

## **A DEATH AND DISABILITY LIFE TABLE FOR INSURED WORKERS BORN IN 1991**

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### **Introduction**

The Social Security program is not just a program for providing income during retirement. A worker, who meets certain requirements for insured status will also receive monthly cash benefits in the event of disability.<sup>1</sup> Survivors may receive benefits after the death of an active worker, retired worker, or a disabled worker. This note illustrates the likelihood that a young worker, while maintaining insured status, will receive these types of benefits prior to becoming eligible for full retirement benefits. We make these illustrations using the intermediate assumptions of the 2011 Trustees Report. *Actuarial Note #2005.6*, which was based on the intermediate assumptions of the 2005 Trustees Report, was the prior publication that illustrated this likelihood.

In order to assess the financial condition of the Social Security program, we make projections of the number of insured workers who die or become disabled each year for the next 75 years. These projections depend on the age-sex-specific projections of mortality and disability incidence, and age-sex-duration-specific projections of disabled life mortality and recovery. Additional information regarding these projections is published by the Board of Trustees of the Old-Age and Survivors Insurance and Disability Insurance Trust Funds in annual reports (Trustees Reports) and in actuarial studies.<sup>2</sup>

Using rates of death, recovery, and disability incidence from the intermediate assumptions, we present estimates of the probability that an illustrative worker will become disabled or die before reaching normal retirement age. We define an illustrative worker in this note as follows: (a) born in 1991, that is, belongs to the 1991 birth cohort; (b) becomes insured at age 20 in 2011; and (c) maintains insured status thereafter. Normal retirement age, the age at which full Social Security benefits can be received, is age 67 for our illustrative worker. Table A compares these estimates using the 1991 birth cohort with those published in *Actuarial Note #129*, which used the 1966 birth cohort. The projected probabilities of death before normal retirement age have decreased

between the 1966 and 1991 cohorts, reflecting in part the actual improvement in mortality experience since 1986. The projected probability of becoming disabled before normal retirement age has decreased for insured men between the 1966 and 1991 cohorts, but has increased for insured females. For the 1991 insured cohort, we project that the probability of surviving from age 20 to normal retirement age without ever being disabled is 63 percent for males and 69 percent for females. Comparable probabilities projected for the 1966 insured cohort are 58 percent for males and 70 percent for females.

### **Assumptions and Methods**

Tables B and C show death and disability life tables for insured males and females, respectively, who were born in 1991. We derive death and disability rates by sex and single year of age (20 through 67) for four population groups: total, active, disabled, and recovered. The active group is composed of insured workers who are alive and have never been disabled. The disabled group consists of workers who are currently disabled. The recovered group consists of insured workers who have had a prior disability, but are not currently disabled. All workers are assumed to be fully and disability insured at all times after reaching age 20.<sup>3</sup> For each age, we calculate deaths, entitlements to disability-worker-benefits, and recoveries from the disability rolls. For each population (active, disabled, recovered, and total), we determine the number of persons alive at the beginning of the next year by adding and/or subtracting the relevant components of change to the number of persons alive at the beginning of the year.

For those born in 1991, we developed cohort insured life tables for each sex, from age 20 to age 67. To calculate total deaths for the insured population, we applied the age-sex-specific mortality rates of the general population to the beginning of the year total population.<sup>4</sup>

<sup>1</sup> Disabled means receiving Social Security disability benefits, and, thus, meeting all qualifications to receive these benefits.

<sup>2</sup> Additional information is located at the following internet site: <http://www.socialsecurity.gov/OACT/pubs.html>.

<sup>3</sup> Computing disability incidence rates by age using insured workers gives a larger probability of disability entitlement than if all workers were included in the calculations.

<sup>4</sup> Using general population mortality rates may slightly overstate death rates for the insured because the group excluded, the uninsured, are likely to have higher death rates than the general population.

We calculated deaths for the disabled population by applying age-sex-duration-specific<sup>5</sup> mortality rates to the beginning of the year disabled population. We assumed that newly entitled disabled-worker-beneficiaries, that is, those in duration 0, are exposed for half a year, since on average they become entitled at mid-year. We calculated deaths occurring to those who have recovered from disability (“recovered deaths”) by applying the age-sex-specific mortality rates of the general population to the recovered population at the beginning of the year, with adjustments. To make these adjustments, we added half of the newly recovered population and subtracted half of those newly disabled from the recovered population. Active deaths are the residual: subtract the disabled and recovered deaths from the total population deaths.

We developed cohort disability incidence rates for each sex, from age 20 to age 67, for those born in 1991. To calculate newly disabled-worker-beneficiaries, we applied the age-sex-specific incidence rates to the active and recovered populations at the beginning of the year.

Finally, we developed rates of recovery from disability for each sex, from age 20 to age 67, for those born in 1991. To calculate the number of recoveries from the disabled population we applied age-sex-duration-specific<sup>5</sup> recovery rates to the beginning of the year disabled population. We assumed that newly entitled disabled-worker-beneficiaries (in duration 0) are exposed for half a year.

## Results

Table B provides tabulations which allow for the computation of various probabilities of survival, death, and

<sup>5</sup> Age is age at entitlement to a disability-worker-benefit. Duration refers to the complete number of years since entitlement to a disability-worker-benefit.

disability for insured males born in 1991. Table C provides the same information for insured females born in 1991. For example, the probability that an insured female, age 25 in 2016, will survive to age 60 without ever becoming disabled is 78 percent. To get this result, we divided the number of active lives at age 60 (774,414) by the number of active lives at age 25 (986,940).

Table D uses the tabulations in tables B and C to derive various probabilities of survival, death, and disability for insured males and females born in 1991. We calculated the probability of survival without disability from age 20 to age  $x$  by dividing the active population at the beginning of the year at age  $x$  by the active population at the beginning of the year at age 20. The probability of dying or becoming disabled after age 20 and before age  $x$  is calculated as the complement, that is, 1 minus the probability of surviving without disability from age 20 to age  $x$ . For example, we project that an insured male worker who attained age 20 in 2011 has a 63 percent chance of surviving to age 67 without ever becoming disabled and a 37 percent chance of either dying or becoming disabled prior to age 67.

Table D also includes probabilities of an insured worker becoming disabled and of an insured worker dying while active. These probabilities are shown from age 20 to age  $x$ . We calculate these values by dividing the total newly disabled and the total deaths from the active population prior to age  $x$ , respectively, by the active population alive at the beginning of the year at age 20. For example, we project that an insured female worker who attained age 20 in 2011 has a 19 percent chance of becoming disabled before age 60. In addition, the probability that she will die before age 60 without receiving disability Social Security is only 4 percent.

**Table A: Probability of Death and/or Disability for Illustrative Cases of Insured Workers**

Trustees Report Year <sup>1</sup>	Year of Attainment of Age 20	Probability of Death Before NRA (while active <sup>2</sup> )			Probability of Disability Before NRA			Probability of Survival to NRA (never disabled)		
		Male	Female	Total <sup>3</sup>	Male	Female	Total <sup>3</sup>	Male	Female	Total <sup>3</sup>
1986	1986	0.095	0.060	0.077	0.322	0.240	0.281	0.583	0.700	0.642
2011	2011	0.091	0.049	0.070	0.276	0.260	0.268	0.633	0.691	0.662

<sup>1</sup> Calculations based on the intermediate assumptions of that year’s Trustees Report (intermediate II-B for the 1986 Trustees Report).

<sup>2</sup> Active workers are defined as those who are alive and have never been disabled.

<sup>3</sup> Totals are obtained by combining tables B and C. For example, the probability of dying before NRA while active would equal 7.0 percent,  $(91,124 + 48,917) / (1,000,000 + 1,000,000)$ .

Notes: Probabilities are determined assuming all are disability insured throughout their working lives.

For a recent historical perspective, see Actuarial Study 122, Social Security Disability Insurance Program Worker Experience at: <http://www.ssa.gov/OACT/NOTES/actstud.html>.





**Table D: Probabilities of Non-disability Survival, Death and Disability for Insured Workers Attaining Age 20 in 2011  
(Born in 1991)**

Males Attaining Age 20 in 2011					Females Attaining Age 20 in 2011				
Age <i>x</i>	Probability of Surviving Not Disabled From Age 20 To Age <i>x</i>	Probability of Disability From Age 20 To Age <i>x</i>	Probability of Death While Active From Age 20 To Age <i>x</i>	Probability of Disability or Death From Age 20 To Age <i>x</i>	Age <i>x</i>	Probability of Surviving Not Disabled From Age 20 To Age <i>x</i>	Probability of Disability From Age 20 To Age <i>x</i>	Probability of Death While Active From Age 20 To Age <i>x</i>	Probability of Disability or Death From Age 20 To Age <i>x</i>
21	99.6%	0.3%	0.1%	0.4%	21	99.7%	0.2%	0.0%	0.3%
22	99.2	0.5	0.3	0.8	22	99.5	0.4	0.1	0.5
23	98.8	0.8	0.4	1.2	23	99.2	0.6	0.1	0.8
24	98.3	1.1	0.6	1.7	24	99.0	0.9	0.2	1.0
25	97.9	1.4	0.7	2.1	25	98.7	1.1	0.2	1.3
26	97.5	1.7	0.8	2.5	26	98.5	1.3	0.3	1.5
27	97.2	1.8	1.0	2.8	27	98.3	1.4	0.3	1.7
28	96.9	2.0	1.1	3.1	28	98.0	1.6	0.4	2.0
29	96.6	2.2	1.2	3.4	29	97.8	1.8	0.4	2.2
30	96.3	2.3	1.4	3.7	30	97.6	1.9	0.5	2.4
31	96.0	2.5	1.5	4.0	31	97.4	2.1	0.5	2.6
32	95.7	2.7	1.6	4.3	32	97.1	2.3	0.6	2.9
33	95.4	2.9	1.7	4.6	33	96.8	2.6	0.6	3.2
34	95.0	3.2	1.8	5.0	34	96.5	2.8	0.7	3.5
35	94.7	3.4	1.9	5.3	35	96.2	3.1	0.7	3.8
36	94.3	3.7	2.0	5.7	36	95.9	3.4	0.8	4.1
37	93.9	4.0	2.1	6.1	37	95.5	3.7	0.8	4.5
38	93.5	4.3	2.2	6.5	38	95.1	4.0	0.9	4.9
39	93.1	4.6	2.4	6.9	39	94.7	4.3	0.9	5.3
40	92.6	4.9	2.5	7.4	40	94.3	4.7	1.0	5.7
41	92.1	5.2	2.6	7.9	41	93.8	5.1	1.1	6.2
42	91.6	5.6	2.8	8.4	42	93.4	5.5	1.2	6.6
43	91.1	6.0	2.9	8.9	43	92.8	5.9	1.3	7.2
44	90.5	6.4	3.1	9.5	44	92.3	6.3	1.4	7.7
45	89.9	6.9	3.3	10.1	45	91.7	6.8	1.5	8.3
46	89.2	7.3	3.5	10.8	46	91.1	7.3	1.6	8.9
47	88.5	7.8	3.7	11.5	47	90.5	7.8	1.8	9.5
48	87.8	8.3	3.9	12.2	48	89.8	8.3	1.9	10.2
49	87.1	8.8	4.1	12.9	49	89.1	8.9	2.0	10.9
50	86.3	9.4	4.4	13.7	50	88.4	9.5	2.2	11.6
51	85.3	10.0	4.7	14.7	51	87.5	10.1	2.3	12.5
52	84.3	10.7	5.0	15.7	52	86.6	10.9	2.5	13.4
53	83.2	11.5	5.3	16.8	53	85.6	11.7	2.6	14.4
54	82.1	12.3	5.6	17.9	54	84.7	12.5	2.8	15.3
55	81.0	13.1	5.9	19.0	55	83.7	13.4	2.9	16.3
56	79.8	14.1	6.2	20.2	56	82.6	14.4	3.1	17.4
57	78.3	15.2	6.4	21.7	57	81.3	15.5	3.2	18.7
58	76.9	16.4	6.7	23.1	58	80.1	16.6	3.4	19.9
59	75.4	17.6	6.9	24.6	59	78.8	17.7	3.5	21.2
60	73.9	19.0	7.2	26.1	60	77.4	18.9	3.6	22.6
61	72.2	20.4	7.4	27.8	61	76.1	20.1	3.8	23.9
62	70.4	21.9	7.7	29.6	62	74.8	21.3	3.9	25.2
63	68.6	23.4	7.9	31.4	63	73.4	22.5	4.1	26.6
64	66.9	24.9	8.2	33.1	64	72.1	23.7	4.2	27.9
65	65.4	26.2	8.5	34.6	65	70.9	24.6	4.4	29.1
66	64.2	27.1	8.8	35.8	66	70.0	25.4	4.6	30.0
67	63.3	27.6	9.1	36.7	67	69.1	26.0	4.9	30.9