

DISABILITY AND DEATH PROBABILITY TABLES
FOR INSURED WORKERS BORN IN 1997

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Introduction

The Social Security program is not just a program for providing income during retirement. Workers who meet certain requirements for insured status may receive monthly cash benefits before retirement age if they have impairments resulting in disability.¹ Survivors may receive benefits after the death of an insured worker, retired worker, or a disabled worker. This note illustrates the likelihood that a young worker, while maintaining insured status, will become disabled or die, resulting in payment of disability or survivor benefits prior to becoming eligible for full retirement benefits. We make these illustrations using the intermediate assumptions of the 2017 Trustees Report. This note succeeds *Actuarial Note Number 2016.6*, which was based on the intermediate assumptions of the 2016 Trustees Report.

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 age-sex-specific mortality and disability incidence rates, and age-sex-duration-specific disabled-life mortality and recovery rates. Additional information regarding these projections is provided in annual reports of the Board of Trustees of the Old-Age and Survivors Insurance and Disability Insurance Trust Funds (Trustees Reports) and in actuarial studies.²

Using projected rates of death, recovery, and disability incidence under the intermediate assumptions, we estimate the probability that an illustrative worker will become disabled or die before reaching normal retirement age (NRA). We define an illustrative worker in this note as follows: (a) born in 1997, that is, belongs to the 1997 birth cohort; (b) becomes insured at age 20 in 2017; (c) maintains insured status thereafter; and (d) retires at NRA. The NRA, the age at which a person may first become entitled to retirement benefits without reduction based on age, is age 67 for our illustrative

worker. Tables A and B compare these estimates using the 1997 birth cohort with those published in prior years. The projected probabilities of death before NRA have decreased between the 1966 and 1997 cohorts, reflecting in part the actual improvement in mortality experience between 1986 and 2017. The projected probability of becoming disabled before NRA has decreased for insured men between the 1966 and 1997 cohorts, but has increased for insured women. For the 1997 birth cohort, we project that the probability of surviving from age 20 to NRA without ever being disabled is 64 percent for males and 70 percent for females. Comparable probabilities projected for the 1966 birth cohort are 58 percent for males and 70 percent for females.

Table B shows the total projected probability of death as the sum of the probability of death while disabled and the probability of death while not disabled. Between the 1996 and 1997 cohorts, the projected probability of death before NRA increased for both males and females. However, the projected probability of becoming disabled (as shown in Table A) decreased between these cohorts.

Assumptions and Methods

Tables C and D show disability and death probabilities for insured males and females, respectively, who were born in 1997. 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 entitled to receive a Social Security disabled-worker benefit. The recovered group consists of insured workers who have had a prior disability, but are not currently entitled to receive a disabled-worker benefit. All workers are assumed to be fully and disability insured at all times after reaching age 20.³ For each age, we calculate deaths, entitlements to disabled-worker benefits, and recoveries from the disability rolls. For each population group (active, disabled, recovered, and total), we determine the number of

¹ Disabled means inability to engage in any substantial gainful activity as a result of medically determinable physical or mental impairments that can be expected to result in death or to last for a continuous period of not less than 12 months. Special rules apply for workers at ages 55 and over whose disability is based on blindness.

² These publications may be found at: <http://www.ssa.gov/OACT/pubs.html>.

³ 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.

persons alive at the beginning of the next year by adding or subtracting the relevant components of change to the number of persons alive at the beginning of the year.

For those born in 1997, we develop cohort insured life tables for each sex, from age 20 to age 67. To calculate total deaths for the insured population, we apply the age-sex-specific mortality rates of the general population to the total population at the beginning of the year.⁴

We calculate deaths for the disabled population by applying age-sex-duration-specific⁵ mortality rates to the disabled population at the beginning of the year. We assume that newly entitled disabled-worker beneficiaries, that is, those in duration 0, are exposed for half a year, because on average they become entitled at mid-year. We calculate deaths for 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 add half of the newly recovered population and subtract half of those newly disabled from the recovered population. Active deaths are the residual: we subtract the disabled deaths and recovered deaths from the total population deaths.

We develop cohort disability incidence rates for each sex, from age 20 to age 67, for those born in 1997. To calculate the number of new disabled-worker beneficiaries, we apply the age-sex-specific incidence rates to the active and recovered populations at the beginning of the year.

Finally, we develop rates of recovery from disability for each sex, from age 20 to age 67, for those born in 1997. To calculate the number of recoveries from the disabled population, we apply age-sex-duration-specific⁵ recovery rates to the beginning of the year disabled popula-

tion. We assume that newly entitled disabled-worker beneficiaries (in duration 0) are exposed for half a year.

Results

Table C provides tabulations which allow for the computation of various probabilities of survival, death, and disability for insured males born in 1997. Table D provides the same information for insured females born in 1997. For example, the probability that an insured female, age 25 in 2022, will survive to age 60 without ever becoming disabled is 79 percent. To get this result, we divide the number of active lives at age 60 (778,419) by the number of active lives at age 25 (990,671).

Table E uses the tabulations in tables C and D to derive various probabilities of disability, death, and survival for insured males and females born in 1997. We calculate the probability of survival without disability from age 20 to age x by dividing the active insured population at the beginning of the year at age x by the active insured 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 2017 has a 64 percent chance of surviving to age 67 without ever becoming disabled and a 36 percent chance of either dying or becoming disabled prior to age 67.

Table E also includes probabilities of an insured worker becoming disabled and of an insured worker dying while never disabled. 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 insured population from age 20 to age x , respectively, by the active insured population alive at the beginning of the year of attaining age 20. For example, we project that an insured female worker who attained age 20 in 2017 has a 19 percent chance of becoming disabled between age 20 and age 60. In addition, the probability that she will die between age 20 and age 60 without ever receiving Social Security disability benefits is only 3 percent.

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

⁵ Age is age at entitlement to a disabled-worker benefit. Duration refers to the complete number of years since entitlement to a disabled-worker benefit.

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

Trustees Report Year ¹ (Year of Attainment of Age 20)	Year of Birth	Probability of Disability Before NRA			Probability of Death While Never Disabled Before NRA			Probability of Survival to NRA With No Disability		
		Male	Female	Total ²	Male	Female	Total ²	Male	Female	Total ²
1986	1966	0.322	0.240	0.281	0.095	0.060	0.077	0.583	0.700	0.642
2011	1991	0.276	0.260	0.268	0.091	0.049	0.070	0.633	0.691	0.662
2012	1992	0.276	0.264	0.270	0.090	0.048	0.069	0.634	0.688	0.661
2013	1993	0.275	0.264	0.270	0.085	0.044	0.065	0.639	0.692	0.666
2014	1994	0.277	0.263	0.270	0.082	0.042	0.062	0.641	0.695	0.668
2015	1995	0.279	0.265	0.272	0.078	0.040	0.059	0.643	0.695	0.669
2016	1996	0.277	0.262	0.270	0.078	0.041	0.059	0.645	0.697	0.671
2017	1997	0.275	0.260	0.268	0.080	0.042	0.061	0.645	0.697	0.671

¹ Calculations are based on the intermediate assumptions of that year's Trustees Report (alternative II-B for the 1986 Trustees Report).

² Totals are obtained by combining tables C and D. For example, the probability of death while never disabled before NRA equals 6.1 percent for the 1997 birth cohort $(80,261 + 42,069) / (1,000,000 + 1,000,000)$.

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

For a recent historical perspective, see Actuarial Study 123, Social Security Disability Insurance Program Worker Experience, at: <http://www.ssa.gov/OACT/NOTES/actstud.html>.

Table B: Probability of Death for Illustrative Cases of Insured Workers by Disabled Status

Trustees Report Year ¹ (Year of Attainment of Age 20)	Year of Birth	(A) = (B) + (C)			(B)			(C)		
		Probability of Death Before NRA			Probability of Death While Disabled Before NRA			Probability of Death While Not Disabled Before NRA ²		
		Male	Female	Total ³	Male	Female	Total ³	Male	Female	Total ³
1986	1966	0.221	0.129	0.175	0.121	0.067	0.094	0.100	0.062	0.081
2011	1991	0.155	0.096	0.125	0.061	0.045	0.053	0.094	0.050	0.072
2012	1992	0.153	0.095	0.124	0.061	0.045	0.053	0.092	0.049	0.071
2013	1993	0.149	0.090	0.119	0.061	0.045	0.053	0.088	0.045	0.066
2014	1994	0.145	0.088	0.116	0.061	0.045	0.053	0.084	0.043	0.064
2015	1995	0.143	0.087	0.115	0.063	0.045	0.054	0.080	0.042	0.061
2016	1996	0.142	0.087	0.115	0.062	0.045	0.053	0.081	0.042	0.061
2017	1997	0.144	0.088	0.116	0.061	0.045	0.053	0.082	0.043	0.063

¹ Calculations are based on the intermediate assumptions of that year's Trustees Report (alternative II-B for the 1986 Trustees Report).

² Includes workers who recovered from disabilities.

³ Totals are obtained by combining tables C and D. For example, the probability of death while disabled before NRA equals 5.3 percent for the 1997 birth cohort $(61,169 + 45,034) / (1,000,000 + 1,000,000)$.

Notes:

1. Probabilities are determined assuming all illustrative workers are disability insured throughout their working lives.

For a recent historical perspective, see Actuarial Study 123, Social Security Disability Insurance Program Worker Experience, at: <http://www.ssa.gov/OACT/NOTES/actstud.html>.

2. Totals do not necessarily equal the sum of rounded components.

Table D: Disability and Death Probabilities for the Female 1997 Birth Cohort

Age x	Living At Beginning Of Year				Deaths								Newly Disabled							
					Total		Active		Disabled		Recovered		Total		Active		Recovered		Newly Recovered	
	Total	Active	Disabled	Recovered	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$	x to $x+1$	20 to $x+1$
20	1,000,000	1,000,000	-	-	344	344	339	339	5	5	-	-	1,397	1,397	1,397	1,397	-	-	3	3
21	999,656	998,264	1,389	3	381	725	367	706	14	19	-	-	1,448	2,845	1,448	2,845	-	-	13	16
22	999,275	996,449	2,810	16	415	1,140	393	1,099	22	41	-	-	1,513	4,358	1,513	4,358	-	-	22	38
23	998,860	994,543	4,279	38	443	1,583	412	1,511	31	72	-	-	1,520	5,878	1,520	5,878	-	-	32	70
24	998,417	992,611	5,736	70	468	2,051	428	1,939	40	112	-	-	1,512	7,390	1,512	7,390	-	-	59	129
25	997,949	990,671	7,149	129	493	2,544	440	2,379	53	165	-	-	1,370	8,760	1,370	8,760	-	-	129	258
26	997,456	988,861	8,337	258	520	3,064	456	2,835	64	229	-	-	1,269	10,029	1,269	10,029	-	-	202	460
27	996,936	987,136	9,340	460	546	3,610	475	3,310	71	300	-	-	1,354	11,383	1,353	11,382	1	1	241	701
28	996,390	985,308	10,382	700	572	4,182	495	3,805	77	377	-	-	1,430	12,813	1,429	12,811	1	2	273	974
29	995,818	983,384	11,462	972	598	4,780	507	4,312	90	467	1	1	1,511	14,324	1,510	14,321	1	3	287	1,261
30	995,220	981,367	12,596	1,257	625	5,405	513	4,825	111	578	1	2	1,756	16,080	1,754	16,075	2	5	318	1,579
31	994,595	979,100	13,923	1,572	653	6,058	516	5,341	136	714	1	3	2,055	18,135	2,052	18,127	3	8	352	1,931
32	993,942	976,532	15,490	1,920	682	6,740	525	5,866	156	870	1	4	2,243	20,378	2,239	20,366	4	12	371	2,302
33	993,260	973,768	17,206	2,286	711	7,451	528	6,394	181	1,051	2	6	2,457	22,835	2,451	22,817	6	18	389	2,691
34	992,549	970,789	19,093	2,667	742	8,193	534	6,928	206	1,257	2	8	2,689	25,524	2,682	25,499	7	25	410	3,101
35	991,807	967,573	21,166	3,068	779	8,972	547	7,475	229	1,486	3	11	2,910	28,434	2,901	28,400	9	34	429	3,530
36	991,028	964,125	23,418	3,485	820	9,792	559	8,034	258	1,744	3	14	3,093	31,527	3,082	31,482	11	45	448	3,978
37	990,208	960,484	25,805	3,919	859	10,651	570	8,604	285	2,029	4	18	3,287	34,814	3,274	34,756	13	58	484	4,462
38	989,349	956,640	28,323	4,386	895	11,546	573	9,177	318	2,347	4	22	3,493	38,307	3,477	38,233	16	74	502	4,964
39	988,454	952,590	30,996	4,868	934	12,480	573	9,750	356	2,703	5	27	3,714	42,021	3,695	41,928	19	93	522	5,486
40	987,520	948,322	33,832	5,366	978	13,458	584	10,334	388	3,091	6	33	3,930	45,951	3,908	45,836	22	115	568	6,054
41	986,542	943,830	36,806	5,906	1,033	14,491	615	10,949	412	3,503	6	39	4,154	50,105	4,128	49,964	26	141	601	6,655
42	985,509	939,087	39,947	6,475	1,108	15,599	633	11,582	467	3,970	8	47	4,373	54,478	4,343	54,307	30	171	616	7,271
43	984,401	934,111	43,237	7,053	1,207	16,806	682	12,264	516	4,486	9	56	4,618	59,096	4,583	58,890	35	206	638	7,909
44	983,194	928,846	46,701	7,647	1,324	18,130	741	13,005	572	5,058	11	67	4,843	63,939	4,803	63,693	40	246	641	8,550
45	981,870	923,302	50,331	8,237	1,450	19,580	815	13,820	622	5,680	13	80	5,194	69,133	5,148	68,841	46	292	687	9,237
46	980,420	917,339	54,216	8,865	1,580	21,160	875	14,695	690	6,370	15	95	5,557	74,690	5,504	74,345	53	345	740	9,977
47	978,840	910,960	58,343	9,537	1,727	22,887	954	15,649	756	7,126	17	112	5,781	80,471	5,721	80,066	60	405	742	10,719
48	977,113	904,285	62,626	10,202	1,887	24,774	1,030	16,679	837	7,963	20	132	5,975	86,446	5,908	85,974	67	472	741	11,460
49	975,226	897,347	67,023	10,856	2,059	26,833	1,094	17,773	941	8,904	24	156	6,142	92,588	6,069	92,043	73	545	706	12,166
50	973,167	890,184	71,518	11,465	2,237	29,070	1,226	18,999	984	9,888	27	183	7,439	100,027	7,344	99,387	95	640	729	12,895
51	970,930	881,614	77,244	12,072	2,416	31,486	1,301	20,300	1,084	10,972	31	214	8,922	108,949	8,801	108,188	121	761	725	13,620
52	968,514	871,512	84,357	12,645	2,583	34,069	1,325	21,625	1,223	12,195	35	249	9,903	117,852	8,776	116,964	127	888	718	14,338
53	965,931	861,411	91,319	13,201	2,735	36,804	1,366	22,991	1,331	13,526	38	287	8,756	126,608	8,624	125,588	132	1,020	715	15,053
54	963,196	851,421	98,029	13,746	2,875	39,679	1,368	24,359	1,465	14,991	42	329	8,933	135,541	8,791	134,379	142	1,162	651	15,704
55	960,321	841,262	104,846	14,213	3,042	42,721	1,455	25,814	1,541	16,532	46	375	10,078	145,619	9,911	144,290	167	1,329	672	16,376
56	957,279	829,896	112,711	14,672	3,219	45,940	1,524	27,338	1,645	18,177	50	425	11,495	157,114	11,295	155,585	200	1,529	682	17,058
57	954,060	817,077	121,879	15,104	3,354	49,294	1,511	28,849	1,789	19,966	54	479	11,610	168,724	11,399	166,984	211	1,740	641	17,699
58	950,706	804,167	131,059	15,480	3,428	52,722	1,376	30,225	1,995	21,961	57	536	11,614	180,338	11,395	178,379	219	1,959	628	18,327
59	947,278	791,396	140,050	15,832	3,478	56,200	1,185	31,410	2,234	24,195	59	595	12,028	192,366	11,792	190,171	236	2,195	597	18,924
60	943,800	778,419	149,247	16,134	3,526	59,726	1,144	32,554	2,321	26,516	61	656	11,953	204,319	11,710	201,881	243	2,438	669	19,593
61	940,274	765,565	158,210	16,499	3,641	63,367	1,084	33,638	2,492	29,008	65	721	11,960	216,279	11,708	213,589	252	2,690	720	20,313
62	936,633	752,773	166,958	16,902	3,892	67,259	1,074	34,712	2,747	31,755	71	792	12,243	228,522	11,974	225,563	269	2,959	643	20,956
63	932,741	739,725	175,811	17,205	4,320	71,579	1,195	35,907	3,045	34,800	80	872	11,729	240,251	11,462	237,025	267	3,226	520	21,476
64	928,421	727,068	183,975	17,378	4,892	76,471	1,477	37,384	3,323	38,123	92	964	9,949	250,200	9,717	246,742	232	3,458	460	21,936
65	923,529	715,874	190,141	17,514	5,566	82,037	2,087	39,471	3,373	41,496	106	1,070	7,982	258,182	7,791	254,533	191	3,649	355	22,291
66	917,963	705,996	194,395	17,572	6,256	88,293	2,598	42,069	3,538	45,034	120	1,190	6,050	264,232	5,903	260,436	147	3,796	294	22,585
67	911,707	697,495	196,613	17,599																

**Table E: Probabilities of Disability, Death, and Survival for Insured Workers Attaining Age 20 in 2017
(1997 Birth Cohort)**

Males Attaining Age 20 in 2017					Females Attaining Age 20 in 2017				
Age x	Probability of Survival With No Disability From Age 20 To Age x	Probability of Disability From Age 20 To Age x	Probability of Death While Never Disabled From Age 20 To Age x	Probability of Death or Disability From Age 20 To Age x	Age x	Probability of Survival With No Disability From Age 20 To Age x	Probability of Disability From Age 20 To Age x	Probability of Death While Never Disabled From Age 20 To Age x	Probability of Death or Disability From Age 20 To Age x
21	99.7	0.2	0.1	0.3	21	99.8	0.1	0.0	0.2
22	99.4	0.4	0.2	0.6	22	99.6	0.3	0.1	0.4
23	99.0	0.7	0.3	1.0	23	99.5	0.4	0.1	0.5
24	98.7	0.9	0.4	1.3	24	99.3	0.6	0.2	0.7
25	98.3	1.1	0.5	1.7	25	99.1	0.7	0.2	0.9
26	98.0	1.3	0.6	2.0	26	98.9	0.9	0.2	1.1
27	97.8	1.5	0.8	2.2	27	98.7	1.0	0.3	1.3
28	97.5	1.6	0.9	2.5	28	98.5	1.1	0.3	1.5
29	97.2	1.8	1.0	2.8	29	98.3	1.3	0.4	1.7
30	96.9	2.0	1.1	3.1	30	98.1	1.4	0.4	1.9
31	96.6	2.2	1.2	3.4	31	97.9	1.6	0.5	2.1
32	96.3	2.4	1.3	3.7	32	97.7	1.8	0.5	2.3
33	95.9	2.6	1.5	4.1	33	97.4	2.0	0.6	2.6
34	95.6	2.9	1.6	4.4	34	97.1	2.3	0.6	2.9
35	95.2	3.1	1.7	4.8	35	96.8	2.5	0.7	3.2
36	94.8	3.4	1.8	5.2	36	96.4	2.8	0.7	3.6
37	94.4	3.7	1.9	5.6	37	96.0	3.1	0.8	4.0
38	94.0	4.0	2.0	6.0	38	95.7	3.5	0.9	4.3
39	93.6	4.3	2.1	6.4	39	95.3	3.8	0.9	4.7
40	93.1	4.6	2.2	6.9	40	94.8	4.2	1.0	5.2
41	92.7	5.0	2.4	7.3	41	94.4	4.6	1.0	5.6
42	92.2	5.4	2.5	7.8	42	93.9	5.0	1.1	6.1
43	91.7	5.8	2.6	8.3	43	93.4	5.4	1.2	6.6
44	91.1	6.2	2.7	8.9	44	92.9	5.9	1.2	7.1
45	90.5	6.6	2.8	9.5	45	92.3	6.4	1.3	7.7
46	89.9	7.1	3.0	10.1	46	91.7	6.9	1.4	8.3
47	89.3	7.6	3.1	10.7	47	91.1	7.4	1.5	8.9
48	88.6	8.1	3.3	11.4	48	90.4	8.0	1.6	9.6
49	87.9	8.7	3.4	12.1	49	89.7	8.6	1.7	10.3
50	87.1	9.2	3.6	12.9	50	89.0	9.2	1.8	11.0
51	86.3	9.9	3.8	13.7	51	88.2	9.9	1.9	11.8
52	85.2	10.7	4.0	14.8	52	87.2	10.8	2.0	12.8
53	84.2	11.6	4.2	15.8	53	86.1	11.7	2.2	13.9
54	83.1	12.4	4.5	16.9	54	85.1	12.6	2.3	14.9
55	82.0	13.3	4.7	18.0	55	84.1	13.4	2.4	15.9
56	80.7	14.3	5.0	19.3	56	83.0	14.4	2.6	17.0
57	79.2	15.5	5.3	20.8	57	81.7	15.6	2.7	18.3
58	77.7	16.7	5.6	22.3	58	80.4	16.7	2.9	19.6
59	76.2	17.9	5.9	23.8	59	79.1	17.8	3.0	20.9
60	74.7	19.2	6.1	25.3	60	77.8	19.0	3.1	22.2
61	73.0	20.6	6.4	27.0	61	76.6	20.2	3.3	23.4
62	71.4	22.0	6.6	28.6	62	75.3	21.4	3.4	24.7
63	69.7	23.5	6.9	30.3	63	74.0	22.6	3.5	26.0
64	68.0	24.9	7.1	32.0	64	72.7	23.7	3.6	27.3
65	66.6	26.0	7.4	33.4	65	71.6	24.7	3.7	28.4
66	65.4	26.9	7.7	34.6	66	70.6	25.5	3.9	29.4
67	64.5	27.5	8.0	35.5	67	69.7	26.0	4.2	30.3

Note: Totals do not necessarily equal the sums of rounded components.