the 2001 Commissioners Standard Ordinary Mortality Tables (“CSO Mortality Tables”). The CSO Mortality Tables were created by the Society of Actuaries in conjunction with the National Association of Insurance Commissioners to provide statutory guidance to state insurance commissioners in figuring out what statutory reserves should be for insurers in their state. The CSO Mortality Tables do not reliably predict the life expectancy for the general population or an incarcerated population because they are based on the lives of insured people, essentially selecting a portion of the population that is much healthier than the general population. An additional problem with the tables is that they were created in 2001 with data much older than 2001 causing concerns that the data relied upon by the tables is outdated and unreliable.
8. *Methodology:* To determine life expectancies for male inmates in SCDC, I reviewed approximately 68,000 male inmate records provided to me by SCDC.² The SCDC information included a unique identifier for each inmate (in place of the inmate’s name), their date of entry to SCDC, their age at entry, and the date of release or death (where applicable). Those records originally included all inmates incarcerated from 1996-2015 and included follow-up data through the first half of 2016. Of the 68,000 records, I identified 3,000 duplicate records and excluded them from my final data set. I also identified and excluded a small number of records where the dates of admission and dates of death or release were incongruent. After making these exclusions, I reviewed the records of the remaining 64,204 unique inmates. For purposes of this affidavit, the records of the 64,204 inmates reviewed are referred to as the “SCDC Population.”
9. In the SCDC records provided to me was information from the South Carolina Department of Health and Environmental Control (“DHEC”) on all of those individuals who died between 1996 and 2016. As part of the preparation of the records provided to me, DHEC used the identifying information provided by SCDC to link the SCDC database with DHEC’s information. I was thus provided with the

² I did not receive data from the South Carolina Department of Juvenile Justice, so I did not have sufficient data to calculate the mortality rates of 15, 16, or 17 year olds. This does not affect the accuracy of the reported life expectancies for inmates 18 years old and older because, as discussed below, life expectancy is based on mortality rates for people the same age as the individual and those older than that individual.

date of death and the age at the time of death for each individual within the SCDC population who died at some point after they entered SCDC.³

10. *Mortality Rate Calculation*: To determine life expectancies from the SCDC Population, I first needed to determine the mortality rates for each year of age of people incarcerated in SCDC. Exhibit 2 shows my mortality rate calculations for all individuals incarcerated in SCDC between 1996 and 2015 (Exhibits 3 and 4 show my calculations for black inmates only and white inmates only, respectively). The following is a description of my mortality rate calculations, using column references to the tables in Exhibits 2, 3, and 4.

- a. The first column labeled **Age** lists ages 15 through 97. This range was used because an individual who was incarcerated at SCDC at some point between 1996 and 2015 was alive at each age between 15 and 97.
- b. The second column labeled **Alive** represents the number of men from the SCDC Population who passed through a given age during the time period between 1996 and 2015.
- c. The third column labeled **Dead** provides the number of men within the SCDC Population who died at a given age any time between 1996 and 2016.
- d. The fourth column labeled **Total** provides the total of the “Alive” and “Dead” columns, which is the total population at risk of death during a given age.
- e. The fifth column labeled **Mortality Rate** provides the rate at which men in the SCDC population die at any given age. The mortality rate is calculated by dividing the number of people who died (column three) at a given age by the total number of people at risk of death (column four) during the same age.
- f. The sixth column labeled **Smoothed Mortality Rate** provides the trend of the mortality rate. In statistics, when dealing with raw data like the data relating to the population considered in this case, the rate calculations can have anomalies and bumps such that smoothing is necessary to identify the actual trend over time. To find the trend for the SCDC population mortality

³ The individuals died either during their incarceration or after their release from SCDC. Reliance on mortality information both during incarceration and after release is standard methodology in the actuarial field for calculating the life expectancy of individuals who have been incarcerated. Using this data provides the most reliable calculation for the life expectancy of a juvenile sentenced to a prison term of any length of time. Other analyses, including a study of deaths of incarcerated individuals serving life sentences shows the observed age at the time of death for those individuals who died while incarcerated is substantially lower than the life expectancy calculated from the data obtained from DHEC. See ¶¶ 17-18.

rate, I calculated the three-year moving average of the mortality rates by averaging a given age's mortality rate with the two ages surrounding it. As the data became sparser at the older ages, I used a five-year moving average, which included the mortality rate at a given age and the two ages above and below it. This calculation found the trend in these mortality rates for a more accurate calculation of life expectancies at each age.

11. *Mortality Ratio Calculation:* I next compared the SCDC Population mortality rates with the general United States population mortality rates.

- a. The seventh column on Exhibits 2-4 labeled **US Population Mortality Rate** provides the most current mortality rates by age for males in the US population available at the time of this analysis. These mortality rates were determined by the Centers for Disease Control ("CDC") and is used in life tables published in the CDC's Vital Statistics Reports. The CDC mortality rates are calculated for life tables for the all US males, for black US males only, and for white US males only; these life tables are attached as Exhibits 5, 6, and 7 respectively.⁴ On SCDC Population Mortality Rate tables (Exhibits 2-4) for various races, the US Mortality rate was obtained from the US Life Table for the same race.
- b. The eighth, and final column, on Exhibits 2-4 labeled **Mortality Ratios** compares the smoothed mortality rate from the SCDC Population at a given age with the US Population mortality rate for the same age. The mortality ratio is calculated by dividing the SCDC Population mortality rate by the US Population mortality rate, meaning any mortality ratio over 1.0 indicates the SCDC Population mortality rate is higher than the US Population mortality rate. Mortality ratios are provided only for ages in which there were at least five deaths among the SCDC Population in order to ensure the accuracy of the resulting ratios and life expectancies.

12. *Race Specific Calculations:* I created mortality rate and mortality ratio tables for all races, blacks only, and whites only because doing so is consistent with the CDC analysis of the US population, which shows that race has a significant effect on mortality rates.

13. *Creation of Life Tables:* Life tables provide life expectancies based on mortality rates from a given population. Using the mortality ratios calculated in Exhibits 2-4, I created life tables for the SCDC Population. I created individual life tables for all males, all black males, and all white males, which are attached as Exhibits 8, 9, and 10, respectively. The following is a description of the life expectancy calculations, using column references to the tables in Exhibits 8, 9, and 10.

⁴ The mortality rates on the CDC US Population Life Tables are found in the column labeled **Probability of dying between ages x and x + 1** on Exhibits 5-7.

- a. The first column labeled **Age** lists all ages 0-100.
- b. The second column labeled **Basic Mortality** provides the mortality rate at a given age from the US Population Life Tables (Exhibits 5-7).
- c. The third column labeled **Mortality Risk Factor** is the mortality ratio calculated on the SCDC Population Mortality Rate Tables in Exhibits 2-4.
- d. The fourth column labeled **Adjusted Mortality** provides the US mortality rate for a given age adjusted by the mortality risk factor (mortality ratio) using multiplication.⁵ At ages where there was sufficient mortality data (five or more deaths at any given age) from the SCDC Population, the adjusted mortality rate equals the mortality rate calculated from the SCDC Population data.⁶ At ages where there was insufficient mortality data (four or less deaths at any given age) from the SCDC Population, the adjusted mortality rate equals the US Population mortality rates.
- e. The fifth column labeled **Population at Risk** starts with a hypothetical cohort, or population of 100,000 at age 0. This population is decreased at each successive age by the number of deaths that occurred at the previous age. For example, in the SCDC Life Table for all races (Exhibit 8), the population at risk in age 0-1 is the full hypothetical cohort of 100,000 less 658 deaths that occurred during the first year of life.
- f. The sixth column labeled **Deaths** provides the number of deaths expected to occur at a given age. This number is calculated by multiplying the adjusted mortality rate (column four) by the population at risk (column five).
- g. The seventh column labeled **Interval Person-years** provides the number of years lived by the remaining population during a given age. This is calculated by subtracting one half of the number of deaths during that age from the population at risk during a given age (this assumes the individuals who die during that year live an average of half the year before dying).
- h. The eighth column labeled **Cumulative Person-years** provides the total number of years left to be lived by the entire population surviving to a given

⁵ I used the mortality ratio (comparing the SCDC Population mortality rates to the US Population mortality rates) because I did not have mortality rates for all ages from the SCDC Population data. Specifically, there is not sufficient data for male SCDC inmates at the very youngest and very oldest ages. In order to create a credible life table, one needs to have mortality rates for all of the ages. Use of the mortality ratio to create an adjusted mortality rate is standard practice in the actuarial field when reviewing populations that do not have enough data to calculate credible mortality rates for all ages.

⁶ These ages are designated by highlighting in the Mortality Risk Factor column.

age. This is calculated by totaling the interval-person years for a given age and all of the ages after that age.

- i. The ninth column labeled **Life Expectancy** provides the remaining life expectancy for any SCDC inmate surviving to a given age. It is calculated by dividing the cumulative person-years (column eight) by the population at risk (column five) at a given age.
- j. To use the life expectancy to calculate the age to which an SCDC inmate is expected to live, on average, locate the age of the inmate in the age column and identify the corresponding life expectancy, then add the person's age to the life expectancy. For example, on the Life Table for blacks only (Exhibit 9), a black male inmate in SCDC at age 18 has a remaining life expectancy of 38.2 years. This individual would, therefore, be expected to live to age 56 (18 + 38.2).

14. *Notes on Using Life Tables:* Because race is a risk factor affecting life expectancy, it is most appropriate to use the life table for the race corresponding to the actual inmate to determine the life expectancy for that inmate. For example, a black male inmate's life expectancy is most accurately determined by using the Life Table for black males only (Exhibit 9). A white male inmate's life expectancy is most accurately determined by using the Life Table for white males only (Exhibit 10). Hispanic or Latino inmates' life expectancies are most accurately calculated by using the Life Table for white males only (Exhibit 10) because SCDC classifies them as white.⁷ Life expectancies for inmates of other races can most accurately be calculated by using the Life Table for all races⁸ (Exhibit 8).

15. *Findings:* The SCDC Population Life Tables (Exhibits 8-10) can be compared to the US Population Life Tables (Exhibits 5-7). Comparing the life expectancy for 18 year old males of any race in the general US Population and the SCDC Population reveals that an 18 year old in the general US Population has a remaining life expectancy of 59.1 years (expected death at 77 years old) and an 18 year old male in SCDC has a remaining life expectancy of 37.3 years (expected death at 55 years old). The 18 year old who is incarcerated in SCDC, accordingly, has a life expectancy that is 21.8 years shorter than a male in the general US Population.

⁷ Because SCDC does not classify Hispanic or Latino inmates separately from whites, the white male only mortality rates and life table include data from Hispanic and Latino inmates.

⁸ In addition to classifying inmates as black or white, SCDC uses classifications for Pacific Islander, Asian, American Indian, unknown, and other, but these categories of inmates did not include a sufficient number of inmates to allow for creation of a life table specific to them. Thus, all races are included in the Life Table for all races and that table can be used for inmates who do not fall within the black, white or Hispanic/Latino categories.

16. The Life Tables created based on the SCDC Population clearly indicate that any person who has been incarcerated in SCDC has a lower life expectancy than a person in the general US Population.
17. *Observed Data on Deaths in SCDC:* SCDC also provided me with information on all inmates serving a life sentence who died in SCDC between January 2001 and June 2016. The number of deaths during this period was not sufficient to create a credible life table for inmates serving life sentences who died while incarcerated.⁹ I was, however, able to compare the actual life span of the individuals who died to their expected age of death based on the US Population Life Tables.¹⁰ I grouped these individuals by the age of their last admission to SCDC and calculated the average number of years difference between their actual age at death and their expected age at death in the table below.

Age at Last Admission Group	Average Difference Observed vs Expected Age at Death
16 to 19	31.8
20 to 24	26.5
25 to 29	21.4
30 to 39	21.7
40 to 49	16.8
50 to 59	10.0
60 up	4.9

As this table shows, the individuals sentenced to life who entered SCDC between the ages of 16 and 19 died while incarcerated an average of 31.8 years earlier than predicted by the US Population life expectancies.

18. The SCDC Population Life Table for all races shows (Exhibit 8) a life expectancy for a 16 year old male incarcerated in SCDC for any length of time is 39.2 years, which is 21.8 years less than the life expectancy of a 16 year old male in the general US Population. The calculations above, based on observed deaths, show the actual

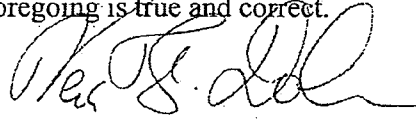
⁹ In order to create a credible life table, the population data must include five deaths at each age. During the period of 2001 to 2016, there were 262 deaths among inmates serving a life sentence. This was insufficient data to create a life table. While the data set is not large enough to create a life table, it is sufficient to show the mortality risk trend of people serving life imprisonment in SCDC as compared to the general US Population.

¹⁰ Because these deaths occurred between 2001 and 2016, I used the life expectancies published in 2000 for the general US Population. Since 2000, the life expectancies for the general population have increased.

life span of a 16 year old serving life imprisonment was 31.8 years less than the life expectancy of a 16 year old male in the general US Population. This demonstrates that a male incarcerated in SCDC for life is at a much higher risk of mortality and has a significantly shorter life expectancy than the general US Population.

- 19. *Other Notes:* My life expectancy calculations were completed in 2016 with records from 1996 to 2015 and mortality data through 2016. I recommend updating mortality data and mortality ratios every five years. I recommend a full twenty-year look back, as was completed here, be completed again in ten years.

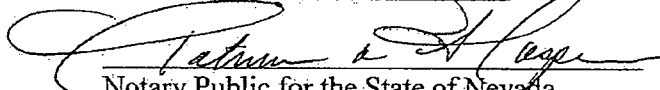
I affirm, under the penalty of perjury, that the foregoing is true and correct.



VERA F. DOLAN

Sworn to and subscribed before me

This 5 day of MAY, 2017



Notary Public for the State of Nevada

My commission expires: 10-18-2020



Exhibit 1

Vera F. Dolan

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702.476.8500 / dolanvp@consultancy.com

EDUCATION and PROFESSIONAL CERTIFICATIONS

MSPH University of North Carolina at Chapel Hill, Epidemiology, 1981
BA The Johns Hopkins University, Public Health, 1979
FALU Fellow of the Academy of Life Underwriting, 1998
ELS Editor in the Life Sciences, 2003

EXPERIENCE

Principal, VFD Consulting, Inc., 1989 to Present

Providing life and health insurance and related industries mortality and underwriting research, market research, product development, business development and technology, underwriting education and training, and litigation support to multinational clients, including:

AIG American General Life Cos.	LabOne
American Family Life Insurance Co.	Life Settlement Consulting & Management
AVS Underwriting	Los Angeles County Crime Laboratories
Bank of America	MetLife Canada
Calypte Biomedical	MIB Group
Canada Life Reinsurance	Millennium Pharmaceuticals
Charles Schwab & Co.	Mutual of Omaha
Clinical Reference Laboratory	North Coast Opportunities
decydeWARE	<i>On The Risk – The Journal of the Academy of Life Underwriting</i>
Drinker, Biddle & Reath	PartnerRe Life (formerly Winterthur Life Reinsurance)
Edwards Lifesciences	Pacific Blue Cross
EMSI (formerly PMSI)	PPO Oklahoma
Farmers Mutual Insurance Co.	Protective Life Insurance Co.
FaxWatch	Safe Harbor Resources
Federal Home Loan Bank (San Francisco)	Sagicor Financial Corporation
First Financial Underwriting Services	Society of Actuaries
General American Life Insurance Co.	Thomson Management Solutions
Golden Gateway Financial	21st Services
Hank George, Inc.	Wells Fargo Bank
Health Net of California	Western Reserve Life Assurance Co. of Ohio
Heritage Labs	Xcelerate Corporation
HSBC Insurance Services	
Independent Order of Foresters	
Insure.com	

Vera F. Dolan

Curriculum Vitae, continued

Expert witness services provided to the following:

Multiple retentions:

Andres, Andres & Moore, Santa Ana, CA
Barger & Wolen, Irvine, CA and New York, NY
County of Hawaii, Hilo, HI
Donahue Horrow, El Segundo, CA
Lewis & Roca, Phoenix, AZ

McCue-Pauley & Associates, Dallas, TX
Taylor Anderson, Denver, CO
U.S. Department of Justice
Wilson Elser Moskowitz Edelman & Dicker, Los Angeles and San Diego, CA

Expert witness brokers:

AMFS / Medical Experts Nationwide
Consolidated Consultants
Insurance Expert Network
ForensisGroup
LITILI

Medical Advisors, Inc
Medical Consultant Services
The TASA Group
Thomson Reuters Expert Witness Service

Single cases:

Andrews Kurth, Dallas, TX
Bolt Keenley Kim, Berkeley, CA
Campano Law Group, Lancaster, CA
Carlin & Buchsbaum, Long Beach, CA
Carmody Torrance Sandak Hennessey, Waterbury, CT
City of Torrance, Torrance, CA
Corr Cronin Michelson Baumgardner Preece, Seattle, WA
Coughlin Law Firm, San Diego, CA
Cozen O'Connor, Wilmington, DE
Deitchman & Deitchman, Placerville, CA
Demas Law Group, Sacramento, CA
Dressler Law Office, New Haven, CT
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Epstein Becker & Green, Los Angeles, CA
Evan Freirich, Boulder, CO
Fairchild, Price, Haley & Smith, Nacogdoches, TX
Fallgatter Farmand & Catlin, Jacksonville, FL
Ferguson, Skipper, Shaw, Keyser, Baron & Tirabassi, Sarasota, FL
Friedman, Rubin & White, Anchorage, AL
Gilchrist & Rutter, Santa Monica, CA
Graves & King, Riverside, CA
Greenberg Traurig, Denver, CO
Greene Broillet & Wheeler, Santa Monica, CA
The Healy Law Firm, Chicago, IL
Hinshaw & Culbertson, Los Angeles, CA
Hoagland, Fitzgerald & Pranaitis, Alton, IL
Diana Holt, LLC, Columbia, SC
Jardine Law Office, DeForest, WI
Kent D. Jensen Law Office, Burley, ID
Johnson Schachter & Lewis, Sacramento, CA
Kantor & Kantor, Northridge, CA
Katten Muchin Rosenman, Los Angeles, CA
Kitch Drutchas Wagner Valitutti & Sherbrook, Detroit, MI
Knapp Petersen Clarke, Glendale, CA
Koch Degrn & Gomez, Visalia, CA
Law Office of Andy Basseri, Beverly Hills, CA
Law Offices of Benjamin Blakeman, Los Angeles, CA
Law Offices of Robert A. Brenner, Woodland Hills, CA
Law Office of Sean Brew, San Diego, CA
Law Offices of James Matthew Brown, San Diego, CA

Law Offices of Clyde I. Butts, Walnut Creek, CA
Law Offices of Michael Jay Green, Honolulu, HI
Law Office of Katherine MacKinnon, St. Louis Park, MN
Law Office of Stephen W. Penn, Morgan Hill, CA
Law Office of Charles M. Ray, Newport Beach, CA
Law Office of Kenneth U. Reyes, Los Angeles, CA
Law Offices of Cary T. Tanaka, Honolulu, HI
Law Office of Edward J. Thomas, Bakersfield, CA
Littler Mendelson, San Jose, CA
MacMorris & Carbone, Stockton, CA
Daniel Q. Mahone, Frederick, MD
McArdle, Frost & Brinton, Chicago, IL
McDermott Will & Emery, Chicago, IL
McDowell & Osburn, Manchester, NH
McFall Burnett & Brinton, Manteca, CA
Meyers McConnell Reisz Siderman, Los Angeles, CA
Milavetz Gallop & Milavetz, Edina, MN
Morris Polich & Purdy, San Francisco, CA
Myers & Gomel, Las Vegas, NV
Nicholas & Tomasevic, San Diego, CA
Norton Rose Fulbright US, Houston, TX
Ogden Murphy Wallace, Seattle, WA
Pyle Sims Duncan & Stevenson, San Diego, CA
Renaud Cook Drury Mesaros, Phoenix, AZ
Riverside County Public Defender, Riverside, CA
Saur Law Office, Laguna Hills, CA
Schumacher Francis & Nelson, Charleston, WV
Segal and Kirby, Sacramento, CA
Seyfarth Shaw, Chicago, IL
SGH Martineau, London, England
Shook Hardy & Bacon, Kansas City, MO
Sigelman Law Corporation, Beverly Hills, CA
Snell & Wilmer, Phoenix, AZ
South Carolina Commission on Indigent Defense, Columbia, SC
Stanley Law Offices, Syracuse, NY
Stennett & Casino, San Diego, CA
Vaka Law Group, Tampa, FL
Webb Bordson Law Group, San Diego, CA
David K. Wilson & Associates, Sherman, TX
Whitfield & Eddy, Des Moines, IA
Winters & Associates, San Diego, CA

Vera F. Dolan

Curriculum Vitae, continued

Consulting Projects – Underwriting

- Life Underwriting Requirements Research, 2004 to Present Providing methodologies, analysis and write-up of insurance testing laboratory data to initiate new products and services. Conducting cohort mortality studies to improve life underwriting risk assessment.
- Life Policy and Procedures Manual, 2014 Revised and updated life insurance policy and procedures manual based on current underwriting and business operations.
- Health Medical Underwriting Manual, 2010 Adapted medical underwriting manual for supplemental health insurance products.
- Structured Settlement Underwriting Manual, 2008 Developed underwriting manual for structured settlements based on current processes.
- Life Claims Audit, 2007 Performed random selection of cases and designed case data extraction sheet for large life insurance claims study.
- Critical Illness and Disability Income Training, 2006 Prepared and presented training to life underwriters in critical illness and disability income underwriting.
- Underwriting Manual Research and Writing, 2006 Adapted traditional life underwriting manual for simplified life, disability and waiver of premium products.
- Life Settlement Experience Analysis, 2006 Analysis of life settlement mortality to determine predictive factors.
- Life Underwriting Research, 2001 to 2003 Constructed life tables from medical literature to validate life underwriting guidelines. Produced quantitative and qualitative life underwriting manual guidance.
- Life Settlement Underwriting Research, 1998 to 2004 Provided model and design of automated life expectancy calculation system, data collection instruments, evaluation scoring and impairment risk factor weights.
- Insurance Services Product Development, 1997 to 1998 Provided analysis of disease mortality, incidence and prevalence to develop new insurance services product.
- Pension Underwriting Research, 1994 Provided biostatistical research basis to a multinational consortium for a new type of impaired risk European pension product.

Consulting Projects - Business Development and Technology

- Simplified Products Survey and Report, 2005 Conducted survey of top-selling simplified products for underwriting and business process lessons learned.
- New Business Process Review and Optimization, 2004 to 2005 Examined current life new business processes to identify opportunities for decreasing redundancies, handoffs, and inefficiencies.
- Underwriting Decision Software Development, 2004 to 2005 Product and market development of life underwriting software that uses advanced logic engine
- Freelance Writing and Editing, 2004 Editing and writing summaries of medical articles, medical conferences, and insurance topics for physicians and consumers.
- Underwriting Operations Annual Report, 2004 Assisted in editing, writing and analysis of metrics presented in life underwriting operations report for 2003.
- Business Process Improvement, 2003 Interviewed underwriting and business support staff to prepare future improvement in life insurance business process workflow.

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Curriculum Vitae, continued

Consulting Projects - Banking

- Enterprise Technology Plan, 2000 Collaborated on design of three-year technology plan for a Federal bank.
- Financial Services Experience Analysis and Strategy, 1995 to 1998 Provided statistical analysis and models to select business and consumer customers for acquisition and retention programs. Estimated bank account life expectancies using actuarial life table methods.
- Human Resources Automation Plan, 1993 Collaborated in development of plan and prototype for automated human resources management.

Certificate of Appreciation for 30 Years of Contribution, *On The Risk - Journal of the Academy of Life Underwriting*, May 4, 2016

Associate Editor, *On The Risk - Journal of the Academy of Life Underwriting*, 2004-Present

Contributing Editor, *On The Risk - Journal of the Academy of Life Underwriting*, 1994-1997

Kaiser Foundation Health Plan, Oakland, California

Medical Economics and Statistics, 1988 to 1989

Converted community-based pricing approach to experience-based rating for a \$2.5 billion premium enterprise. Conducted underwriting market study of 20,000 employers. Conducted analyses to determine competitive pricing for 2+ million member optical and pharmaceutical programs.

Transamerica Occidental Life Insurance Company, Los Angeles, California

New Business Underwriting Research, 1985 to 1988

Provided analysis of company data and medical literature to support management and underwriting decisions. Developed original methods for actuarial analyses now used for automated systems underwriting \$1.5 billion in annual business.

Lincoln National Reinsurance, Ft. Wayne, Indiana

Underwriting Research, 1982 to 1985

Provided analysis of company data and medical literature to support management and underwriting decisions.

University of North Carolina, Chapel Hill, North Carolina

Department of Biostatistics, 1981 to 1982

Performed statistical analyses for multinational clinical trials.

National Institute of Occupational Safety and Health, Cincinnati, Ohio

Industrywide Studies Branch, Biometry Section, Summer 1980

Performed proportionate mortality analysis of death certificate data for evidence of excess brain tumors among petrochemical workers. Performed analysis of medical records for evidence of excess birth anomalies among railroad workers exposed to dioxin.

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE

"Advantages of a Life Expectancy Using Life Insurance Underwriting and Life Settlement Methods in the Legal Setting" VFD Consulting, Inc.

"Highlights of the 2016 CLIMOA Annual Scientific Meeting" On The Risk - Journal of the Academy of Life Underwriting, Vol. 32, No. 4, 2016

"Hemoglobin Screening Independently Predicts All-Cause Mortality" J. Insurance Medicine, Vol. 45, No. 2, 2015, with Michael Fulks and Robert L. Stout

"Adjusting Measured Creatinine for Low Serum Glucose to Improve Mortality Prediction" On The Risk - Journal of the Academy of Life Underwriting, Vol. 31, No. 3, 2015, with Michael Fulks and Robert L. Stout

"Changing the 'Normal Range' for Blood Pressure from 140/90 to 130/any Improves Risk Assessment" J. Insurance Medicine, Vol. 45, No. 1, 2015, with Michael Fulks and Robert L. Stout

"2014 CRL Blood Pressure Study of Life Insurance Applicants" J. Insurance Medicine, Vol. 45, No. 1, 2015, with Michael Fulks and Robert L. Stout

"Which eGFR Calculation Offers the Best Mortality Prediction for Insurance?" On The Risk - Journal of the Academy of Life Underwriting, Vol. 31, No. 2, 2015, with Michael Fulks and Robert L. Stout

"Using Urine Protein Creatinine Ratio Alone or Reflexing to Urine Albumin in the Applicant with HbA1c Elevation" On The Risk - Journal of the Academy of Life Underwriting, Vol. 31, No. 1, 2015, with Michael Fulks and Robert L. Stout

"Basic Laboratory Testing" In: Basic Life Insurance Underwriting, ALU 101 Textbook, Sixth Ed. Academy of Life Underwriting, 2014, with Michael Fulks and Robert L. Stout

"Evaluating the Risk of Renal Disease Using Urine Proteinuria or Urine Albuminuria in the Applicant with HbA1c Elevation" On The Risk - Journal of the Academy of Life Underwriting, Vol. 30, No. 4, 2014, with Michael Fulks and Robert L. Stout

"Advantages of a Life Expectancy Using Life Insurance Underwriting and Life Settlement Methods in the Legal Setting" Defense Research Institute Life, Health and Disability Newsletter, Vol. 25, Issue 2, June 26, 2014

"Serum Globulin Predicts All-Cause Mortality for Life Insurance Applicants" J. Insurance Medicine, Vol. 44, No. 2, 2014, with Michael Fulks and Robert L. Stout

"NT-proBNP as a Predictor of All-Cause Mortality in a Population of Insurance Applicants" On The Risk - Journal of the Academy of Life Underwriting, Vol. 30, No. 2, 2014, with Michael Clark, Valerie Kaufman, Michael Fulks and Robert L. Stout

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

"Beware That Low Urine Creatinine!" On The Risk - Journal of the Academy of Life Underwriting, Vol. 30, No. 1, 2014, with Michael Fulks and Robert L. Stout

"NT-proBNP as a Predictor of All-Cause Mortality in a Population of Insurance Applicants" J. Insurance Medicine, Vol. 44, No. 1, 2014, with Michael Clark, Valerie Kaufman, Michael Fulks and Robert L. Stout

"Scoring Life Insurance Applicants' Laboratory Results, Blood Pressure and Build to Predict All-Cause Mortality Risk" J. Insurance Medicine, Vol. 43, No. 3, 2012, with Michael Fulks and Robert L. Stout

"Urine Protein/Creatinine Ratio as a Risk Predictor in Non-Diabetics with Normal Renal Function" J. Insurance Medicine, Vol. 43, No. 2, 2012, with Michael Fulks and Robert L. Stout

"Trends in Mortality of Insurance Applicants with HIV Infection" J. Insurance Medicine, Vol. 43, No. 2, 2012, with Robert L. Stout and Michael Fulks

"PSA: What Values Predict Increased Mortality Risk?" On The Risk - Journal of the Academy of Life Underwriting, Vol. 27, No. 3, 2011, with Michael Fulks and Robert L. Stout

"Letter to the Editor: The Use of Modeling for Associating Test Values and Mortality Risk" J. Insurance Medicine, Vol. 43, No. 1, 2012, with Michael Fulks and Robert L. Stout

"Isolated Hematuria as a Mortality Risk Predictor" On The Risk - Journal of the Academy of Life Underwriting, Vol. 27, No. 4, 2011, with Michael Fulks and Robert L. Stout

"Highlights of the 2011 AHOU Annual Conference" On The Risk - Journal of the Academy of Life Underwriting, Vol. 27, No. 3, 2011

"Correction to article: Association of Cholesterol, LDL, HDL, Cholesterol/HDL and Triglyceride with All-Cause Mortality in Life Insurance Applicants" J. Insurance Medicine, Vol. 42, No. 2-4, 2011, with Michael Fulks and Robert L. Stout

"CDT and Serum Alcohol: What Is the Risk?" On The Risk - Journal of the Academy of Life Underwriting, Vol. 27, No. 1, 2011, with Robert L. Stout and Michael Fulks

"Albumin and All-Cause Mortality Risk in Insurance Applicants" J. Insurance Medicine, Vol. 42, No. 1, 2010, with Michael Fulks and Robert L. Stout

"Mortality Associated with Positive Hepatitis C and B Test Results" On The Risk - Journal of the Academy of Life Underwriting, Vol. 26, No. 3, 2010, with Robert L. Stout and Michael Fulks

"Glucosuria as a Mortality Risk Predictor When Blood Is Not Collected" On The Risk - Journal of the Academy of Life Underwriting, Vol. 26, No. 2, 2010, with Robert L. Stout and Michael Fulks

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

“Mortality Associated with Positive Cocaine Test Results” *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 26, No. 1, 2010, with Robert L. Stout and Michael Fulks

“Association of Cholesterol, LDL, HDL, Cholesterol/HDL and Triglyceride with All-Cause Mortality in Life Insurance Applicants” *J. Insurance Medicine*, Vol. 41, No. 4, 2009, with Michael Fulks and Robert L. Stout

“Letter to the Editor: The Authors Reply” *J. Insurance Medicine*, Vol. 41, No. 3, 2009, with Michael Fulks and Robert L. Stout

“Underwriting Implications of Elevated Carcinoembryonic Antigen” *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 25, No. 3, 2009, with Robert L. Stout and Michael Fulks

“Mortality Associated with Bilirubin Levels in Insurance Applicants” *J. Insurance Medicine*, Vol. 41, No. 1, 2009, with Michael Fulks and Robert L. Stout

“Non-Cigarette Tobacco Use – What is the Risk?” *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 25, No. 2, 2009, with Robert L. Stout and Michael Fulks

“Hemoglobin A1c and Mortality in Insurance Applicants: A 5-Year Follow-Up Study”, *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 25, No. 1, 2009, with Robert L. Stout and Michael Fulks

“Using Liver Enzymes as Screening Tests to Predict Mortality Risk” *J. Insurance Medicine*, Vol. 40, No. 4, 2008, with Michael Fulks and Robert L. Stout

“Underwriting Integrity: Lessons from the Subprime Mortgage Crisis” *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 24, No. 4, 2008

“Highlights from the 2007 AHOU Meeting” *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 24, No. 1, 2008

“Increased Mortality Associated with Elevated Carcinoembryonic Antigen in Insurance Applicants” *J. Insurance Medicine*, Vol. 39, No. 4, 2007, with Robert L. Stout, Michael Fulks, Mark E. Magee and Luis Suarez

“Relationship of Hemoglobin A1c to Mortality in Nonsmoking Insurance Applicants” *J. Insurance Medicine*, Vol. 39, No. 3, 2007, with Robert L. Stout, Michael Fulks, Mark E. Magee and Luis Suarez

“Highlights from the 2006 AHOU Meeting” *On The Risk - Journal of the Academy of Life Underwriting*, Vol. 23, No. 1, 2007

“The Reproductive System” In: Intermediate Medical Life Insurance Underwriting ALU 201, 1st ed., Education Committee of the Academy of Life Underwriting, chapter 4, 2006

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

“Highlights from the 2006 CIU Meeting” On The Risk - Journal of the Academy of Life Underwriting, Vol. 22, No. 3, 2006

“Improvements in Cotinine Testing of Insurance Applicants” On The Risk - Journal of the Academy of Life Underwriting, Vol. 22, No. 2, 2006 with Robert L. Stout and Mark Magee

“Highlights from the LOMA Emerging Technology Conference: Understanding How to Use New Technology” On The Risk - Journal of the Academy of Life Underwriting, Vol. 22, No. 2, 2006

Panelist, “Contemplating Pandemic Risk” by Steven C. Siegel, The Actuary, Vol. 3, Issue 3, 2006

“Highlights of the 2005 AHOU Conference” On The Risk - Journal of the Academy of Life Underwriting, Vol. 22, No. 1, 2006

“Simplified Products: Something Old, Something New, and Something That May Just Make You Blue!” On The Risk - Journal of the Academy of Life Underwriting, with Ernest A. Testa, Vol. 22, No. 1, 2006

“2005 Simplified Product Survey: Final Report” for MIB Group, with Ernest A. Testa, January 2006

“Highlights of the 2005 CIU Conference” On The Risk - Journal of the Academy of Life Underwriting, Vol. 21, No. 4, 2005

“Underwriting for the New Millennium: Simplified Product Survey” NewsDirect, September 2005

“Sleep Problems and Accidents” On The Risk - Journal of the Academy of Life Underwriting, Vol. 21, No. 1, 2005

“Customer Relationship Management: A Reinsurer’s Experience” On The Risk - Journal of the Academy of Life Underwriting, Vol. 20, No. 2, 2004

“Current Concepts in the Insulin Resistance Syndrome” On The Risk - Journal of the Academy of Life Underwriting, with Robert Weir, Vol. 20, No. 1, 2004

“Highlights of the 2003 AAIM” On The Risk - Journal of the Academy of Life Underwriting, Vol. 20, No. 1, 2004

“Current Concepts in Multiple Sclerosis” On The Risk - Journal of the Academy of Life Underwriting, with Robert Weir, Vol. 19, No. 4, 2003

“Multiple Sclerosis” Canada Life Review Online, Third Quarter 2003, with Robert Weir

“Highlights of the 2003 CIU Meeting” On The Risk - Journal of the Academy of Life Underwriting, Vol. 19, No. 3, 2003

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

“Web-Assisted Inspection Reports: Part 2 of 2” On The Risk - Journal of the Academy of Life Underwriting, Vol. 19, No. 3, 2003

“Keynote Presentation to the Annual Meeting, Canadian Institute of Underwriters” Canada Life Review Online, Second Quarter 2003

“Web-Assisted Inspection Reports: Part 1 of 2” On The Risk - Journal of the Academy of Life Underwriting, On The Risk - Journal of the Academy of Life Underwriting, Vol. 19, No. 2, 2003

“Highlights of the 2002 AAIM” On The Risk - Journal of the Academy of Life Underwriting, Vol. 19, No. 1, 2003

Project Manager, “Report of the 2002 Automated Risk Assessment System Study” Thomson Management Solutions, February 2003

“Insulin Resistance Syndrome” Canada Life Review Online, Fourth Quarter 2002

“The New Paradigm of Coronary Artery Disease: Part 1. The Pathophysiology of Vulnerable Plaque” On The Risk - Journal of the Academy of Life Underwriting, with Robert Weir, Vol. 18, No. 4, 2002

“Orthostatic Hypotension” On The Risk - Journal of the Academy of Life Underwriting, with Robert Weir, Vol. 18, No. 3, 2002

“Highlights of the 2002 CLIMOA” On The Risk - Journal of the Academy of Life Underwriting, Vol. 18, No. 3, 2002

“Treatment of Localized Prostate Cancer” On The Risk - Journal of the Academy of Life Underwriting, Vol. 18, No. 2, 2002

“Privacy Rules and Regulations: An Interview with Linda S. Kaiser, Esq.” On The Risk - Journal of the Academy of Life Underwriting, Vol. 18, No. 1, 2002

“Treated Cholesterol; A Preferred Risk?” Canada Life Review Online, First Quarter 2002, with Robert Weir

“Body Mass Index and Mortality” On The Risk - Journal of the Academy of Life Underwriting, Vol. 17, No. 4, 2001, with Robert Weir

“Innovations in Underwriting Build” Canada Life Review No. 2, 2001

“Honoring Past HOLUA Presidents” On The Risk - Journal of the Academy of Life Underwriting, Vol. 17, No. 3, 2001

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

“Highlights of the 2001 HOLUA: An Underwriter’s Odyssey” On The Risk - Journal of the Academy of Life Underwriting, Vol. 17, No. 3, 2001

“Genetic Testing Provides Challenge to Insurers” American Clinical Laboratory, Vol. 20, No. 4, 2001 pp. 18-9

“Highlights of the Spring 2001 Risk Appraisal Forum” On The Risk - Journal of the Academy of Life Underwriting, Vol. 17, No. 2, 2001

“Highlights of the 2000 IHOU: Gateway to Change” On The Risk- Journal of the Academy of Life Underwriting, Vol. 17, No. 1, 2001

“Progress in Establishing the Association of Home Office Underwriters” On The Risk - Journal of the Academy of Life Underwriting, Vol. 17, No. 1, 2001

“Innovative Technologies for Detecting Alcohol Abuse and Monitoring Drinking Status” American Clinical Laboratory, Vol. 20, No. 1, 2001

“Highlights of the 2000 CIU: Take a Risk!” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 4, 2000

“Alternative/Complementary Medicine” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 4, 2000

“Life Settlements” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 4, 2000, with Chris Cook

“Underwriting Settlements” In: Viatical and Life Settlements: The Challenge Facing the Life Insurance Industry, Jean Gora, ed., Life Office Management Association, Chapter 4, 2000

“Detecting Alcohol Abuse and Monitoring Drinking Status” *LabOne* Insight, Fall 2000

“Building Corporate E-Commerce” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 3, 2000

“Highlights of the 2000 HOLUA: Brave New World” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 3, 2000

“Progress Report on the Formation of the New Underwriting Organization” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 3, 2000

“Highlights of the Spring 2000 Risk Appraisal Forum” On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 2, 2000

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

"Les Grubin Hosts Risk Appraisal Forum in the City by the Bay" Broker World, Vol. 20, No. 6, 2000

"Highlights of the 1999 IHOU" On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 1, 2000

"A Substandard Life Brokerage Agent's Perspective on Underwriting" On The Risk - Journal of the Academy of Life Underwriting, Vol. 16, No. 1, 2000

"Liquid Gold: What Urine Can Do for You" NAILBA Magazine, Winter 2000, with Kip Whitefield

"Highlights of the 1999 CIU" On The Risk - Journal of the Academy of Life Underwriting, Vol. 15, No. 4, 1999

"Highlights of the 2nd International Underwriting Congress" On The Risk - Journal of the Academy of Life Underwriting, Vol. 15, No. 3, 1999

"Highlights of the 1999 HOLUA Meeting" On The Risk - Journal of the Academy of Life Underwriting, Vol. 15, No. 3, 1999

"Predicting Motor Vehicle Accidents Among the Elderly" Underwriter Alert, Vol. 9, No. 2, 1999

"Risk Factors for Elder Abuse" Journal of Insurance Medicine, Vol. 31, No. 1, 1999, pp 13-20

"Insurance Securitization" On The Risk - Journal of the Academy of Life Underwriting, Vol. 15, No. 1, 1999

"Highlights of the 1998 HOLUA: Capitol Crossfire" On The Risk - Journal of the Academy of Life Underwriting, Vol. 14, No. 3, 1998

"DNA Typing for Individual Identification" On The Risk - Journal of the Academy of Life Underwriting, Vol. 14, No. 2, 1998

"DNA Typing for Individual Identification" FALU Paper, 1998

Highlights of the 1997 IHOU: Remember Our Mission" On The Risk - Journal of the Academy of Life Underwriting, Vol. 14, No. 1, 1998

"Underwriting and Risk Classification" Society of Actuaries' International Section News, No. 15, February 1998, with Chris Cook

"Highlights of the 1997 CIU: Reach for the Top" On The Risk - Journal of the Academy of Life Underwriting, Vol. 13, No. 4, 1997

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

"Highlights of the 1997 HOLUA: The Heat Is On" On The Risk - Journal of the Academy of Life Underwriting, Vol. 13, No. 3, 1997

"First International Underwriting Congress" Society of Actuaries' International Section News, No. 14, August 1997, with Chris Cook

"Highlights of the 1997 International Underwriting Congress" On The Risk - Journal of the Academy of Life Underwriting, Vol. 13, No. 2, with Chris Cook

"International Outlook: Highlights of the 1997 International Underwriting Congress" Resources, Vol. 17, No. 6 Supplement, 1997, with Chris Cook

"Highlights of the 1996 IHOU: Building Bridges" On The Risk - Journal of the Academy of Life Underwriting, Vol. 13, No. 1, 1997

"Medical Studies: Where Do They Come From? Transferring Medical Knowledge to Risk Selection" (Part 2 of 2)" Underwriter Alert, Vol. 6, No. 6, 1997

"Elevated GGT, Hypertension and Obesity" On The Risk - Journal of the Academy of Life Underwriting, Vol. 12, No. 4, 1996

"Clinical Trials and Population Studies (Part 1 of 2)" Underwriter Alert, Vol. 6, No. 5, 1996

"Highlights of the 1996 HOLUA: Navigating the Waves of Change" On The Risk - Journal of the Academy of Life Underwriting, Vol. 12, No. 3, 1996

"Underwriting Cultural Markets: Focus on Asian Indian Ethnicity" On The Risk - Journal of the Academy of Life Underwriting, Vol. 12, No. 3, 1996

"Highlights of the Spring 1996 Risk Appraisal Forum" On The Risk - Journal of the Academy of Life Underwriting, Vol. 12, No. 2, 1996

"Tobacco and User/Abstainer Pricing" Product Development News Society of Actuaries, Issue 40, May 1996

"Underwriting Research Resources Among Life Insurers: A Survey" VFD Consulting, Inc. 1996

"Highlights of the 1995 ICLAM/AAIM Conference" On The Risk - Journal of the Academy of Life Underwriting, Vol. 12, No. 1, 1996, with John J. Krinik

"The Quest for Excellence: Highlights of the 1995 IHOU" On The Risk - Journal of the Academy of Life Underwriting, Vol. 12, No. 1, 1996

Vera F. Dolan
Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

"Conference Review: 1995 Nucleic Acid-Based Technologies" On The Risk - Journal of the Academy of Life Underwriting, Vol. 11, No. 4, 1995

"Scaling New Peaks - Highlights of the 1995 HOLUA Annual Meeting" On The Risk - Journal of the Academy of Life Underwriting, Vol. 11, No. 3, 1995

"OTR Meeting Review: 1995 Society of Insurance Research Planning and Economics Conference" On The Risk - Journal of the Academy of Life Underwriting, Vol. 11, No. 3, 1995

"Tobacco and User/Abstainer Pricing" On The Risk - Journal of the Academy of Life Underwriting Vol. 11, No. 2, 1995

"OTR Meeting Review: Highlights of the 1994 IHOU" On The Risk - Journal of the Academy of Life Underwriting, Vol. 11, No. 1, 1995

"Underwriting Marital Violence" On The Risk - Journal of the Academy of Life Underwriting, Vol. 10, No. 5, 1994

"Highlights of the 1994 HOLUA Meeting" On The Risk - Journal of the Academy of Life Underwriting, Vol. 10, No. 4, 1994

"How Agents Can Cope With Reluctance to Sell DI" National Underwriter, Vol. 97, No. 49, 1993

"Both 'Supply' and 'Demand' Causing Sales Doldrums" National Underwriter, Vol. 97, No. 44, 1993

"Sailing for Success: Highlights of the 1993 IHOU Meeting" On The Risk - Journal of the Academy of Life Underwriting, Vol. 10, No. 2, 1994

"Moderate Alcohol Intake and Reduced Mortality: Illusion or Preferred Risk?" On The Risk - Journal of the Academy of Life Underwriting, Vol. 10, No. 1, 1993

"Expanding Horizons: Highlights of the 1993 HOLUA" On The Risk - Journal of the Academy of Life Underwriting, Vol. 9, No. 4, 1993

"Underwriters Urged to Tap More Into Elderly Mkt" National Underwriter, Vol. 97, No. 23, 1993

Contributing Analyst, Medical Risks: Trends in Mortality by Age and Time Elapsed, Edward Lew and Jerzy Gajewski, Praeger Publishers, New York, 1990 (as Vera F. Kelly)

"Notes on Breast Cancer" On The Risk - Journal of the Academy of Life Underwriting, Vol. 4, No. 3, 1988 (as Vera F. Kelly)

Vera F. Dolan

Curriculum Vitae, continued

PUBLICATIONS - INSURANCE, continued

"Underwriting Epilepsy" On The Risk - Journal of the Academy of Life Underwriting, Vol. 2, No. 4, 1986
(as Vera F. Kelly)

PUBLICATIONS – BUSINESS, HEALTH and OTHER

"Selling Our Children in the U.S.: An Interview with Russ Combs" The Voice: The Journal of the Domestic Violence Movement, Winter 2005

Contributor, After the Guns Fall Silent: The Enduring Legacy of Landmines, S. Roberts and J. Williams, Vietnam Veterans of America Foundation, Washington, D.C. 1995

Editor, The Politics of Information Systems, Paul Strassmann, Information Economics Press, New Canaan, CT, 1994

Invited Editorial Response, American Programmer, January, 1993

Editor-Producer, Win Some, Lose Some: My 40 Years in Corporate America, John Titsworth, Information Economics Press, New Canaan, CT, 1992

Editor, The Business Value of Computers, Paul Strassmann, Information Economics Press, New Canaan, CT, 1990

Editor, Information Payoff: The Transformation of Work in the Electronic Age, Paul Strassmann, Macmillan Free Press, NY, 1985 (as Vera F. Kelly)

"A Proportionate Mortality Study of an Oil, Chemical and Atomic Workers Local in Texas City, Texas" Annals of the New York Academy of Sciences, 381(1982): 54-61, with Recve, Waxweiler, Thomas and Itaya (as Vera F. Kelly)

PRESENTATIONS

"Life Expectancy for Litigation" Collegium of Pecuniary Damage Experts, Las Vegas, Nevada, March 31, 2017

"Juvenile Life Without Parole Sentencing and Resentencing Case Update" CLE presentation (4.5 hours, course no. 168516), University of South Carolina School of Law, Columbia, South Carolina, December 16, 2016

"Isolated Hematuria: What Is the Risk?" Northern California Life Insurance Association, Walnut Creek, California, May 10, 2012

"Positive Cocaine Tests and Mortality" Northern California Life Insurance Association, Berkeley, California, September 17, 2009

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Curriculum Vitae, continued

PRESENTATIONS, continued

“Actuaries and Public Health: From Analysis to Action” Society of Actuaries Health Spring Meeting, Los Angeles, California, May 28, 2008, with Grady Catterall and Dana Goldman

“Research Results: Potential Impact of a Pandemic on the U.S. Health Insurance System” Society of Actuaries Health Spring Meeting, Los Angeles, California, May 28, 2008, with Jim Toole and Jim Walbridge

“How the World Has Changed, and How Medical Underwriting Will Benefit Your Applicants and Your Companies’ Bottom Line” Annual Product Development Actuary Symposium, Denver, Colorado, June 26, 2007, with Robert L. Stout

“Non-Underwritten Life Products – Do They Work?” Annual Product Development Actuary Symposium, Denver, Colorado, June 25, 2007, with Jack Simon

“Pandemics and Extreme Events” Actuarial Society of Greater New York Annual Meeting, New York City, New York, November 9, 2006, with Janet Carstens

“Underwriting Simplified Issue Life Insurance Products” Group Underwriting Association of America, San Diego, California, October 31, 2006, with Ernie Testa

“The Life Settlements Market” Society of Actuaries Annual Meeting, Chicago, Illinois, October 18, 2006, with Tony Duscio and Jay Vadiveloo

“Preparing for Extreme Events” Society of Actuaries Annual Meeting, Chicago, Illinois, October 18, 2006, with Janet Carstens and Max Rudolph

“Pandemic Exposure and Risk Management Strategies in Asia as Compared to the United States” Society of Actuaries Life Spring Meeting, Hollywood, Florida, May 24, 2006, with Ronald Klein

“Current Trends in Distribution Channels: New Underwriting for a New Millennium” Society of Actuaries Life Spring Meeting, New Orleans, Louisiana, May 23, 2005, with Jim McArdle and Ernie Testa

“Gynecologic and Obstetric Disorders” Institute of Caribbean Home Office Underwriters, Almond Beach Resort, Barbados, September 14, 2004

“Sleep Dysfunction and Disorders” Institute of Caribbean Home Office Underwriters, Almond Beach Resort, Barbados, September 13, 2004

“Sleep Dysfunction and Disorders” Western Home Office Underwriters Association, Colorado Springs, Colorado, June 3, 2004

“Nail a Front Door on Your Back Room” Social Enterprise Alliance, San Francisco, California, March 5, 2004, with David Allburn and Russ Combs

Vera F. Dolan

Curriculum Vitae, continued

PRESENTATIONS, continued

"Multiple Sclerosis" Northern California Life Insurance Association, Emeryville, California, October 22, 2003

"Post-Stroke Morbidity" Northern California Life Insurance Association, San Rafael, California, March 21, 2001

"Variable Life Insurance – The New Frontier!" National Association of Variable Annuities, Palm Beach, Florida, November 6, 2000, with Mark Daley

"Analysis of Profitability by Customer: Banking Case Study" Society of Actuaries, Orlando, Florida, June 19, 1997, with Rex Atwood and Nancy Church

"Establishing Underwriting Guidelines Using General Population Data" International Underwriting Congress, Mexico City, Mexico, February 25, 1997, with Rick Bergstrom

"They Came for AIDS; They Stayed for Liver" Society of Actuaries, Orlando, Florida, October 28, 1996, with Rick Bergstrom and Hank George

"Detecting and Evaluating Marital Violence" Western Home Office Underwriters Association, Squaw Valley, California, June 9, 1995

Last update March 31, 2017

Exhibit 2

South Carolina DC men admitted 1996 to 2015, followed to 2016

Last admission only, duplicate IDs removed, admission year errors removed

Exposure for all races; N=64,204

Mortality rates are smoothed for ≥ 5 deaths (running average of 3 or 5 raw rates, previous age, current age & next age)

Age	All races			Total	Mortality Rate	Smoothed Mortality Rate	US Population Mortality Rate	Mortality Ratios (≥ 5 deaths only)
	Alive	Dead						
15	3	0		3	0.000000		0.000439	
16	90	0		90	0.000000		0.000552	
17	831	0		831	0.000000		0.000675	
18	2,272	6		2,278	0.002634	0.002701	0.000807	3.3
19	4,322	12		4,334	0.002769	0.003011	0.000942	3.2
20	6,585	24		6,609	0.003631	0.003233	0.001085	3.0
21	8,457	28		8,485	0.003300	0.003812	0.001216	3.1
22	9,725	44		9,769	0.004504	0.004359	0.001310	3.3
23	10,374	55		10,429	0.005274	0.005486	0.001353	4.1
24	10,409	70		10,479	0.006680	0.006254	0.001358	4.6
25	10,065	69		10,134	0.006809	0.006646	0.001351	4.9
26	9,552	62		9,614	0.006449	0.007431	0.001349	5.5
27	8,993	82		9,075	0.009036	0.007899	0.001353	5.8
28	8,454	70		8,524	0.008212	0.008922	0.001371	6.5
29	8,014	77		8,091	0.009517	0.009048	0.001399	6.5
30	7,681	73		7,754	0.009414	0.009188	0.001432	6.4
31	7,465	65		7,530	0.008632	0.010131	0.001464	6.9
32	7,199	90		7,289	0.012347	0.010670	0.001496	7.1
33	6,904	77		6,981	0.011030	0.011365	0.001528	7.4
34	6,738	73		6,811	0.010718	0.010614	0.001563	6.8
35	6,473	66		6,539	0.010093	0.010348	0.001613	6.4
36	6,288	65		6,353	0.010231	0.011223	0.001682	6.7
37	5,989	81		6,070	0.013344	0.012599	0.001764	7.1
38	5,823	84		5,907	0.014220	0.014226	0.001857	7.7
39	5,670	87		5,757	0.015112	0.015292	0.001964	7.8
40	5,529	93		5,622	0.016542	0.016436	0.002083	7.9
41	5,286	95		5,381	0.017655	0.017101	0.002227	7.7
42	5,114	89		5,203	0.017106	0.017659	0.002414	7.3
43	5,012	93		5,105	0.018217	0.018047	0.002653	6.8
44	4,901	94		4,995	0.018819	0.019173	0.002939	6.5
45	4,734	99		4,833	0.020484	0.021675	0.003243	6.7
46	4,545	120		4,665	0.025723	0.025268	0.003563	7.1
47	4,164	127		4,291	0.029597	0.027663	0.003922	7.1
48	3,971	113		4,084	0.027669	0.030107	0.004320	7.0
49	3,715	127		3,842	0.033056	0.032962	0.004749	6.9
50	3,453	137		3,590	0.038162	0.038314	0.005193	7.4
51	3,193	146		3,339	0.043726	0.041608	0.005647	7.4
52	2,920	131		3,051	0.042937	0.044710	0.006122	7.3
53	2,669	133		2,802	0.047466	0.045803	0.006630	6.9
54	2,372	117		2,489	0.047007	0.050491	0.007181	7.0
55	2,068	125		2,193	0.057000	0.053517	0.007779	6.9
56	1,852	111		1,963	0.056546	0.055167	0.008415	6.6
57	1,624	89		1,713	0.051956	0.057715	0.009074	6.4
58	1,418	98		1,516	0.064644	0.061413	0.009727	6.3
59	1,213	88		1,301	0.067640	0.069713	0.010371	6.7
60	1,057	88		1,145	0.076856	0.078531	0.011034	7.1
61	878	88		966	0.091097	0.082366	0.011738	7.0
62	733	63		796	0.079146	0.086399	0.012489	6.9
63	635	62		697	0.088953	0.083857	0.013335	6.3
64	549	50		599	0.083472	0.085654	0.014319	6.0
65	444	41		485	0.084536	0.087103	0.015482	5.6
66	379	39		418	0.093301	0.096722	0.016824	5.7
67	324	41		365	0.112329	0.097724	0.018330	5.3
68	271	26		297	0.087542	0.091657	0.019900	4.6
69	234	19		253	0.075099	0.089544	0.021539	4.2

South Carolina DC men admitted 1996 to 2015, followed to 2016

Last admission only, duplicate IDs removed, admission year errors removed

Exposure for all races; N=64,204

Mortality rates are smoothed for ≥ 5 deaths (running average of 3 or 5 raw rates, previous age, current age & next age)

Age	Alive	All races		Total	Mortality Rate	Smoothed Mortality Rate	US Population Mortality Rate	Mortality Ratios (≥ 5 deaths only)	
		Dead							
70	194	23		217	0.105991	0.095649	0.023396	4.1	
71	152	20		172	0.116279	0.090170	0.025476	3.5	
72	136	14		150	0.093333	0.096203	0.027794	3.5	
73	125	8		133	0.060150	0.097922	0.030350	3.2	
74	102	12		114	0.105263	0.091534	0.033204	2.8	
75	85	11		96	0.114583	0.094742	0.036345	2.6	
76	76	7		83	0.084337	0.109378	0.039788	2.7	
77	57	7		64	0.109375	0.111855	0.043720	2.6	
78	52	8		60	0.133333	0.114580	0.048335	2.4	
79	45	6		51	0.117647	0.116462	0.053650	2.2	
80	34	5		39	0.128205	0.125356	0.059565	2.1	
81	29	3		32	0.093750		0.065848		
82	22	4		26	0.153846		0.072956		
83	20	1		21	0.047619		0.080741		
84	19	0		19	0.000000		0.089357		
85	17	1		18	0.055556		0.099650		
86	14	2		16	0.125000		0.110901		
87	13	1		14	0.071429		0.123146		
88	10	3		13	0.230769		0.136412		
89	13	0		13	0.000000		0.150710		
90	9	0		9	0.000000		0.166038		
91	8	0		8	0.000000		0.182374		
92	7	0		7	0.000000		0.199676		
93	10	0		10	0.000000		0.217880		
94	15	1		16	0.062500		0.236903		
95	2	0		2	0.000000		0.256636		
96	2	0		2	0.000000		0.276954		
97	2	0		2	0.000000		0.297713		
Total deaths		4,239							

Exhibit 3

South Carolina DC men admitted 1996 to 2015, followed to 2016

Last admission only, duplicate IDs removed, admission year errors removed

Exposure for blacks only; N=40,454

Mortality rates are smoothed for ≥ 5 deaths (running average of 3 or 5 raw rates, previous age, current age & next age)

Age	Alive	Black Dead	Total	Raw Mortality Rate	Smoothed Mortality Rate	US Population Mortality Rate	Mortality Ratios (≥ 5 deaths only)
15	2	0	2	0.000000		0.000655	
16	60	0	60	0.000000		0.000822	
17	543	0	543	0.000000		0.001004	
18	1,504	5	1,509	0.003313	0.003033	0.001206	2.5
19	2,898	8	2,906	0.002753	0.003351	0.001421	2.4
20	4,498	18	4,516	0.003986	0.003383	0.001654	2.0
21	5,847	20	5,867	0.003409	0.004059	0.001874	2.2
22	6,867	33	6,900	0.004783	0.004333	0.002041	2.1
23	7,453	36	7,489	0.004807	0.005139	0.002134	2.4
24	7,508	44	7,552	0.005826	0.005656	0.002168	2.6
25	7,216	46	7,262	0.006334	0.005943	0.002186	2.7
26	6,842	39	6,881	0.005668	0.006574	0.002212	3.0
27	6,426	50	6,476	0.007721	0.007412	0.002230	3.3
28	5,938	53	5,991	0.008847	0.008178	0.002245	3.6
29	5,604	45	5,649	0.007966	0.008357	0.002259	3.7
30	5,284	44	5,328	0.008258	0.007893	0.002267	3.5
31	5,059	38	5,097	0.007455	0.008957	0.002276	3.9
32	4,786	54	4,840	0.011157	0.009753	0.002300	4.2
33	4,554	49	4,603	0.010645	0.010648	0.002350	4.5
34	4,392	45	4,437	0.010142	0.010346	0.002426	4.3
35	4,152	43	4,195	0.010250	0.009901	0.002527	3.9
36	3,937	37	3,974	0.009311	0.010548	0.002646	4.0
37	3,679	45	3,724	0.012084	0.012161	0.002772	4.4
38	3,525	54	3,579	0.015088	0.013441	0.002896	4.6
39	3,452	46	3,498	0.013150	0.015186	0.003027	5.0
40	3,291	58	3,349	0.017319	0.015133	0.003179	4.8
41	3,101	47	3,148	0.014930	0.015972	0.003369	4.7
42	3,016	48	3,064	0.015666	0.015002	0.003607	4.2
43	2,941	43	2,984	0.014410	0.014833	0.003902	3.8
44	2,870	42	2,912	0.014423	0.015822	0.004251	3.7
45	2,739	52	2,791	0.018631	0.019842	0.004616	4.3
46	2,611	71	2,682	0.026473	0.024402	0.005016	4.9
47	2,421	70	2,491	0.028101	0.026482	0.005513	4.8
48	2,274	58	2,332	0.024871	0.026654	0.006129	4.3
49	2,127	59	2,186	0.026990	0.028625	0.006838	4.2
50	1,988	70	2,058	0.034014	0.032107	0.007586	4.2
51	1,830	67	1,897	0.035319	0.035336	0.008344	4.2
52	1,681	64	1,745	0.036676	0.038086	0.009145	4.2
53	1,541	68	1,609	0.042262	0.041294	0.010011	4.1
54	1,360	64	1,424	0.044944	0.046430	0.010959	4.2
55	1,183	65	1,248	0.052083	0.049429	0.011995	4.1
56	1,055	57	1,112	0.051259	0.050691	0.013107	3.9
57	937	48	985	0.048731	0.056749	0.014274	4.0
58	794	60	854	0.070258	0.061732	0.015455	4.0
59	677	48	725	0.066207	0.072218	0.016630	4.3
60	585	51	636	0.080189	0.082261	0.017888	4.6
61	466	52	518	0.100386	0.093277	0.019207	4.9
62	363	40	403	0.099256	0.093367	0.020451	4.6
63	320	28	348	0.080460	0.093350	0.021595	4.3
64	269	30	299	0.100334	0.089763	0.022717	4.0
65	206	20	226	0.088496	0.097257	0.023933	4.1
66	183	21	204	0.102941	0.107622	0.025369	4.2
67	152	23	175	0.131429	0.114021	0.027104	4.2
68	116	14	130	0.107692	0.117090	0.029089	4.0
69	95	12	107	0.112150	0.107763	0.031191	3.5

South Carolina DC men admitted 1996 to 2015, followed to 2016

Last admission only, duplicate IDs removed, admission year errors removed

Exposure for blacks only; N=40,454

Mortality rates are smoothed for ≥ 5 deaths (running average of 3 or 5 raw rates, previous age, current age & next age)

Age	Alive	Black Dead	Total	Raw Mortality Rate	Smoothed Mortality Rate	US Population Mortality Rate	Mortality Ratios (≥ 5 deaths only)
70	78	9	87	0.103448	0.115344	0.033429	3.5
71	60	9	69	0.130435	0.116942	0.035780	3.3
72	55	4	59	0.067797		0.038397	
73	48	3	51	0.058824		0.041254	
74	39	5	44	0.113636		0.044174	
75	30	5	35	0.142857		0.047704	
76	27	2	29	0.068966		0.051047	
77	18	3	21	0.142857		0.054624	
78	17	3	20	0.150000		0.059628	
79	15	2	17	0.117647		0.064976	
80	11	2	13	0.153846		0.070676	
81	9	1	10	0.100000		0.076651	
82	8	0	8	0.000000		0.085516	
83	7	0	7	0.000000		0.092664	
84	6	0	6	0.000000		0.100307	
85	5	0	5	0.000000		0.108460	
86	4	1	5	0.200000		0.117140	
87	5	0	5	0.000000		0.126357	
88	4	0	4	0.000000		0.136120	
89	3	0	3	0.000000		0.146432	
90	2	0	2	0.000000		0.157294	
91	3	0	3	0.000000		0.168701	
92	2	0	2	0.000000		0.180641	
93	3	0	3	0.000000		0.193099	
94	7	0	7	0.000000		0.206052	
95	1	0	1	0.000000		0.219470	
96	1	0	1	0.000000		0.233321	
97	1	0	1	0.000000		0.247561	
Total deaths		2,351					

Exhibit 4

South Carolina DC men admitted 1996 to 2015, followed to 2016

Last admission only, duplicate IDs removed, admission year errors removed

Exposure for whites only; N=22,081

Mortality rates are smoothed for ≥ 5 deaths (running average of 3 or 5 raw rates, previous age, current age & next age)

Age	Alive	White Dead	Total	Raw Mortality Rate	Smoothed Mortality Rate	US Population Mortality Rate	Mortality Ratios (≥ 5 deaths only)
15	1	0	1	0.000000		0.000414	
16	28	0	28	0.000000		0.000522	
17	268	0	268	0.000000		0.000641	
18	717	1	718	0.001393		0.000773	
19	1,325	4	1,329	0.003010		0.000909	
20	1,944	6	1,950	0.003077	0.003181	0.001053	3.0
21	2,427	8	2,435	0.003285	0.003500	0.001185	3.0
22	2,647	11	2,658	0.004138	0.004806	0.001283	3.7
23	2,697	19	2,716	0.006996	0.006919	0.001333	5.2
24	2,676	26	2,702	0.009623	0.008440	0.001349	6.3
25	2,620	23	2,643	0.008702	0.009056	0.001354	6.7
26	2,466	22	2,488	0.008842	0.010391	0.001365	7.6
27	2,316	32	2,348	0.013629	0.009974	0.001379	7.2
28	2,265	17	2,282	0.007450	0.011864	0.001401	8.5
29	2,173	32	2,205	0.014512	0.011735	0.001432	8.2
30	2,161	29	2,190	0.013242	0.013335	0.001467	9.1
31	2,177	27	2,204	0.012250	0.013876	0.001502	9.2
32	2,195	36	2,231	0.016136	0.013753	0.001536	9.0
33	2,147	28	2,175	0.012874	0.013955	0.001570	8.9
34	2,150	28	2,178	0.012856	0.012136	0.001609	7.5
35	2,131	23	2,154	0.010678	0.011928	0.001665	7.2
36	2,177	27	2,204	0.012250	0.013112	0.001742	7.5
37	2,158	36	2,194	0.016408	0.014128	0.001829	7.7
38	2,156	30	2,186	0.013724	0.016339	0.001921	8.5
39	2,078	40	2,118	0.018886	0.016139	0.002023	8.0
40	2,117	34	2,151	0.015807	0.019133	0.002135	9.0
41	2,066	48	2,114	0.022706	0.019370	0.002273	8.5
42	2,001	40	2,041	0.019598	0.022267	0.002459	9.1
43	1,991	50	2,041	0.024498	0.023331	0.002703	8.6
44	1,956	52	2,008	0.025896	0.024755	0.002997	8.3
45	1,922	47	1,969	0.023870	0.025127	0.003309	7.6
46	1,864	49	1,913	0.025614	0.027223	0.003631	7.5
47	1,684	56	1,740	0.032184	0.030095	0.003984	7.6
48	1,638	55	1,693	0.032487	0.035454	0.004366	8.1
49	1,540	67	1,607	0.041693	0.039239	0.004768	8.2
50	1,428	65	1,493	0.043537	0.046941	0.005179	9.1
51	1,325	78	1,403	0.055595	0.050285	0.005596	9.0
52	1,210	66	1,276	0.051724	0.054307	0.006034	9.0
53	1,104	65	1,169	0.055603	0.052714	0.006508	8.1
54	990	53	1,043	0.050815	0.057024	0.007026	8.1
55	868	60	928	0.064655	0.060073	0.007591	7.9
56	780	54	834	0.064748	0.062302	0.008191	7.6
57	672	41	713	0.057504	0.060358	0.008812	6.8
58	608	38	646	0.058824	0.062585	0.009425	6.6
59	520	40	560	0.071429	0.068333	0.010028	6.8
60	458	37	495	0.074747	0.076123	0.010645	7.2
61	402	36	438	0.082192	0.072227	0.011305	6.4
62	362	23	385	0.059740	0.079569	0.012031	6.6
63	308	33	341	0.096774	0.074694	0.012880	5.8
64	276	20	296	0.067568	0.082340	0.013896	5.9
65	233	21	254	0.082677	0.085880	0.015110	5.7
66	191	18	209	0.086124	0.079940	0.016503	4.8
67	169	18	187	0.096257	0.074702	0.018045	4.1
68	153	11	164	0.067073	0.079705	0.019623	4.1
69	139	6	145	0.041379	0.083840	0.021262	3.9

South Carolina DC men admitted 1996 to 2015, followed to 2016

Last admission only, duplicate IDs removed, admission year errors removed

Exposure for whites only; N=22,081

Mortality rates are smoothed for ≥ 5 deaths (running average of 3 or 5 raw rates, previous age, current age & next age)

Age	Alive	White Dead	Total	Raw Mortality Rate	Smoothed Mortality Rate	US Population Mortality Rate	Mortality Ratios (≥ 5 deaths only)
70	116	14	130	0.107692	0.086566	0.023146	3.7
71	92	11	103	0.106796	0.085347	0.025278	3.4
72	81	10	91	0.109890	0.097071	0.027630	3.5
73	77	5	82	0.060976	0.095204	0.030219	3.2
74	63	7	70	0.100000	0.092364	0.033126	2.8
75	55	6	61	0.098361	0.088990	0.036255	2.5
76	49	5	54	0.092593	0.095477	0.039716	2.4
77	39	4	43	0.093023		0.043757	
78	35	5	40	0.125000		0.048405	
79	30	4	34	0.117647		0.053785	
80	23	3	26	0.115385		0.059839	
81	20	2	22	0.090909		0.066176	
82	14	4	18	0.222222		0.073348	
83	13	1	14	0.071429		0.081302	
84	13	0	13	0.000000		0.090236	
85	12	1	13	0.076923		0.100743	
86	10	1	11	0.090909		0.112235	
87	8	1	9	0.111111		0.124750	
88	6	3	9	0.333333		0.138311	
89	7	0	7	0.000000		0.152931	
90	6	0	6	0.000000		0.168603	
91	5	0	5	0.000000		0.185302	
92	5	0	5	0.000000		0.202980	
93	7	0	7	0.000000		0.221569	
94	8	1	9	0.111111		0.240976	
95	1	0	1	0.000000		0.261085	
96	1	0	1	0.000000		0.281762	
97	1	0	1	0.000000		0.302853	
Total deaths		1,874					

EXHIBIT 5

Table 2. Life table for males: United States, 2011

Spreadsheet version available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/64_11/Table02.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
0-1	0.006575	100,000	658	99,427	7,629,389	76.3
1-2	0.000445	99,342	44	99,320	7,529,961	75.8
2-3	0.000301	99,298	30	99,283	7,430,641	74.8
3-4	0.000240	99,268	24	99,256	7,331,358	73.9
4-5	0.000183	99,244	18	99,235	7,232,101	72.9
5-6	0.000169	99,226	17	99,218	7,132,866	71.9
6-7	0.000150	99,210	15	99,202	7,033,648	70.9
7-8	0.000134	99,195	13	99,188	6,934,446	69.9
8-9	0.000115	99,181	11	99,176	6,835,258	68.9
9-10	0.000097	99,170	10	99,165	6,736,082	67.9
10-11	0.000085	99,160	8	99,156	6,636,917	66.9
11-12	0.000092	99,152	9	99,147	6,537,761	65.9
12-13	0.000132	99,143	13	99,136	6,438,613	64.9
13-14	0.000213	99,130	21	99,119	6,339,477	64.0
14-15	0.000323	99,109	32	99,093	6,240,358	63.0
15-16	0.000439	99,077	43	99,055	6,141,265	62.0
16-17	0.000552	99,033	55	99,006	6,042,210	61.0
17-18	0.000675	98,979	67	98,945	5,943,204	60.0
18-19	0.000807	98,912	80	98,872	5,844,259	59.1
19-20	0.000942	98,832	93	98,785	5,745,387	58.1
20-21	0.001085	98,739	107	98,685	5,646,602	57.2
21-22	0.001216	98,632	120	98,572	5,547,917	56.2
22-23	0.001310	98,512	129	98,447	5,449,345	55.3
23-24	0.001353	98,383	133	98,316	5,350,898	54.4
24-25	0.001358	98,250	133	98,183	5,252,582	53.5
25-26	0.001351	98,116	133	98,050	5,154,399	52.5
26-27	0.001349	97,984	132	97,918	5,056,349	51.6
27-28	0.001353	97,852	132	97,785	4,958,431	50.7
28-29	0.001371	97,719	134	97,652	4,860,646	49.7
29-30	0.001399	97,585	137	97,517	4,762,994	48.8
30-31	0.001432	97,449	140	97,379	4,665,477	47.9
31-32	0.001464	97,309	143	97,238	4,568,098	46.9
32-33	0.001496	97,167	145	97,094	4,470,860	46.0
33-34	0.001528	97,021	148	96,947	4,373,766	45.1
34-35	0.001563	96,873	151	96,797	4,276,819	44.1
35-36	0.001613	96,722	156	96,643	4,180,022	43.2
36-37	0.001682	96,565	162	96,484	4,083,378	42.3
37-38	0.001764	96,403	170	96,318	3,986,894	41.4
38-39	0.001857	96,233	179	96,144	3,890,576	40.4
39-40	0.001964	96,054	189	95,960	3,794,432	39.5
40-41	0.002083	95,866	200	95,766	3,698,472	38.6
41-42	0.002227	95,666	213	95,560	3,602,706	37.7
42-43	0.002414	95,453	230	95,338	3,507,147	36.7
43-44	0.002653	95,223	253	95,096	3,411,809	35.8
44-45	0.002939	94,970	279	94,830	3,316,713	34.9
45-46	0.003243	94,691	307	94,537	3,221,882	34.0
46-47	0.003563	94,384	336	94,216	3,127,345	33.1
47-48	0.003922	94,047	369	93,863	3,033,129	32.3
48-49	0.004320	93,679	405	93,476	2,939,266	31.4
49-50	0.004749	93,274	443	93,052	2,845,790	30.5
50-51	0.005193	92,831	482	92,590	2,752,738	29.7
51-52	0.005647	92,349	522	92,088	2,660,148	28.8
52-53	0.006122	91,827	562	91,546	2,568,060	28.0
53-54	0.006630	91,265	605	90,963	2,476,514	27.1
54-55	0.007181	90,660	651	90,335	2,385,551	26.3
55-56	0.007779	90,009	700	89,659	2,295,216	25.5
56-57	0.008415	89,309	752	88,933	2,205,557	24.7
57-58	0.009074	88,557	804	88,156	2,116,624	23.9
58-59	0.009727	87,754	854	87,327	2,028,469	23.1
59-60	0.010371	86,900	901	86,450	1,941,141	22.3
60-61	0.011034	85,999	949	85,525	1,854,692	21.6

See footnote at end of table.

Table 2. Life table for males: United States, 2011—Con.Spreadsheet version available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/64_11/Table02.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
61-62	0.011738	85,050	998	84,551	1,769,167	20.8
62-63	0.012489	84,052	1,050	83,527	1,684,616	20.0
63-64	0.013335	83,002	1,107	82,449	1,601,089	19.3
64-65	0.014319	81,895	1,173	81,309	1,518,641	18.5
65-66	0.015482	80,723	1,250	80,098	1,437,332	17.8
66-67	0.016824	79,473	1,337	78,804	1,357,234	17.1
67-68	0.018330	78,136	1,432	77,420	1,278,430	16.4
68-69	0.019900	76,703	1,526	75,940	1,201,010	15.7
69-70	0.021539	75,177	1,619	74,367	1,125,070	15.0
70-71	0.023396	73,558	1,721	72,697	1,050,702	14.3
71-72	0.025476	71,837	1,830	70,922	978,005	13.6
72-73	0.027794	70,007	1,946	69,034	907,083	13.0
73-74	0.030350	68,061	2,066	67,028	838,049	12.3
74-75	0.033204	65,995	2,191	64,900	771,021	11.7
75-76	0.036345	63,804	2,319	62,645	706,121	11.1
76-77	0.039788	61,485	2,446	60,262	643,477	10.5
77-78	0.043720	59,039	2,581	57,748	583,215	9.9
78-79	0.048335	56,458	2,729	55,093	525,467	9.3
79-80	0.053650	53,729	2,883	52,287	470,374	8.8
80-81	0.059565	50,846	3,029	49,332	418,086	8.2
81-82	0.065848	47,817	3,149	46,243	368,754	7.7
82-83	0.072956	44,669	3,259	43,039	322,511	7.2
83-84	0.080741	41,410	3,343	39,738	279,472	6.7
84-85	0.089357	38,066	3,402	36,366	239,734	6.3
85-86	0.099650	34,665	3,454	32,938	203,368	5.9
86-87	0.110901	31,211	3,461	29,480	170,430	5.5
87-88	0.123146	27,749	3,417	26,041	140,950	5.1
88-89	0.136412	24,332	3,319	22,672	114,910	4.7
89-90	0.150710	21,013	3,167	19,429	92,237	4.4
90-91	0.166038	17,846	2,963	16,364	72,808	4.1
91-92	0.182374	14,883	2,714	13,526	56,443	3.8
92-93	0.199676	12,169	2,430	10,954	42,918	3.5
93-94	0.217880	9,739	2,122	8,678	31,964	3.3
94-95	0.236903	7,617	1,804	6,715	23,286	3.1
95-96	0.256636	5,812	1,492	5,067	16,571	2.9
96-97	0.276954	4,321	1,197	3,722	11,505	2.7
97-98	0.297713	3,124	930	2,659	7,782	2.5
98-99	0.318755	2,194	699	1,844	5,123	2.3
99-100	0.339914	1,495	508	1,241	3,279	2.2
100 and over	1.000000	987	987	2,038	2,038	2.1

SOURCE: CDC/NCHS, National Vital Statistics System.

EXHIBIT 6

Table 17. Life table for non-Hispanic black males: United States, 2011Spreadsheet version available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/64_11/Table17.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
0-1	0.012502	100,000	1,250	98,927	7,173,820	71.7
1-2	0.000674	98,750	67	98,716	7,074,893	71.6
2-3	0.000494	98,683	49	98,659	6,976,177	70.7
3-4	0.000356	98,634	35	98,617	6,877,518	69.7
4-5	0.000316	98,599	31	98,584	6,778,901	68.8
5-6	0.000258	98,568	25	98,555	6,680,317	67.8
6-7	0.000224	98,543	22	98,532	6,581,762	66.8
7-8	0.000193	98,521	19	98,511	6,483,230	65.8
8-9	0.000161	98,502	16	98,494	6,384,719	64.8
9-10	0.000128	98,486	13	98,480	6,286,225	63.8
10-11	0.000107	98,473	11	98,468	6,187,746	62.8
11-12	0.000118	98,463	12	98,457	6,089,278	61.8
12-13	0.000183	98,451	18	98,442	5,990,821	60.9
13-14	0.000310	98,433	31	98,418	5,892,379	59.9
14-15	0.000481	98,402	47	98,379	5,793,961	58.9
15-16	0.000655	98,355	64	98,323	5,695,583	57.9
16-17	0.000822	98,291	81	98,250	5,597,260	56.9
17-18	0.001004	98,210	99	98,160	5,499,010	56.0
18-19	0.001206	98,111	118	98,052	5,400,849	55.0
19-20	0.001421	97,993	139	97,923	5,302,797	54.1
20-21	0.001654	97,854	162	97,773	5,204,874	53.2
21-22	0.001874	97,692	183	97,600	5,107,101	52.3
22-23	0.002041	97,509	199	97,409	5,009,501	51.4
23-24	0.002134	97,310	208	97,206	4,912,092	50.5
24-25	0.002168	97,102	211	96,997	4,814,886	49.6
25-26	0.002186	96,891	212	96,786	4,717,890	48.7
26-27	0.002212	96,680	214	96,573	4,621,104	47.8
27-28	0.002230	96,466	215	96,358	4,524,531	46.9
28-29	0.002245	96,251	216	96,143	4,428,173	46.0
29-30	0.002259	96,035	217	95,926	4,332,030	45.1
30-31	0.002267	95,818	217	95,709	4,236,104	44.2
31-32	0.002276	95,600	218	95,492	4,140,395	43.3
32-33	0.002300	95,383	219	95,273	4,044,904	42.4
33-34	0.002350	95,163	224	95,052	3,949,631	41.5
34-35	0.002426	94,940	230	94,825	3,854,579	40.6
35-36	0.002527	94,709	239	94,590	3,759,755	39.7
36-37	0.002646	94,470	250	94,345	3,665,165	38.8
37-38	0.002772	94,220	261	94,089	3,570,820	37.9
38-39	0.002896	93,959	272	93,823	3,476,730	37.0
39-40	0.003027	93,687	284	93,545	3,382,908	36.1
40-41	0.003179	93,403	297	93,255	3,289,363	35.2
41-42	0.003369	93,106	314	92,949	3,196,108	34.3
42-43	0.003607	92,793	335	92,625	3,103,159	33.4
43-44	0.003902	92,458	361	92,277	3,010,533	32.6
44-45	0.004251	92,097	392	91,901	2,918,256	31.7
45-46	0.004616	91,706	423	91,494	2,826,355	30.8
46-47	0.005016	91,282	458	91,053	2,734,861	30.0
47-48	0.005513	90,824	501	90,574	2,643,807	29.1
48-49	0.006129	90,324	554	90,047	2,553,233	28.3
49-50	0.006838	89,770	614	89,463	2,463,186	27.4
50-51	0.007586	89,156	676	88,818	2,373,723	26.6
51-52	0.008344	88,480	738	88,111	2,284,905	25.8
52-53	0.009145	87,742	802	87,340	2,196,794	25.0
53-54	0.010011	86,939	870	86,504	2,109,454	24.3
54-55	0.010959	86,069	943	85,597	2,022,950	23.5
55-56	0.011995	85,126	1,021	84,615	1,937,352	22.8
56-57	0.013107	84,105	1,102	83,553	1,852,737	22.0
57-58	0.014274	83,002	1,185	82,410	1,769,184	21.3
58-59	0.015455	81,817	1,264	81,185	1,686,774	20.6
59-60	0.016630	80,553	1,340	79,883	1,605,589	19.9
60-61	0.017888	79,213	1,417	78,505	1,525,705	19.3

See footnotes at end of table.

Table 17. Life table for non-Hispanic black males: United States, 2011—Con.Spreadsheet version available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/64_11/Table17.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
61-62	0.019207	77,796	1,494	77,049	1,447,201	18.6
62-63	0.020451	76,302	1,560	75,522	1,370,151	18.0
63-64	0.021595	74,742	1,614	73,935	1,294,629	17.3
64-65	0.022717	73,128	1,661	72,297	1,220,695	16.7
65-66	0.023933	71,466	1,710	70,611	1,148,398	16.1
66-67	0.025369	69,756	1,770	68,871	1,077,787	15.5
67-68	0.027104	67,986	1,843	67,065	1,008,915	14.8
68-69	0.029089	66,144	1,924	65,182	941,851	14.2
69-70	0.031191	64,220	2,003	63,218	876,669	13.7
70-71	0.033429	62,216	2,080	61,177	813,451	13.1
71-72	0.035780	60,137	2,152	59,061	752,274	12.5
72-73	0.038397	57,985	2,226	56,872	693,214	12.0
73-74	0.041254	55,759	2,300	54,608	636,342	11.4
74-75	0.044174	53,458	2,361	52,278	581,733	10.9
75-76	0.047704	51,097	2,438	49,878	529,456	10.4
76-77	0.051047	48,659	2,484	47,417	479,578	9.9
77-78	0.054624	46,175	2,522	44,914	432,161	9.4
78-79	0.059628	43,653	2,603	42,352	387,246	8.9
79-80	0.064976	41,050	2,667	39,716	344,895	8.4
80-81	0.070676	38,383	2,713	37,026	305,178	8.0
81-82	0.076651	35,670	2,734	34,303	268,152	7.5
82-83	0.085516	32,936	2,817	31,528	233,849	7.1
83-84	0.092664	30,119	2,791	28,724	202,321	6.7
84-85	0.100307	27,328	2,741	25,958	173,597	6.4
85-86	0.108460	24,587	2,667	23,254	147,639	6.0
86-87	0.117140	21,920	2,568	20,637	124,386	5.7
87-88	0.126357	19,353	2,445	18,130	103,749	5.4
88-89	0.136120	16,907	2,301	15,757	85,619	5.1
89-90	0.146432	14,606	2,139	13,537	69,862	4.8
90-91	0.157294	12,467	1,961	11,487	56,326	4.5
91-92	0.168701	10,506	1,772	9,620	44,839	4.3
92-93	0.180641	8,734	1,578	7,945	35,219	4.0
93-94	0.193099	7,156	1,382	6,465	27,274	3.8
94-95	0.206052	5,774	1,190	5,179	20,809	3.6
95-96	0.219470	4,584	1,006	4,081	15,630	3.4
96-97	0.233321	3,578	835	3,161	11,548	3.2
97-98	0.247561	2,743	679	2,404	8,388	3.1
98-99	0.262144	2,064	541	1,794	5,984	2.9
99-100	0.277019	1,523	422	1,312	4,190	2.8
100 and over	1.000000	1,101	1,101	2,878	2,878	2.6

NOTE: This life table is based on death rates that have been adjusted for race and ethnicity misclassification on death certificates.

SOURCE: CDC/NCHS, National Vital Statistics System.

EXHIBIT 7

Table 14. Life table for non-Hispanic white males: United States, 2011Spreadsheet version available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/64_11/Table14.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
0-1	0.005524	100,000	552	99,517	7,643,091	76.4
1-2	0.000413	99,448	41	99,427	7,543,575	75.9
2-3	0.000273	99,407	27	99,393	7,444,148	74.9
3-4	0.000229	99,379	23	99,368	7,344,755	73.9
4-5	0.000156	99,357	15	99,349	7,245,387	72.9
5-6	0.000160	99,341	16	99,333	7,146,038	71.9
6-7	0.000146	99,325	14	99,318	7,046,705	70.9
7-8	0.000132	99,311	13	99,304	6,947,387	70.0
8-9	0.000114	99,298	11	99,292	6,848,082	69.0
9-10	0.000095	99,286	9	99,282	6,748,790	68.0
10-11	0.000082	99,277	8	99,273	6,649,509	67.0
11-12	0.000088	99,269	9	99,264	6,550,236	66.0
12-13	0.000125	99,260	12	99,254	6,450,972	65.0
13-14	0.000201	99,248	20	99,238	6,351,718	64.0
14-15	0.000305	99,228	30	99,213	6,252,480	63.0
15-16	0.000414	99,197	41	99,177	6,153,268	62.0
16-17	0.000522	99,156	52	99,130	6,054,091	61.1
17-18	0.000641	99,105	64	99,073	5,954,960	60.1
18-19	0.000773	99,041	77	99,003	5,855,888	59.1
19-20	0.000909	98,964	90	98,920	5,756,885	58.2
20-21	0.001053	98,875	104	98,822	5,657,965	57.2
21-22	0.001185	98,770	117	98,712	5,559,143	56.3
22-23	0.001283	98,653	127	98,590	5,460,431	55.3
23-24	0.001333	98,527	131	98,461	5,361,841	54.4
24-25	0.001349	98,395	133	98,329	5,263,380	53.5
25-26	0.001354	98,263	133	98,196	5,165,051	52.6
26-27	0.001365	98,130	134	98,063	5,066,855	51.6
27-28	0.001379	97,996	135	97,928	4,968,792	50.7
28-29	0.001401	97,860	137	97,792	4,870,864	49.8
29-30	0.001432	97,723	140	97,653	4,773,072	48.8
30-31	0.001467	97,583	143	97,512	4,675,419	47.9
31-32	0.001502	97,440	146	97,367	4,577,907	47.0
32-33	0.001536	97,294	149	97,219	4,480,540	46.1
33-34	0.001570	97,145	153	97,068	4,383,321	45.1
34-35	0.001609	96,992	156	96,914	4,286,252	44.2
35-36	0.001665	96,836	161	96,755	4,189,338	43.3
36-37	0.001742	96,675	168	96,591	4,092,583	42.3
37-38	0.001829	96,506	177	96,418	3,995,992	41.4
38-39	0.001921	96,330	185	96,237	3,899,574	40.5
39-40	0.002023	96,145	195	96,047	3,803,337	39.6
40-41	0.002135	95,950	205	95,848	3,707,290	38.6
41-42	0.002273	95,745	218	95,637	3,611,442	37.7
42-43	0.002459	95,528	235	95,410	3,515,805	36.8
43-44	0.002703	95,293	258	95,164	3,420,395	35.9
44-45	0.002997	95,035	285	94,893	3,325,231	35.0
45-46	0.003309	94,750	313	94,594	3,230,338	34.1
46-47	0.003631	94,437	343	94,266	3,135,744	33.2
47-48	0.003984	94,094	375	93,907	3,041,479	32.3
48-49	0.004366	93,719	409	93,515	2,947,572	31.5
49-50	0.004768	93,310	445	93,088	2,854,058	30.6
50-51	0.005179	92,865	481	92,625	2,760,970	29.7
51-52	0.005596	92,384	517	92,126	2,668,345	28.9
52-53	0.006034	91,867	554	91,590	2,576,220	28.0
53-54	0.006508	91,313	594	91,016	2,484,630	27.2
54-55	0.007026	90,719	637	90,400	2,393,614	26.4
55-56	0.007591	90,081	684	89,739	2,303,214	25.6
56-57	0.008191	89,397	732	89,031	2,213,475	24.8
57-58	0.008812	88,665	781	88,274	2,124,444	24.0
58-59	0.009425	87,884	828	87,470	2,036,169	23.2
59-60	0.010028	87,056	873	86,619	1,948,700	22.4
60-61	0.010645	86,183	917	85,724	1,862,081	21.6

See footnotes at end of table.

Table 14. Life table for non-Hispanic white males: United States, 2011—Con.Spreadsheet version available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/64_11/Table14.xlsx.

Age (years)	Probability of dying between ages x and $x + 1$	Number surviving to age x	Number dying between ages x and $x + 1$	Person-years lived between ages x and $x + 1$	Total number of person-years lived above age x	Expectation of life at age x
	q_x	l_x	d_x	L_x	T_x	e_x
61-62	0.011305	85,265	964	84,783	1,776,357	20.8
62-63	0.012031	84,301	1,014	83,794	1,691,574	20.1
63-64	0.012880	83,287	1,073	82,751	1,607,780	19.3
64-65	0.013896	82,214	1,142	81,643	1,525,029	18.5
65-66	0.015110	81,072	1,225	80,459	1,443,386	17.8
66-67	0.016503	79,847	1,318	79,188	1,362,927	17.1
67-68	0.018045	78,529	1,417	77,821	1,283,739	16.3
68-69	0.019623	77,112	1,513	76,355	1,205,919	15.6
69-70	0.021262	75,599	1,607	74,795	1,129,563	14.9
70-71	0.023146	73,991	1,713	73,135	1,054,768	14.3
71-72	0.025278	72,279	1,827	71,365	981,633	13.6
72-73	0.027630	70,452	1,947	69,478	910,268	12.9
73-74	0.030219	68,505	2,070	67,470	840,789	12.3
74-75	0.033126	66,435	2,201	65,335	773,319	11.6
75-76	0.036255	64,234	2,329	63,070	707,985	11.0
76-77	0.039716	61,905	2,459	60,676	644,915	10.4
77-78	0.043757	59,447	2,601	58,146	584,239	9.8
78-79	0.048405	56,845	2,752	55,470	526,093	9.3
79-80	0.053785	54,094	2,909	52,639	470,623	8.7
80-81	0.059839	51,184	3,063	49,653	417,984	8.2
81-82	0.066176	48,122	3,184	46,529	368,331	7.7
82-83	0.073348	44,937	3,296	43,289	321,802	7.2
83-84	0.081302	41,641	3,385	39,948	278,513	6.7
84-85	0.090236	38,256	3,452	36,530	238,565	6.2
85-86	0.100743	34,804	3,506	33,050	202,035	5.8
86-87	0.112235	31,297	3,513	29,541	168,985	5.4
87-88	0.124750	27,785	3,466	26,052	139,444	5.0
88-89	0.138311	24,319	3,364	22,637	113,392	4.7
89-90	0.152931	20,955	3,205	19,353	90,755	4.3
90-91	0.168603	17,750	2,993	16,254	71,402	4.0
91-92	0.185302	14,758	2,735	13,390	55,149	3.7
92-93	0.202980	12,023	2,440	10,803	41,758	3.5
93-94	0.221569	9,583	2,123	8,521	30,955	3.2
94-95	0.240976	7,459	1,798	6,561	22,435	3.0
95-96	0.261085	5,662	1,478	4,923	15,874	2.8
96-97	0.281762	4,184	1,179	3,594	10,951	2.6
97-98	0.302853	3,005	910	2,550	7,357	2.4
98-99	0.324194	2,095	679	1,755	4,807	2.3
99-100	0.345609	1,416	489	1,171	3,052	2.2
100 and over	1.000000	926	926	1,881	1,881	2.0

NOTE: This life table is based on death rates that have been adjusted for race and ethnicity misclassification on death certificates.
SOURCE: CDC/NCHS, National Vital Statistics System.

EXHIBIT 8

Appendix A. 2011 U.S. General Population Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
All races

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
0-1	0.006575	1.0	0.0065750	100,000	658	99,427	5,474,009	54.7
1-2	0.000445	1.0	0.0004450	99,342	44	99,320	5,374,582	54.1
2-3	0.000301	1.0	0.0003010	99,298	30	99,283	5,275,262	53.1
3-4	0.000240	1.0	0.0002400	99,268	24	99,256	5,175,979	52.1
4-5	0.000183	1.0	0.0001830	99,244	18	99,235	5,076,723	51.2
5-6	0.000169	1.0	0.0001690	99,226	17	99,218	4,977,488	50.2
6-7	0.000150	1.0	0.0001500	99,209	15	99,202	4,878,271	49.2
7-8	0.000134	1.0	0.0001340	99,194	13	99,188	4,779,069	48.2
8-9	0.000115	1.0	0.0001150	99,181	11	99,176	4,679,882	47.2
9-10	0.000097	1.0	0.0000970	99,170	10	99,165	4,580,706	46.2
10-11	0.000085	1.0	0.0000850	99,160	8	99,156	4,481,541	45.2
11-12	0.000092	1.0	0.0000920	99,152	9	99,148	4,382,385	44.2
12-13	0.000132	1.0	0.0001320	99,143	13	99,137	4,283,238	43.2
13-14	0.000213	1.0	0.0002130	99,130	21	99,120	4,184,101	42.2
14-15	0.000323	1.0	0.0003230	99,109	32	99,093	4,084,982	41.2
15-16	0.000439	1.0	0.0004390	99,077	43	99,056	3,985,889	40.2
16-17	0.000552	1.0	0.0005520	99,034	55	99,007	3,886,833	39.2
17-18	0.000675	1.0	0.0006750	98,979	67	98,946	3,787,827	38.3
18-19	0.000807	3.3	0.0027013	98,912	267	98,779	3,688,881	37.3
19-20	0.000942	3.2	0.0030114	98,645	297	98,497	3,590,103	36.4
20-21	0.001085	3.0	0.0032334	98,348	318	98,189	3,491,606	35.5
21-22	0.001216	3.1	0.0038118	98,030	374	97,843	3,393,417	34.6
22-23	0.001310	3.3	0.0043592	97,656	426	97,443	3,295,574	33.7
23-24	0.001353	4.1	0.0054859	97,230	533	96,964	3,198,131	32.9
24-25	0.001358	4.6	0.0062542	96,697	605	96,395	3,101,168	32.1
25-26	0.001351	4.9	0.0066459	96,092	639	95,773	3,004,773	31.3

Appendix A. 2011 U.S. General Population Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
All races

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
26-27	0.001349	5.5	0.0074312	95,453	709	95,099	2,909,001	30.5
27-28	0.001353	5.8	0.0078989	94,744	748	94,370	2,813,902	29.7
28-29	0.001371	6.5	0.0089216	93,996	839	93,577	2,719,532	28.9
29-30	0.001399	6.5	0.0090478	93,157	843	92,736	2,625,956	28.2
30-31	0.001432	6.4	0.0091878	92,314	848	91,890	2,533,220	27.4
31-32	0.001464	6.9	0.0101313	91,466	927	91,003	2,441,330	26.7
32-33	0.001496	7.1	0.0106698	90,539	966	90,056	2,350,328	26.0
33-34	0.001528	7.4	0.0113651	89,573	1,018	89,064	2,260,272	25.2
34-35	0.001563	6.8	0.0106137	88,555	940	88,085	2,171,208	24.5
35-36	0.001613	6.4	0.0103475	87,615	907	87,162	2,083,123	23.8
36-37	0.001682	6.7	0.0112230	86,708	973	86,222	1,995,961	23.0
37-38	0.001764	7.1	0.0125987	85,735	1,080	85,195	1,909,740	22.3
38-39	0.001857	7.7	0.0142256	84,655	1,204	84,053	1,824,545	21.6
39-40	0.001964	7.8	0.0152915	83,451	1,276	82,813	1,740,492	20.9
40-41	0.002083	7.9	0.0164363	82,175	1,351	81,500	1,657,679	20.2
41-42	0.002227	7.7	0.0171008	80,824	1,382	80,133	1,576,179	19.5
42-43	0.002414	7.3	0.0176592	79,442	1,403	78,741	1,496,046	18.8
43-44	0.002653	6.8	0.0180473	78,039	1,408	77,335	1,417,306	18.2
44-45	0.002939	6.5	0.0191735	76,631	1,469	75,897	1,339,971	17.5
45-46	0.003243	6.7	0.0216755	75,162	1,629	74,348	1,264,074	16.8
46-47	0.003563	7.1	0.0252682	73,533	1,858	72,604	1,189,727	16.2
47-48	0.003922	7.1	0.0276631	71,675	1,983	70,684	1,117,123	15.6
48-49	0.004320	7.0	0.0301072	69,692	2,098	68,643	1,046,439	15.0
49-50	0.004749	6.9	0.0329621	67,594	2,228	66,480	977,796	14.5
50-51	0.005193	7.4	0.0383143	65,366	2,504	64,114	911,316	13.9
51-52	0.005647	7.4	0.0416080	62,862	2,616	61,554	847,202	13.5

Appendix A. 2011 U.S. General Population Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
All races

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
52-53	0.006122	7.3	0.0447095	60,246	2,694	58,899	785,648	13.0
53-54	0.006630	6.9	0.0458032	57,552	2,636	56,234	726,749	12.6
54-55	0.007181	7.0	0.0504908	54,916	2,773	53,530	670,515	12.2
55-56	0.007779	6.9	0.0535175	52,143	2,791	50,748	616,986	11.8
56-57	0.008415	6.6	0.0551671	49,352	2,723	47,991	566,238	11.5
57-58	0.009074	6.4	0.0577152	46,629	2,691	45,284	518,248	11.1
58-59	0.009727	6.3	0.0614132	43,938	2,698	42,589	472,964	10.8
59-60	0.010371	6.7	0.0697133	41,240	2,875	39,803	430,375	10.4
60-61	0.011034	7.1	0.0785312	38,365	3,013	36,859	390,573	10.2
61-62	0.011738	7.0	0.0823663	35,352	2,912	33,896	353,714	10.0
62-63	0.012489	6.9	0.0863986	32,440	2,803	31,039	319,818	9.9
63-64	0.013335	6.3	0.0838569	29,637	2,485	28,395	288,780	9.7
64-65	0.014319	6.0	0.0856537	27,152	2,326	25,989	260,385	9.6
65-66	0.015482	5.6	0.0871033	24,826	2,162	23,745	234,396	9.4
66-67	0.016824	5.7	0.0967221	22,664	2,192	21,568	210,651	9.3
67-68	0.018330	5.3	0.0977241	20,472	2,001	19,472	189,083	9.2
68-69	0.019900	4.6	0.0916566	18,471	1,693	17,625	169,612	9.2
69-70	0.021539	4.2	0.0895439	16,778	1,502	16,027	151,987	9.1
70-71	0.023396	4.1	0.0956488	15,276	1,461	14,546	135,960	8.9
71-72	0.025476	3.5	0.0901705	13,815	1,246	13,192	121,415	8.8
72-73	0.027794	3.5	0.0962033	12,569	1,209	11,965	108,223	8.6
73-74	0.030350	3.2	0.0979219	11,360	1,112	10,804	96,258	8.5
74-75	0.033204	2.8	0.0915335	10,248	938	9,779	85,454	8.3

Appendix A. 2011 U.S. General Population Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
All races

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
75-76	0.036345	2.6	0.0947418	9,310	882	8,869	75,675	8.1
76-77	0.039788	2.7	0.1093784	8,428	922	7,967	66,806	7.9
77-78	0.043720	2.6	0.1118552	7,506	840	7,086	58,839	7.8
78-79	0.048335	2.4	0.1145796	6,666	764	6,284	51,753	7.8
79-80	0.053650	2.2	0.1164621	5,902	687	5,559	45,469	7.7
80-81	0.059565	2.1	0.1253563	5,215	654	4,888	39,911	7.7
81-82	0.065848	1.0	0.0658480	4,561	300	4,411	35,023	7.7
82-83	0.072956	1.0	0.0729560	4,261	311	4,106	30,612	7.2
83-84	0.080741	1.0	0.0807410	3,950	319	3,791	26,506	6.7
84-85	0.089357	1.0	0.0893570	3,631	324	3,469	22,716	6.3
85-86	0.099650	1.0	0.0996500	3,307	330	3,142	19,247	5.8
86-87	0.110901	1.0	0.1109010	2,977	330	2,812	16,105	5.4
87-88	0.123146	1.0	0.1231460	2,647	326	2,484	13,293	5.0
88-89	0.136412	1.0	0.1364120	2,321	317	2,163	10,809	4.7
89-90	0.150710	1.0	0.1507100	2,004	302	1,853	8,646	4.3
90-91	0.166038	1.0	0.1660380	1,702	283	1,561	6,793	4.0
91-92	0.182374	1.0	0.1823740	1,419	259	1,290	5,233	3.7
92-93	0.199676	1.0	0.1996760	1,160	232	1,044	3,943	3.4
93-94	0.217880	1.0	0.2178800	928	202	827	2,899	3.1
94-95	0.236903	1.0	0.2369030	726	172	640	2,072	2.9
95-96	0.256636	1.0	0.2566360	554	142	483	1,432	2.6
96-97	0.276954	1.0	0.2769540	412	114	355	949	2.3
97-98	0.297713	1.0	0.2977130	298	89	254	594	2.0
98-99	0.318755	1.0	0.3187550	209	67	176	341	1.6
99-100	0.339914	1.0	0.3399140	142	48	118	165	1.2
100+	1.00000	1.0	1.0000000	94	94	47	47	0.5

EXHIBIT 9

Appendix B. 2011 U.S. General Population Non-Hispanic Black Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
Black men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
0-1	0.012502	1.0	0.0125020	100,000	1,250	99,007	5,516,944	55.2
1-2	0.000674	1.0	0.0006740	98,750	67	98,717	5,417,937	54.9
2-3	0.000494	1.0	0.0004940	98,683	49	98,659	5,319,221	53.9
3-4	0.000356	1.0	0.0003560	98,634	35	98,617	5,220,562	52.9
4-5	0.000316	1.0	0.0003160	98,599	31	98,584	5,121,946	51.9
5-6	0.000258	1.0	0.0002580	98,568	25	98,556	5,023,362	51.0
6-7	0.000224	1.0	0.0002240	98,543	22	98,532	4,924,807	50.0
7-8	0.000193	1.0	0.0001930	98,521	19	98,512	4,826,275	49.0
8-9	0.000161	1.0	0.0001610	98,502	16	98,494	4,727,763	48.0
9-10	0.000128	1.0	0.0001280	98,486	13	98,480	4,629,269	47.0
10-11	0.000107	1.0	0.0001070	98,473	11	98,468	4,530,790	46.0
11-12	0.000118	1.0	0.0001180	98,462	12	98,456	4,432,322	45.0
12-13	0.000183	1.0	0.0001830	98,450	18	98,441	4,333,866	44.0
13-14	0.000310	1.0	0.0003100	98,432	31	98,417	4,235,425	43.0
14-15	0.000481	1.0	0.0004810	98,401	47	98,378	4,137,009	42.0
15-16	0.000655	1.0	0.0006550	98,354	64	98,322	4,038,631	41.1
16-17	0.000822	1.0	0.0008220	98,290	81	98,250	3,940,309	40.1
17-18	0.001004	1.0	0.0010040	98,209	99	98,160	3,842,060	39.1
18-19	0.001206	2.5	0.0030332	98,110	298	97,961	3,743,900	38.2
19-20	0.001421	2.4	0.0033507	97,812	328	97,648	3,645,939	37.3
20-21	0.001654	2.0	0.0033826	97,484	330	97,319	3,548,291	36.4
21-22	0.001874	2.2	0.0040591	97,154	394	96,957	3,450,972	35.5
22-23	0.002041	2.1	0.0043329	96,760	419	96,551	3,354,015	34.7
23-24	0.002134	2.4	0.0051386	96,341	495	96,094	3,257,465	33.8
24-25	0.002168	2.6	0.0056559	95,846	542	95,575	3,161,371	33.0
25-26	0.002186	2.7	0.0059428	95,304	566	95,021	3,065,796	32.2

Appendix B. 2011 U.S. General Population Non-Hispanic Black Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
Black men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk I_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
26-27	0.002212	3.0	0.0065743	94,738	623	94,427	2,970,775	31.4
27-28	0.002230	3.3	0.0074117	94,115	698	93,766	2,876,349	30.6
28-29	0.002245	3.6	0.0081778	93,417	764	93,035	2,782,583	29.8
29-30	0.002259	3.7	0.0083570	92,653	774	92,266	2,689,548	29.0
30-31	0.002267	3.5	0.0078932	91,879	725	91,517	2,597,282	28.3
31-32	0.002276	3.9	0.0089569	91,154	816	90,746	2,505,765	27.5
32-33	0.002300	4.2	0.0097525	90,338	881	89,898	2,415,019	26.7
33-34	0.002350	4.5	0.0106481	89,457	953	88,981	2,325,122	26.0
34-35	0.002426	4.3	0.0103458	88,504	916	88,046	2,236,141	25.3
35-36	0.002527	3.9	0.0099009	87,588	867	87,155	2,148,095	24.5
36-37	0.002646	4.0	0.0105482	86,721	915	86,264	2,060,941	23.8
37-38	0.002772	4.4	0.0121608	85,806	1,043	85,285	1,974,677	23.0
38-39	0.002896	4.6	0.0134407	84,763	1,139	84,194	1,889,393	22.3
39-40	0.003027	5.0	0.0151857	83,624	1,270	82,989	1,805,199	21.6
40-41	0.003179	4.8	0.0151330	82,354	1,246	81,731	1,722,210	20.9
41-42	0.003369	4.7	0.0159715	81,108	1,295	80,461	1,640,479	20.2
42-43	0.003607	4.2	0.0150020	79,813	1,197	79,215	1,560,019	19.5
43-44	0.003902	3.8	0.0148330	78,616	1,166	78,033	1,480,804	18.8
44-45	0.004251	3.7	0.0158215	77,450	1,225	76,838	1,402,771	18.1
45-46	0.004616	4.3	0.0198424	76,225	1,512	75,469	1,325,934	17.4
46-47	0.005016	4.9	0.0244018	74,713	1,823	73,802	1,250,465	16.7
47-48	0.005513	4.8	0.0264818	72,890	1,930	71,925	1,176,663	16.1
48-49	0.006129	4.3	0.0266542	70,960	1,891	70,015	1,104,738	15.6
49-50	0.006838	4.2	0.0286250	69,069	1,977	68,081	1,034,724	15.0
50-51	0.007586	4.2	0.0321075	67,092	2,154	66,015	966,643	14.4
51-52	0.008344	4.2	0.0353362	64,938	2,295	63,791	900,628	13.9

Appendix B. 2011 U.S. General Population Non-Hispanic Black Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
Black men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
52-53	0.009145	4.2	0.0380858	62,643	2,386	61,450	836,838	13.4
53-54	0.010011	4.1	0.0412941	60,257	2,488	59,013	775,388	12.9
54-55	0.010959	4.2	0.0464298	57,769	2,682	56,428	716,375	12.4
55-56	0.011995	4.1	0.0494287	55,087	2,723	53,726	659,947	12.0
56-57	0.013107	3.9	0.0506911	52,364	2,654	51,037	606,221	11.6
57-58	0.014274	4.0	0.0567492	49,710	2,821	48,300	555,184	11.2
58-59	0.015455	4.0	0.0617318	46,889	2,895	45,442	506,885	10.8
59-60	0.016630	4.3	0.0722177	43,994	3,177	42,406	461,443	10.5
60-61	0.017888	4.6	0.0822606	40,817	3,358	39,138	419,038	10.3
61-62	0.019207	4.9	0.0932768	37,459	3,494	35,712	379,900	10.1
62-63	0.020451	4.6	0.0933672	33,965	3,171	32,380	344,188	10.1
63-64	0.021595	4.3	0.0933499	30,794	2,875	29,357	311,808	10.1
64-65	0.022717	4.0	0.0897633	27,919	2,506	26,666	282,452	10.1
65-66	0.023933	4.1	0.0972571	25,413	2,472	24,177	255,786	10.1
66-67	0.025369	4.2	0.1076218	22,941	2,469	21,707	231,609	10.1
67-68	0.027104	4.2	0.1140207	20,472	2,334	19,305	209,902	10.3
68-69	0.029089	4.0	0.1170901	18,138	2,124	17,076	190,597	10.5
69-70	0.031191	3.5	0.1077634	16,014	1,726	15,151	173,521	10.8
70-71	0.033429	3.5	0.1153442	14,288	1,648	13,464	158,370	11.1
71-72	0.035780	3.3	0.1169415	12,640	1,478	11,901	144,906	11.5
72-73	0.038397	1.0	0.0383970	11,162	429	10,948	133,005	11.9
73-74	0.041254	1.0	0.0412540	10,733	443	10,512	122,058	11.4
74-75	0.044174	1.0	0.0441740	10,290	455	10,063	111,546	10.8

Appendix B. 2011 U.S. General Population Non-Hispanic Black Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
Black men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
75-76	0.047704	1.0	0.0477040	9,835	469	9,601	101,484	10.3
76-77	0.051047	1.0	0.0510470	9,366	478	9,127	91,883	9.8
77-78	0.054624	1.0	0.0546240	8,888	485	8,646	82,756	9.3
78-79	0.059628	1.0	0.0596280	8,403	501	8,153	74,111	8.8
79-80	0.064976	1.0	0.0649760	7,902	513	7,646	65,958	8.3
80-81	0.070676	1.0	0.0706760	7,389	522	7,128	58,313	7.9
81-82	0.076651	1.0	0.0766510	6,867	526	6,604	51,185	7.5
82-83	0.085516	1.0	0.0855160	6,341	542	6,070	44,581	7.0
83-84	0.092664	1.0	0.0926640	5,799	537	5,531	38,511	6.6
84-85	0.100307	1.0	0.1003070	5,262	528	4,998	32,980	6.3
85-86	0.108460	1.0	0.1084600	4,734	513	4,478	27,982	5.9
86-87	0.117140	1.0	0.1171400	4,221	494	3,974	23,505	5.6
87-88	0.126357	1.0	0.1263570	3,727	471	3,492	19,531	5.2
88-89	0.136120	1.0	0.1361200	3,256	443	3,035	16,039	4.9
89-90	0.146432	1.0	0.1464320	2,813	412	2,607	13,005	4.6
90-91	0.157294	1.0	0.1572940	2,401	378	2,212	10,398	4.3
91-92	0.168701	1.0	0.1687010	2,023	341	1,853	8,186	4.0
92-93	0.180641	1.0	0.1806410	1,682	304	1,530	6,333	3.8
93-94	0.193099	1.0	0.1930990	1,378	266	1,245	4,803	3.5
94-95	0.206052	1.0	0.2060520	1,112	229	998	3,558	3.2
95-96	0.219470	1.0	0.2194700	883	194	786	2,561	2.9
96-97	0.233321	1.0	0.2333210	689	161	609	1,775	2.6
97-98	0.247561	1.0	0.2475610	528	131	463	1,166	2.2
98-99	0.262144	1.0	0.2621440	397	104	345	704	1.8
99-100	0.277019	1.0	0.2770190	293	81	253	359	1.2
100+	1.00000	1.0	1.0000000	212	212	106	106	0.5

EXHIBIT 10

Appendix C. 2011 U.S. General Population Non-Hispanic White Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
White men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
0-1	0.005524	1.0	0.0055240	100,000	552	99,517	5,349,849	53.5
1-2	0.000413	1.0	0.0004130	99,448	41	99,428	5,250,332	52.8
2-3	0.000273	1.0	0.0002730	99,407	27	99,394	5,150,905	51.8
3-4	0.000229	1.0	0.0002290	99,380	23	99,369	5,051,511	50.8
4-5	0.000156	1.0	0.0001560	99,357	15	99,350	4,952,143	49.8
5-6	0.000160	1.0	0.0001600	99,342	16	99,334	4,852,793	48.8
6-7	0.000146	1.0	0.0001460	99,326	15	99,319	4,753,459	47.9
7-8	0.000132	1.0	0.0001320	99,311	13	99,305	4,654,141	46.9
8-9	0.000114	1.0	0.0001140	99,298	11	99,293	4,554,836	45.9
9-10	0.000095	1.0	0.0000950	99,287	9	99,283	4,455,544	44.9
10-11	0.000082	1.0	0.0000820	99,278	8	99,274	4,356,261	43.9
11-12	0.000088	1.0	0.0000880	99,270	9	99,266	4,256,987	42.9
12-13	0.000125	1.0	0.0001250	99,261	12	99,255	4,157,722	41.9
13-14	0.000201	1.0	0.0002010	99,249	20	99,239	4,058,467	40.9
14-15	0.000305	1.0	0.0003050	99,229	30	99,214	3,959,228	39.9
15-16	0.000414	1.0	0.0004140	99,199	41	99,179	3,860,014	38.9
16-17	0.000522	1.0	0.0005220	99,158	52	99,132	3,760,835	37.9
17-18	0.000641	1.0	0.0006410	99,106	64	99,074	3,661,703	36.9
18-19	0.000773	1.0	0.0007730	99,042	77	99,004	3,562,629	36.0
19-20	0.000909	1.0	0.0009090	98,965	90	98,920	3,463,626	35.0
20-21	0.001053	3.0	0.0031812	98,875	315	98,718	3,364,706	34.0
21-22	0.001185	3.0	0.0035003	98,560	345	98,388	3,265,988	33.1
22-23	0.001283	3.7	0.0048065	98,215	472	97,979	3,167,601	32.3
23-24	0.001333	5.2	0.0069188	97,743	676	97,405	3,069,622	31.4
24-25	0.001349	6.3	0.0084401	97,067	819	96,658	2,972,217	30.6
25-26	0.001354	6.7	0.0090557	96,248	872	95,812	2,875,559	29.9

Appendix C. 2011 U.S. General Population Non-Hispanic White Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
White men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
26-27	0.001365	7.6	0.0103911	95,376	991	94,881	2,779,747	29.1
27-28	0.001379	7.2	0.0099736	94,385	941	93,915	2,684,867	28.4
28-29	0.001401	8.5	0.0118636	93,444	1,109	92,890	2,590,952	27.7
29-30	0.001432	8.2	0.0117347	92,335	1,084	91,793	2,498,063	27.1
30-31	0.001467	9.1	0.0133350	91,251	1,217	90,643	2,406,270	26.4
31-32	0.001502	9.2	0.0138762	90,034	1,249	89,410	2,315,627	25.7
32-33	0.001536	9.0	0.0137534	88,785	1,221	88,175	2,226,218	25.1
33-34	0.001570	8.9	0.0139552	87,564	1,222	86,953	2,138,043	24.4
34-35	0.001609	7.5	0.0121357	86,342	1,048	85,818	2,051,090	23.8
35-36	0.001665	7.2	0.0119280	85,294	1,017	84,786	1,965,272	23.0
36-37	0.001742	7.5	0.0131122	84,277	1,105	83,725	1,880,487	22.3
37-38	0.001829	7.7	0.0141275	83,172	1,175	82,585	1,796,762	21.6
38-39	0.001921	8.5	0.0163393	81,997	1,340	81,327	1,714,178	20.9
39-40	0.002023	8.0	0.0161387	80,657	1,302	80,006	1,632,851	20.2
40-41	0.002135	9.0	0.0191327	79,355	1,518	78,596	1,552,845	19.6
41-42	0.002273	8.5	0.0193702	77,837	1,508	77,083	1,474,249	18.9
42-43	0.002459	9.1	0.0222673	76,329	1,700	75,479	1,397,166	18.3
43-44	0.002703	8.6	0.0233308	74,629	1,741	73,759	1,321,687	17.7
44-45	0.002997	8.3	0.0247547	72,888	1,804	71,986	1,247,928	17.1
45-46	0.003309	7.6	0.0251269	71,084	1,786	70,191	1,175,942	16.5
46-47	0.003631	7.5	0.0272227	69,298	1,886	68,355	1,105,751	16.0
47-48	0.003984	7.6	0.0300949	67,412	2,029	66,398	1,037,396	15.4
48-49	0.004366	8.1	0.0354544	65,383	2,318	64,224	970,999	14.9
49-50	0.004768	8.2	0.0392386	63,065	2,475	61,828	906,775	14.4
50-51	0.005179	9.1	0.0469414	60,590	2,844	59,168	844,947	13.9
51-52	0.005596	9.0	0.0502853	57,746	2,904	56,294	785,779	13.6

Appendix C. 2011 U.S. General Population Non-Hispanic White Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
White men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
52-53	0.006034	9.0	0.0543075	54,842	2,978	53,353	729,485	13.3
53-54	0.006508	8.1	0.0527141	51,864	2,734	50,497	676,132	13.0
54-55	0.007026	8.1	0.0570244	49,130	2,802	47,729	625,635	12.7
55-56	0.007591	7.9	0.0600728	46,328	2,783	44,937	577,906	12.5
56-57	0.008191	7.6	0.0623023	43,545	2,713	42,189	532,970	12.2
57-58	0.008812	6.8	0.0603584	40,832	2,465	39,600	490,781	12.0
58-59	0.009425	6.6	0.0625852	38,367	2,401	37,167	451,182	11.8
59-60	0.010028	6.8	0.0683332	35,966	2,458	34,737	414,015	11.5
60-61	0.010645	7.2	0.0761226	33,508	2,551	32,233	379,278	11.3
61-62	0.011305	6.4	0.0722265	30,957	2,236	29,839	347,046	11.2
62-63	0.012031	6.6	0.0795687	28,721	2,285	27,579	317,207	11.0
63-64	0.012880	5.8	0.0746940	26,436	1,975	25,449	289,628	11.0
64-65	0.013896	5.9	0.0823396	24,461	2,014	23,454	264,180	10.8
65-66	0.015110	5.7	0.0858800	22,447	1,928	21,483	240,726	10.7
66-67	0.016503	4.8	0.0799398	20,519	1,640	19,699	219,243	10.7
67-68	0.018045	4.1	0.0747021	18,879	1,410	18,174	199,544	10.6
68-69	0.019623	4.1	0.0797052	17,469	1,392	16,773	181,370	10.4
69-70	0.021262	3.9	0.0838395	16,077	1,348	15,403	164,597	10.2
70-71	0.023146	3.7	0.0865662	14,729	1,275	14,092	149,194	10.1
71-72	0.025278	3.4	0.0853467	13,454	1,148	12,880	135,102	10.0
72-73	0.027630	3.5	0.0970708	12,306	1,195	11,709	122,222	9.9
73-74	0.030219	3.2	0.0952045	11,111	1,058	10,582	110,514	9.9
74-75	0.033126	2.8	0.0923638	10,053	929	9,589	99,932	9.9

Appendix C. 2011 U.S. General Population Non-Hispanic White Male Life Table
Life Expectancies Adjusted for South Carolina DC experience 1996 to 2015, followed to 2016
White men only

Age (years)	Basic Mortality q_x	Mortality Risk Factor	Adjusted Mortality q_x	Population at Risk l_x	Deaths d_x	Interval Person-years L_x	Cumulative Person-years T_x	Life Expectancy e_x
75-76	0.036255	2.5	0.0889904	9,124	812	8,718	90,343	9.9
76-77	0.039716	2.4	0.0954766	8,312	794	7,915	81,625	9.8
77-78	0.043757	1.0	0.0437570	7,518	329	7,354	73,710	9.8
78-79	0.048405	1.0	0.0484050	7,189	348	7,015	66,357	9.2
79-80	0.053785	1.0	0.0537850	6,841	368	6,657	59,342	8.7
80-81	0.059839	1.0	0.0598390	6,473	387	6,280	52,685	8.1
81-82	0.066176	1.0	0.0661760	6,086	403	5,885	46,405	7.6
82-83	0.073348	1.0	0.0733480	5,683	417	5,475	40,521	7.1
83-84	0.081302	1.0	0.0813020	5,266	428	5,052	35,046	6.7
84-85	0.090236	1.0	0.0902360	4,838	437	4,620	29,994	6.2
85-86	0.100743	1.0	0.1007430	4,401	443	4,180	25,375	5.8
86-87	0.112235	1.0	0.1122350	3,958	444	3,736	21,195	5.4
87-88	0.124750	1.0	0.1247500	3,514	438	3,295	17,459	5.0
88-89	0.138311	1.0	0.1383110	3,076	425	2,864	14,164	4.6
89-90	0.152931	1.0	0.1529310	2,651	405	2,449	11,301	4.3
90-91	0.168603	1.0	0.1686030	2,246	379	2,057	8,852	3.9
91-92	0.185302	1.0	0.1853020	1,867	346	1,694	6,796	3.6
92-93	0.202980	1.0	0.2029800	1,521	309	1,367	5,102	3.4
93-94	0.221569	1.0	0.2215690	1,212	269	1,078	3,735	3.1
94-95	0.240976	1.0	0.2409760	943	227	830	2,658	2.8
95-96	0.261085	1.0	0.2610850	716	187	623	1,828	2.6
96-97	0.281762	1.0	0.2817620	529	149	455	1,206	2.3
97-98	0.302853	1.0	0.3028530	380	115	323	751	2.0
98-99	0.324194	1.0	0.3241940	265	86	222	429	1.6
99-100	0.345609	1.0	0.3456090	179	62	148	207	1.2
100+	1.00000	1.0	1.0000000	117	117	59	59	0.5

THE STATE OF SOUTH CAROLINA
In The Supreme Court

APPEAL FROM CHARLESTON COUNTY
Court of Common Pleas
Honorable Kristi Lea Harrington, Circuit Court Judge

APPELLATE CASE NO. 2017-001178

RECEIVED

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S.C. SUPREME COURT

THE STATE

Respondent,

v.

TERRELL ARTIETH SMITH

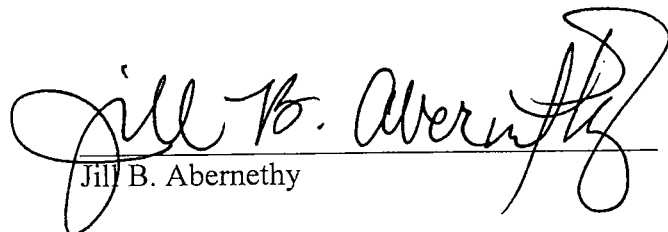
Appellant.

CERTIFICATE OF SERVICE

The undersign hereby certifies that a copy of the Brief of Justice 360 & Cornell Juvenile Justice Project as *Amicus Curiae* in Support of Appellant was serviced by first class United States mail, postage prepaid, this 8th day of October 2019 upon the following:

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