

DISABILITY AND DEATH PROBABILITY TABLES
FOR INSURED WORKERS BORN IN 1995

by Johanna Maleh and Tiffany Bosley

Introduction

The Social Security program is not just a program for providing income during retirement. A worker who meets 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 2015 Trustees Report. This note succeeds *Actuarial Note Number 2014.6*, which was based on the intermediate assumptions of the 2014 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 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.²

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 1995, that is, belongs to the 1995 birth cohort; (b) becomes insured at age 20 in 2015; 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. Tables A and B compare these estimates using the 1995 birth cohort with those published in prior years. The projected probabilities of death before normal retirement age have

decreased between the 1966 and 1995 cohorts, reflecting in part the actual improvement in mortality experience between 1986 and 2015. The projected probability of becoming disabled before normal retirement age has decreased for insured men between the 1966 and 1995 cohorts, but has increased for insured women. For the 1995 birth cohort, we project that the probability of surviving from age 20 to normal retirement age without ever being disabled is 64 percent for males and 69 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 1994 and 1995 cohorts, the projected probability of death before normal retirement age decreased slightly for both sexes. However, the projected probability of becoming disabled (as shown in Table A) increased slightly 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 1995. 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 disability-worker-benefits, and recoveries from the disability rolls. For each population group (active, disabled, recovered, and total), we determine the number of persons alive at the beginning of the next year by adding

¹ Disabled means inability to engage in any substantial gainful activity as a result of physical or mental impairments.

² These publications may be found at: <http://www.socialsecurity.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.

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

For those born in 1995, 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, since 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 1995. 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 1995. 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 1995. Table D provides the same information for insured females born in 1995. For example, the probability that an insured female, age 25 in 2020, will survive to age 60 without ever becoming disabled is 78 percent. To get this result, we divide the number of active lives at age 60 (775,323) by the number of active lives at age 25 (989,396).

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 1995. We calculate 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 2015 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 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 2015 has a 19 percent chance of becoming disabled before age 60. In addition, the probability that she will die before 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

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 5.9 percent for the 1995 birth cohort $(77,600 + 40,457) / (1,000,000 + 1,000,000)$.

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.socialsecurity.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

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 5.4 percent for the 1995 birth cohort $(62,905 + 45,090) / (1,000,000 + 1,000,000)$.

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.socialsecurity.gov/OACT/NOTES/actstud.html>.

Table D: Disability and Death Probabilities for the Female 1995 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			
20	1,000,000	1,000,000	0	0	364	364	360	360	4	4	0	0	1,407	1,407	1,407	1,407	0	0	2	2	
21	999,636	998,233	1,401	2	402	766	388	748	14	18	0	0	1,531	2,938	1,531	2,938	0	0	9	11	
22	999,234	996,314	2,909	11	436	1,202	414	1,162	22	40	0	0	1,750	4,688	1,750	4,688	0	0	20	31	
23	998,798	994,150	4,617	31	462	1,664	429	1,591	33	73	0	0	1,911	6,599	1,911	6,599	0	0	30	61	
24	998,336	991,810	6,465	61	484	2,148	439	2,030	45	118	0	0	1,975	8,574	1,975	8,574	0	0	52	113	
25	997,852	989,396	8,343	113	506	2,654	444	2,474	62	180	0	0	1,732	10,306	1,732	10,306	0	0	109	222	
26	997,346	987,220	9,904	222	529	3,183	454	2,928	75	255	0	0	1,518	11,824	1,518	11,824	0	0	170	392	
27	996,817	985,248	11,177	392	552	3,735	469	3,397	83	338	0	0	1,563	13,387	1,562	13,386	1	1	204	596	
28	996,265	983,217	12,453	595	576	4,311	487	3,884	89	427	0	0	1,636	15,023	1,635	15,021	1	2	233	829	
29	995,689	981,095	13,767	827	600	4,911	499	4,383	100	527	1	1	1,708	16,731	1,707	16,728	1	3	250	1,079	
30	995,089	978,889	15,125	1,075	628	5,539	509	4,892	118	645	1	2	1,925	18,656	1,923	18,651	2	5	297	1,376	
31	994,461	976,457	16,635	1,369	656	6,195	517	5,409	138	783	1	3	2,198	20,854	2,195	20,846	3	8	351	1,727	
32	993,805	973,745	18,344	1,716	679	6,874	520	5,929	158	941	1	4	2,393	23,247	2,389	23,235	4	12	376	2,103	
33	993,126	970,836	20,203	2,087	692	7,566	509	6,438	181	1,122	2	6	2,605	25,852	2,599	25,834	6	18	398	2,501	
34	992,434	967,728	22,229	2,477	703	8,269	494	6,932	207	1,329	2	8	2,833	28,685	2,826	28,660	7	25	425	2,926	
35	991,731	964,408	24,430	2,893	718	8,987	485	7,417	231	1,560	2	10	2,987	31,672	2,978	31,638	9	34	460	3,386	
36	991,013	960,945	26,726	3,342	742	9,729	475	7,892	264	1,824	3	13	3,115	34,787	3,104	34,742	11	45	489	3,875	
37	990,271	957,366	29,088	3,817	776	10,505	485	8,377	288	2,112	3	16	3,306	38,093	3,293	38,035	13	58	530	4,405	
38	989,495	953,588	31,576	4,331	822	11,327	499	8,876	319	2,431	4	20	3,497	41,590	3,481	41,516	16	74	550	4,955	
39	988,673	949,608	34,204	4,861	881	12,208	521	9,397	355	2,786	5	25	3,724	45,314	3,705	45,221	19	93	573	5,528	
40	987,792	945,382	37,000	5,410	945	13,153	550	9,947	390	3,176	5	30	3,937	49,251	3,915	49,136	22	115	629	6,157	
41	986,847	940,917	39,918	6,012	1,021	14,174	597	10,544	417	3,593	7	37	4,158	53,409	4,132	53,268	26	141	654	6,811	
42	985,826	936,188	43,005	6,633	1,122	15,296	645	11,889	469	4,062	8	45	4,397	57,806	4,366	57,634	31	172	667	7,478	
43	984,704	931,177	46,266	7,261	1,251	16,547	727	11,916	514	4,576	10	55	4,645	62,451	4,609	62,243	36	208	684	8,162	
44	983,453	925,841	49,713	7,899	1,401	17,948	817	12,733	572	5,148	12	67	4,867	67,318	4,826	67,069	41	249	683	8,845	
45	982,052	920,198	53,325	8,529	1,558	19,506	903	13,636	641	5,789	14	81	5,219	72,537	5,171	72,240	48	297	730	9,575	
46	980,494	914,124	57,173	9,197	1,713	21,219	963	14,599	733	6,522	17	98	5,575	78,112	5,519	77,759	56	353	782	10,357	
47	978,781	907,642	61,233	9,906	1,877	23,096	1,060	15,659	797	7,319	20	118	5,798	83,910	5,735	83,494	63	416	781	11,138	
48	976,904	900,847	65,453	10,604	2,049	25,145	1,151	16,810	875	8,194	23	141	5,994	89,904	5,924	89,418	70	486	780	11,918	
49	974,855	893,772	69,792	11,291	2,222	27,367	1,216	18,026	980	9,174	26	167	6,180	96,084	6,103	95,521	77	563	735	12,653	
50	972,633	886,453	74,257	11,923	2,407	29,774	1,353	19,379	1,024	10,198	30	197	7,424	103,508	7,325	102,846	99	662	760	13,413	
51	970,226	877,775	79,897	12,554	2,583	32,357	1,421	20,800	1,128	11,326	34	231	8,858	112,366	8,733	111,579	125	787	750	14,163	
52	967,643	867,621	86,877	13,145	2,714	35,071	1,409	22,209	1,267	12,593	38	269	9,909	121,275	8,776	120,355	133	920	742	14,905	
53	964,929	857,436	93,777	13,716	2,791	37,862	1,374	23,583	1,376	13,969	41	310	8,812	130,087	8,673	129,028	139	1,059	733	15,638	
54	962,138	847,389	100,480	14,269	2,831	40,693	1,265	24,848	1,523	15,492	43	353	9,068	139,155	8,918	137,946	150	1,209	667	16,305	
55	959,307	837,206	107,358	14,743	2,888	43,581	1,291	26,139	1,552	17,044	45	398	10,146	149,301	9,970	147,916	176	1,385	690	16,995	
56	956,419	825,945	115,262	15,212	2,972	46,553	1,314	27,453	1,610	18,654	48	446	11,447	160,748	11,240	159,156	207	1,592	701	17,696	
57	953,447	813,391	124,398	15,658	3,045	49,598	1,245	28,698	1,749	20,403	51	497	11,603	172,351	11,384	170,540	219	1,811	653	18,349	
58	950,402	800,762	133,599	16,041	3,107	52,705	1,105	29,803	1,949	22,352	53	550	11,680	184,031	11,451	181,991	229	2,040	642	18,991	
59	947,295	788,206	142,688	16,401	3,177	55,882	942	30,745	2,179	24,531	56	606	12,189	196,220	11,941	193,932	248	2,288	607	19,598	
60	944,118	775,323	152,091	16,704	3,252	59,134	917	31,662	2,277	26,808	58	664	12,097	208,317	11,842	205,774	255	2,543	678	20,276	
61	940,866	762,564	161,233	17,069	3,390	62,524	873	32,535	2,455	29,263	62	726	12,056	220,373	11,792	217,566	264	2,807	735	21,011	
62	937,476	749,899	170,099	17,478	3,670	66,194	889	33,424	2,712	31,975	69	795	12,341	232,714	12,060	229,626	281	3,088	655	21,666	
63	933,806	736,950	179,073	17,783	4,135	70,329	1,055	34,479	3,001	34,976	79	874	11,824	244,538	11,545	241,171	279	3,367	530	22,196	
64	929,671	724,350	187,366	17,955	4,745	75,074	1,380	35,859	3,273	38,249	92	966	10,031	254,569	9,788	250,959	243	3,610	475	22,671	
65	924,926	713,182	193,649	18,095	5,466	80,540	2,037	37,896	3,322	41,571	107	1,073	8,016	262,585	7,818	258,777	198	3,808	360	23,031	
66	919,460	703,327	197,983	18,150	6,203	86,743	2,561	40,457	3,519	45,090	123	1,196	6,049	268,634	5,897	264,674	152	3,960	295	23,326	
67	913,257	694,869	200,218	18,170																	

**Table E: Probabilities of Disability, Death, and Survival for Insured Workers Attaining Age 20 in 2015
(1995 Birth Cohort)**

Males Attaining Age 20 in 2015					Females Attaining Age 20 in 2015				
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	99.3	0.5	0.2	0.7	22	99.6	0.3	0.1	0.4
23	98.9	0.7	0.3	1.1	23	99.4	0.5	0.1	0.6
24	98.5	1.0	0.5	1.5	24	99.2	0.7	0.2	0.8
25	98.1	1.3	0.6	1.9	25	98.9	0.9	0.2	1.1
26	97.8	1.5	0.7	2.2	26	98.7	1.0	0.2	1.3
27	97.5	1.7	0.8	2.5	27	98.5	1.2	0.3	1.5
28	97.1	1.9	1.0	2.9	28	98.3	1.3	0.3	1.7
29	96.8	2.1	1.1	3.2	29	98.1	1.5	0.4	1.9
30	96.5	2.3	1.2	3.5	30	97.9	1.7	0.4	2.1
31	96.2	2.5	1.3	3.8	31	97.6	1.9	0.5	2.4
32	95.9	2.7	1.4	4.1	32	97.4	2.1	0.5	2.6
33	95.5	2.9	1.5	4.5	33	97.1	2.3	0.6	2.9
34	95.2	3.2	1.7	4.8	34	96.8	2.6	0.6	3.2
35	94.8	3.4	1.8	5.2	35	96.4	2.9	0.7	3.6
36	94.4	3.7	1.9	5.6	36	96.1	3.2	0.7	3.9
37	94.1	4.0	2.0	5.9	37	95.7	3.5	0.8	4.3
38	93.7	4.3	2.1	6.3	38	95.4	3.8	0.8	4.6
39	93.2	4.6	2.2	6.8	39	95.0	4.2	0.9	5.0
40	92.8	4.9	2.3	7.2	40	94.5	4.5	0.9	5.5
41	92.3	5.3	2.4	7.7	41	94.1	4.9	1.0	5.9
42	91.9	5.7	2.5	8.1	42	93.6	5.3	1.1	6.4
43	91.3	6.1	2.6	8.7	43	93.1	5.8	1.1	6.9
44	90.8	6.5	2.7	9.2	44	92.6	6.2	1.2	7.4
45	90.2	7.0	2.8	9.8	45	92.0	6.7	1.3	8.0
46	89.6	7.4	3.0	10.4	46	91.4	7.2	1.4	8.6
47	89.0	7.9	3.1	11.0	47	90.8	7.8	1.5	9.2
48	88.3	8.5	3.3	11.7	48	90.1	8.3	1.6	9.9
49	87.5	9.0	3.5	12.5	49	89.4	8.9	1.7	10.6
50	86.8	9.6	3.6	13.2	50	88.6	9.6	1.8	11.4
51	85.9	10.3	3.9	14.1	51	87.8	10.3	1.9	12.2
52	84.8	11.1	4.1	15.2	52	86.8	11.2	2.1	13.2
53	83.8	11.9	4.3	16.2	53	85.7	12.0	2.2	14.3
54	82.7	12.7	4.6	17.3	54	84.7	12.9	2.4	15.3
55	81.5	13.6	4.8	18.5	55	83.7	13.8	2.5	16.3
56	80.3	14.6	5.1	19.7	56	82.6	14.8	2.6	17.4
57	78.8	15.8	5.4	21.2	57	81.3	15.9	2.7	18.7
58	77.3	17.0	5.7	22.7	58	80.1	17.1	2.9	19.9
59	75.8	18.3	5.9	24.2	59	78.8	18.2	3.0	21.2
60	74.3	19.6	6.2	25.7	60	77.5	19.4	3.1	22.5
61	72.7	20.9	6.4	27.3	61	76.3	20.6	3.2	23.7
62	71.1	22.4	6.6	28.9	62	75.0	21.8	3.3	25.0
63	69.4	23.9	6.7	30.6	63	73.7	23.0	3.3	26.3
64	67.8	25.3	6.9	32.2	64	72.4	24.1	3.4	27.6
65	66.4	26.5	7.1	33.6	65	71.3	25.1	3.6	28.7
66	65.3	27.3	7.4	34.7	66	70.3	25.9	3.8	29.7
67	64.3	27.9	7.8	35.7	67	69.5	26.5	4.0	30.5

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