A Model for Projecting the Number of People Who Will Require Long-Term Care in the Future

Part III: The Projected Numbers and The Funnel of Doubt

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A MODEL FOR PROJECTING THE NUMBER OF PEOPLE WHO WILL REQUIRE LONG-TERM CARE IN THE FUTURE

III: The Projected Numbers and the Funnel of Doubt

BY D. E. P. WALSH & B.D. RICKAYZEN

ABSTRACT

A multiple state model has been developed for projecting the number of people in the UK with disabilities over the next forty years. In this paper we discuss the results obtained from using the projection model for nine sets of assumptions. We discuss the many uncertainties which surround the model and attempt to indicate the extent to which these uncertainties might affect the projected numbers. Our results suggest that, although there will be a large increase in the number of elderly people in the UK over the next forty years, the implications for the number of people requiring long-term care could be ameliorated by a reduction in the proportion of older people who are severely disabled.

KEYWORDS

Long term care; Multiple state model; Healthy life expectancy

INTRODUCTION

We have developed a model to project the number of people in the UK who will be disabled over the next 40 years.

In Part I (sections 1, 2 and 3) and Part II (sections 4, 5 and 6) we described the model and the data which we have used in our projections (Walsh & Rickayzen, 2000 and Rickayzen & Walsh, 2000). In Part III, section 7 we show the results from the projection model for nine sets of assumptions. In section 8 we discuss the many uncertainties which surround the projection model and attempt to indicate to what extent these uncertainties might influence the projections. Finally, in sections 9 and 10, we discuss the results emerging from the model.

7. PROJECTIONS BASED ON THE TRANSITION RATE MODEL

7.1 *The projection method*

In section 5 of Part II we described nine different sets of trend assumptions which we decided to incorporate in our model. Before presenting the results arising from each set of assumptions, we provide some details of the projection method used.

For the initial population (in 1986) we need to consider the number of men or women in each disability category at each individual age. Such data are not available for individual ages. To provide the individual age populations we use the prevalence rates derived from the transition rate model discussed in Part II, section 4. The population is not fully consistent with the OPCS prevalence data but, as Table 18 shows, the differences are small.

Twenty-year-olds are treated differently in the projection model from people of other ages. The disability prevalence rates for twenty-year-olds in each year must be included as assumptions. The assumption that we adopt is that these prevalence rates stay constant — we use the OPCS disability prevalence rates for people aged 16 to 19 as the rate appropriate to twenty-year-olds in all years. This assumption is of no great consequence as there are few disabled twenty-year-olds.

The Government Actuary's Department (GAD) population projection includes migration and we include it in our model too in order to reproduce the same total population as the GAD projection. Migration is included in the GAD projection in the following way:

- Half of the migrations are assumed to occur at the start of the year and half at the end.
- Those immigrating at the start of the year are "exposed" to the same mortality rates as the rest of the population during the year.

We take the same approach. The immigrants at the start of the year are also "exposed" to the possibility of deterioration or improvement in health.

We assume that the migrants at age x share the same level of disability as the rest of the population at that age. In the GAD central projection the number of migrants per year does not change beyond 1998. The number does vary with age. In total, there is assumed to be a net immigration per year of roughly 19,500 men aged 20 to 59, 1,250 men aged 60 and over and 22,500 women aged 20 to 59. There is assumed to be a net emigration of roughly 1,500 women aged 60 and over each year.

The following equations describe how the population is moved forward. The equations apply separately to males and females.

Let *Lives*(*x*, *t*, *n*) be the number of lives aged x in year t with a category n disability, where category 0 is taken to mean "healthy" and let *Migrants*(*x*, *t*, *n*) be the corresponding number of immigrants. *Lives*(*x*, *t*, *n*) is determined by the following equation:

$$\begin{aligned} Lives(x,t,n) = &\left[Lives(x-1,t-1,n) + Migrants(x-1,t-1,n)/2\right] \times \\ &\left[1 - Mortality(x-1,t-1,n)\right] \times \\ &\left[1 - DeteriorateFrom(x-1,t-1,n)\right] \times \\ &\left[1 - ImproveFrom(x-1,t-1,n)\right] + \\ &DeteriorateTo(x,t,n) + \\ &ImproveTo(x,t,n) + \\ &Migrants(x,t-1,n)/2 \end{aligned}$$

The quantity $Mortality(x,t,n)$ represents the prbability that a person aged x in year t who is in disability category n dies during the next year.

This quantity can be written as:

$$Mortality(x,t,n) = Mortality(x,t,0) + ExtraMort(x,t,n).$$

The extra mortality due to disability is given by a formula (see Part II, section 4.2.2) and the mortality rate that is independent of disability is set so that the number of deaths in year t at age x agrees with the GAD projection (see Part II, section 4.2.1).

The quantity *DeteriorateFrom* represents a probability. It is related to the expressions in Part II, section 4.3 in the following way:

$$DeteriorateFrom(x,t,0) = NewDisab(x,t) \text{ and}$$

$$DeteriorateFrom(x,t,m) = \sum_{n=m+1}^{10} Deteriorate(x,t,m,n).$$

where *NewDisab* (x, t) and *Deteriorate* (x, t, m, n) are defined in the following way:
NewDisab (x, 1986) is the same as *NewDisab* (x), as defined in section 4.3.2.

NewDisab (x,t) differs from *NewDisab* (x, 1986) in models that include time dependence in the probability of becoming disabled. Similarly, *Deteriorate* (x, 1986, m, n) is the same as *Deteriorate* (x, m, n), which is defined in section 4.3.4. *Deteriorate* (x, t, m, n) differs from this in models that include time dependence in the probability of becoming disabled or in the extra likelihood of disabled people deteriorating.

The quantity *ImproveFrom* represents the probability that a person who survives a year, and does not deteriorate during the year, improves by one disability category during the year. As explained in Part II, section 4.4, in the current projection model this probability is set at 0.1 for all ages and disability classes (but not category 0) and both sexes.

The quantity $DeteriorateTo(x,t,n)$ represents the number of persons aged x in year t who made a transition to disability category n from a lower disability category during the last year. The number is given by:

$$DeteriorateTo(x,t,n) = \sum_{m=0}^{n-1} \{ExposedToDet(x-1,t-1,m) \times Deteriorate(x-1,t-1,m,n)\}$$

where

$$ExposedToDet(x,t,n) = \left[Lives(x,t,n) + Migrants(x,t,n)/2\right] \times \left[1 - Mortality(x,t,n)\right].$$

The quantity *ImproveTo* represents the number of persons aged x in year t who made a transition from disability category $n+1$ to n during the last year. The number is given by:

$$ImproveTo(x,t,n) = ExposedToImp(x-1,t-1,n+1) \times 0.1,$$

where

$$ExposedToImp(x,t,n) = \left[Lives(x,t,n) + Migrants(x,t,n)/2\right] \times \left[1 - Mortality(x,t,n)\right] \times \left[1 - DeteriorateFrom(x,t,n)\right].$$

(The 0.1 is the probability of improvement from one year to the next)

In sections 7.2 to 7.4 we present some results of the projections of the disabled population. The results are presented in three types of table:

- In section 7.2 the tables show the number of people with disabilities. The numbers of disabled people are very important because the costs of providing long-term care will depend on them.
- In section 7.3 the tables show the disability prevalence rates. These rates are important because they take out the effect of the changing population structure and show how healthy or disabled the future populations become in comparison with the current population.
- In section 7.4 the tables show healthy life expectancies.

It should be noted that the three sets of tables are just different ways of presenting the same information.

The projected results shown in the tables do vary a great deal from one model to another. However, we believe that the assumptions in the models are generally plausible. Also, as we discussed in Part I, section 2.3 and Part II, section 5, it is hard to rule out models by using data on trends because these data point in two different directions — more time spent severely disabled according to some data and less time according to others. This means that it is not possible to be confident that the results of one model are more realistic than those from another unless some other constraints can be provided on the trend assumptions. We are not aware of any other constraints.

7.2 *The projected number of people with disabilities*

The projected number of people with disabilities depends on the trends included in the models. In this section we present a series of tables (Table 28A(M), etc.) showing this dependence. There are two tables for each of the nine trend assumptions, one for males (the (M) series) and one for females (the (F) series). Some comments on the numbers in the tables are given after the last of them (Table 28Q(F)).

Since the number of people in each disability category is closely dependent upon the total number of people, we include the totals in Table 27. In this table and subsequent ones, the age category "All" refers to ages 20 and upwards.

For the five years shown in the table, the adult population under 60 peaks in 2016 and the population aged 60-69 peaks in 2026, reflecting the baby boom generation. For higher ages the size of the population is highest in 2036.

Table 27. Projected population (thousands) according to the GAD Model

Age Group	Year	Males	Females
20 – 59	1996	16,097	15,801
	2006	16,578	16,188
	2016	16,680	16,204
	2026	15,867	15,430
	2036	15,266	14,906
60 – 69	1996	2,597	2,822
	2006	2,878	3,039
	2016	3,484	3,634
	2026	4,123	4,163
	2036	3,862	3,855
70 – 79	1996	1,800	2,435
	2006	1,882	2,310
	2016	2,204	2,588
	2026	2,708	3,116
	2036	3,278	3,624
80 – 89	1996	659	1,370
	2006	772	1,386
	2016	890	1,395
	2026	1,126	1,683
	2036	1,400	2,037
90+	1996	67	273
	2006	104	340
	2016	139	374
	2026	184	430
	2036	258	577
All	1996	21,220	22,701
	2006	22,214	23,262
	2016	23,398	24,196
	2026	24,008	24,822
	2036	24,064	25,000

Table 28A(M). Number of males with disabilities (thousands), Model A

Age Group	Year	Able	OPCS Disability Category 1	2	3	4	5	6	7	8	9	10
20–59	1996	15,123	255	143	121	111	102	70	63	50	41	18
	2006	15,502	283	160	135	123	112	77	69	54	44	19
	2016	15,568	294	166	140	127	115	79	71	55	46	19
	2026	14,809	280	158	133	121	110	75	68	53	44	18
	2036	14,271	262	148	125	114	103	71	64	50	41	17
60–69	1996	1,987	167	97	79	70	62	38	36	28	24	9
	2006	2,209	183	107	87	76	68	42	39	30	26	10
	2016	2,657	226	132	108	95	84	52	49	38	33	12
	2026	3,165	263	153	125	109	97	60	56	43	38	14
	2036	2,936	253	147	121	106	94	58	54	42	37	14
70–79	1996	1,077	177	109	93	84	78	48	47	38	35	14
	2006	1,114	186	116	98	90	83	51	50	41	38	15
	2016	1,310	217	135	114	104	96	60	59	47	44	18
	2026	1,583	271	168	143	131	121	76	75	60	57	23
	2036	1,946	323	200	171	155	143	89	87	71	66	26
80–89	1996	194	76	53	50	50	53	37	42	40	44	20
	2006	228	89	62	58	59	63	43	50	46	51	23
	2016	257	102	72	67	68	72	51	58	55	60	27
	2026	327	129	91	85	86	91	64	73	69	76	35
	2036	392	158	112	106	108	115	81	94	89	99	45
90+	1996	5	4	4	4	5	6	5	7	8	11	6
	2006	8	6	6	6	7	9	8	11	13	18	10
	2016	10	9	8	8	10	13	11	15	18	25	14
	2026	13	11	10	11	13	16	14	20	24	33	19
	2036	19	15	14	15	18	23	20	28	34	47	27
All	1996	18,387	679	406	348	321	301	199	195	163	155	66
	2006	19,061	748	450	385	355	334	221	219	184	178	77
	2016	19,803	848	511	437	404	381	252	251	213	208	90
	2026	19,897	952	579	497	460	436	288	291	249	249	109
	2036	19,564	1,012	621	536	500	479	319	327	285	291	130

Table 28A(F). Number of females with disabilities (thousands), Model A

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,693	212	154	151	138	142	104	86	56	45	22
	2006	14,980	232	170	166	150	154	112	93	59	48	24
	2016	14,975	238	173	169	152	157	114	94	60	49	24
	2026	14,264	225	164	160	145	149	108	89	57	46	23
	2036	13,799	213	155	152	137	142	103	85	54	44	22
60–69	1996	2,149	132	99	94	82	86	60	51	29	26	15
	2006	2,323	140	105	100	87	91	64	54	31	27	16
	2016	2,761	170	128	122	106	111	78	67	38	34	20
	2026	3,182	192	144	137	119	125	88	75	43	37	22
	2036	2,922	182	136	130	113	119	84	71	41	36	21
70–79	1996	1,406	168	131	130	119	135	102	95	58	56	35
	2006	1,324	160	125	124	113	130	98	92	56	54	34
	2016	1,493	179	139	138	126	144	108	102	62	60	38
	2026	1,772	217	169	168	154	177	134	126	77	75	47
	2036	2,089	250	195	194	176	202	152	143	87	84	53
80–89	1996	441	100	83	90	89	117	102	113	80	89	65
	2006	448	101	85	91	90	118	103	114	81	90	65
	2016	446	102	85	91	91	119	105	116	83	92	67
	2026	541	122	102	110	109	143	126	139	99	110	81
	2036	636	147	123	132	132	175	154	172	124	139	102
90+	1996	31	12	11	13	14	22	24	34	31	43	39
	2006	35	14	12	15	16	26	29	42	39	57	54
	2016	39	15	14	16	18	29	32	46	43	63	60
	2026	44	17	15	18	20	33	36	52	50	73	70
	2036	58	23	21	24	27	43	49	70	67	99	95
All	1996	18,719	624	477	477	441	503	392	379	254	259	176
	2006	19,111	648	496	495	457	520	407	394	267	276	192
	2016	19,713	704	538	536	493	560	437	424	287	297	208
	2026	19,803	774	594	593	547	627	492	481	327	342	243
	2036	19,504	815	630	632	586	680	542	541	374	402	293

Table 28B(M). Number of males with disabilities (thousands), Model B

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,132	252	141	120	111	101	70	63	49	41	18
	2006	15,533	274	155	131	120	109	75	67	52	43	18
	2016	15,625	278	158	133	121	110	75	67	52	43	18
	2026	14,884	258	147	124	113	103	70	62	48	40	17
	2036	14,360	237	135	114	105	95	65	58	45	37	16
60–69	1996	1,994	165	96	79	69	61	38	35	27	24	9
	2006	2,235	177	103	84	74	65	40	37	29	25	9
	2016	2,713	213	124	101	88	78	48	44	34	30	11
	2026	3,261	239	139	114	99	87	53	49	38	33	12
	2036	3,055	224	131	106	92	81	50	46	35	31	11
70–79	1996	1,087	175	108	92	84	77	47	46	37	34	13
	2006	1,144	182	113	96	87	79	49	47	38	35	14
	2016	1,368	208	129	109	98	89	55	53	42	39	15
	2026	1,689	254	157	133	120	109	67	64	51	47	18
	2036	2,103	297	183	154	138	125	76	73	57	52	20
80–89	1996	199	76	53	50	50	53	37	42	39	42	19
	2006	245	90	62	58	58	61	41	47	43	47	21
	2016	291	103	71	66	66	68	47	53	49	53	24
	2026	389	130	89	82	81	84	57	64	58	63	28
	2036	492	161	110	101	100	103	70	78	72	78	35
90+	1996	6	4	4	4	5	6	5	7	8	11	6
	2006	9	7	6	6	8	10	8	11	13	17	9
	2016	13	10	8	9	10	13	11	15	17	23	12
	2026	18	13	11	12	14	17	14	19	22	29	16
	2036	28	19	16	17	19	24	19	26	30	40	21
All	1996	18,418	673	403	345	318	298	196	192	159	151	65
	2006	19,166	729	439	376	346	323	213	209	174	167	71
	2016	20,009	811	490	418	384	359	235	232	193	186	80
	2026	20,241	894	543	464	427	399	261	258	217	212	91
	2036	20,037	938	574	493	455	427	280	281	239	237	103

Table 28B(F). Number of females with disabilities (thousands), Model B

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,701	210	153	150	137	141	103	85	55	45	22
	2006	15,010	227	166	162	147	151	109	90	57	46	23
	2016	15,028	227	167	162	147	151	109	89	57	46	23
	2026	14,336	211	155	151	137	140	101	83	53	43	21
	2036	13,885	197	144	141	128	131	95	77	50	40	19
60–69	1996	2,157	130	98	93	81	85	59	50	29	25	15
	2006	2,350	136	102	97	84	88	61	52	29	26	15
	2016	2,817	162	122	115	100	104	72	61	35	30	17
	2026	3,272	178	133	126	109	113	78	65	37	32	18
	2036	3,034	164	123	116	101	104	72	60	34	30	17
70–79	1996	1,418	168	130	129	118	134	100	93	57	54	34
	2006	1,358	157	123	122	111	125	93	87	53	50	32
	2016	1,560	173	134	132	120	135	100	92	56	53	33
	2026	1,890	206	160	158	143	161	119	110	66	63	39
	2036	2,265	233	181	177	160	178	130	119	72	67	42
80–89	1996	448	100	84	90	90	117	102	111	79	87	63
	2006	472	102	85	91	90	116	100	109	76	83	60
	2016	489	103	86	91	90	116	99	107	75	82	58
	2026	616	124	103	109	107	136	116	124	86	93	66
	2036	756	150	124	131	129	164	139	149	103	112	80
90+	1996	32	12	11	13	14	22	24	33	30	42	38
	2006	39	15	13	16	17	27	30	41	38	54	50
	2016	46	17	15	18	20	30	33	45	41	57	53
	2026	57	20	18	21	23	35	37	51	46	64	59
	2036	81	28	25	28	31	47	50	67	60	83	76
All	1996	18,756	620	475	475	439	499	388	373	250	253	171
	2006	19,228	637	489	487	449	507	394	378	254	259	179
	2016	19,940	682	523	519	477	535	413	394	263	268	184
	2026	20,171	739	569	565	520	585	452	433	289	295	204
	2036	20,021	772	597	595	549	624	486	472	319	332	233

Table 28C(M). Number of males with disabilities (thousands), Model C

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,141	249	140	119	110	100	69	62	49	40	17
	2006	15,562	266	151	128	117	106	73	65	50	41	17
	2016	15,675	264	151	128	116	105	72	64	49	40	17
	2026	14,949	240	137	117	107	96	66	58	45	37	16
	2036	14,432	217	124	106	97	88	60	53	41	33	14
60–69	1996	2,002	163	95	78	68	60	37	35	27	23	9
	2006	2,261	170	100	81	71	62	38	35	27	23	9
	2016	2,768	199	116	95	83	72	44	40	31	27	10
	2026	3,350	216	127	103	89	77	47	43	32	28	10
	2036	3,164	196	115	93	81	70	42	38	29	25	9
70–79	1996	1,097	174	108	91	83	75	47	45	36	33	13
	2006	1,170	177	110	93	84	76	47	45	35	32	13
	2016	1,417	199	123	104	93	83	51	48	38	34	13
	2026	1,777	238	147	123	110	98	60	56	44	40	15
	2036	2,228	273	167	139	124	110	66	62	48	43	17
80–89	1996	204	76	53	50	50	52	36	41	38	41	18
	2006	263	90	62	57	57	58	40	44	40	43	19
	2016	327	103	70	64	63	64	43	47	43	46	20
	2026	455	128	86	78	76	76	50	54	48	51	22
	2036	599	157	105	94	91	90	59	64	56	59	26
90+	1996	6	5	4	4	5	6	5	7	8	11	6
	2006	10	7	6	7	8	10	8	11	12	16	9
	2016	16	11	9	9	11	13	11	14	16	20	11
	2026	24	15	12	13	14	17	14	18	20	25	13
	2036	39	22	18	18	20	24	18	24	26	33	17
All	1996	18,449	667	400	343	316	295	194	189	156	148	63
	2006	19,265	711	429	367	337	313	205	200	165	156	66
	2016	20,203	775	469	400	366	338	220	214	176	167	71
	2026	20,554	838	509	434	396	365	236	229	189	181	77
	2036	20,462	865	528	451	412	381	246	241	200	193	83

Table 28C(F). Number of females with disabilities (thousands), Model C

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,709	208	152	149	136	140	102	84	55	44	22
	2006	15,037	221	163	159	144	147	107	87	56	45	22
	2016	15,076	218	160	156	142	144	104	85	54	43	21
	2026	14,398	199	147	143	130	132	95	77	50	40	19
	2036	13,957	183	135	132	120	122	88	71	46	36	18
60–69	1996	2,165	129	97	92	80	84	59	49	28	25	14
	2006	2,374	132	100	94	82	84	58	49	28	24	14
	2016	2,869	153	116	109	95	97	67	55	31	27	15
	2026	3,353	164	124	116	101	102	70	57	32	28	16
	2036	3,130	148	112	105	90	91	62	51	29	24	14
70–79	1996	1,429	167	130	129	117	133	99	91	56	53	33
	2006	1,390	155	120	119	108	121	89	82	50	47	29
	2016	1,623	166	129	127	114	126	92	83	50	47	29
	2026	1,999	195	151	148	133	146	106	95	57	53	33
	2036	2,424	215	166	161	144	156	112	99	59	54	33
80–89	1996	456	101	84	90	90	116	101	110	77	85	61
	2006	496	103	86	91	90	114	97	104	72	78	55
	2016	532	104	86	91	89	112	94	98	68	72	51
	2026	691	125	103	107	104	129	106	110	74	79	55
	2036	875	150	123	128	123	151	123	127	85	90	62
90+	1996	33	12	11	13	15	23	24	33	30	41	37
	2006	43	16	14	16	18	28	30	41	37	51	46
	2016	54	18	17	19	21	31	33	44	38	52	46
	2026	71	23	20	23	25	36	37	49	42	56	49
	2036	108	32	28	32	34	49	49	63	53	69	60
All	1996	18,792	617	474	473	438	495	384	368	246	247	166
	2006	19,341	627	482	480	442	495	382	362	242	244	166
	2016	20,153	660	508	502	461	511	389	366	242	242	163
	2026	20,512	706	544	538	493	545	414	388	255	255	171
	2036	20,494	727	563	558	512	569	434	410	271	274	186

Table 28D(M). Number of males with disabilities (thousands), Model D

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,158	244	138	117	108	99	68	61	48	39	17
	2006	15,614	251	144	123	112	101	69	61	47	38	16
	2016	15,760	240	138	118	108	97	66	58	44	36	15
	2026	15,050	211	122	105	96	86	59	51	39	32	14
	2036	14,539	186	108	94	86	77	53	46	35	28	12
60–69	1996	2,017	160	93	76	67	59	36	33	26	22	8
	2006	2,310	158	93	76	66	57	35	32	24	20	8
	2016	2,868	173	102	83	72	62	37	33	25	21	8
	2026	3,501	177	105	85	73	62	37	33	24	20	7
	2036	3,335	151	90	73	62	52	31	27	20	16	6
70–79	1996	1,114	171	106	90	81	74	45	43	34	31	12
	2006	1,215	170	105	89	80	71	43	40	31	28	11
	2016	1,500	183	113	94	84	74	44	41	32	28	11
	2026	1,918	209	128	106	94	82	49	45	35	31	12
	2036	2,446	226	136	112	98	85	50	46	35	31	12
80–89	1996	213	76	53	49	50	51	35	39	36	39	17
	2006	299	89	61	55	54	54	36	39	34	36	16
	2016	400	99	67	60	57	55	36	37	32	33	14
	2026	582	118	78	69	64	60	38	38	32	32	13
	2036	788	139	91	79	73	67	41	41	34	33	14
90+	1996	6	5	4	4	5	6	5	7	8	10	5
	2006	12	8	7	7	8	10	8	10	11	14	8
	2016	22	12	10	10	11	13	10	13	13	16	8
	2026	38	18	14	14	15	16	12	15	15	19	9
	2036	69	26	20	19	20	21	15	18	18	21	10
All	1996	18,508	656	395	338	311	289	190	183	151	141	59
	2006	19,451	676	410	350	320	293	191	182	148	137	58
	2016	20,550	708	430	366	331	300	193	182	146	134	56
	2026	21,089	734	447	379	341	306	195	182	146	133	55
	2036	21,177	729	445	377	338	302	191	178	142	130	54

Table 28D(F). Number of females with disabilities (thousands), Model D

Age Group	Year	Able	OPCS Disability Category 1	2	3	4	5	6	7	8	9	10
20–59	1996	14,725	205	150	147	135	138	101	82	54	43	21
	2006	15,087	212	156	153	139	141	102	82	53	42	20
	2016	15,158	202	150	146	133	134	96	77	50	39	19
	2026	14,499	179	133	130	119	120	86	68	44	35	17
	2036	14,067	161	120	118	108	108	77	61	40	31	15
60–69	1996	2,180	127	96	91	79	82	57	48	27	23	13
	2006	2,420	125	95	89	77	78	54	44	25	21	12
	2016	2,959	138	105	98	85	85	57	46	26	22	12
	2026	3,487	141	107	100	86	84	56	45	25	21	12
	2036	3,283	121	92	85	73	71	47	37	20	17	9
70–79	1996	1,451	165	128	127	116	130	96	88	53	50	31
	2006	1,452	149	116	114	103	113	82	73	44	40	25
	2016	1,738	154	120	116	104	111	78	69	40	37	22
	2026	2,190	172	134	129	114	119	83	72	42	38	23
	2036	2,690	180	139	132	116	119	82	69	40	36	21
80–89	1996	471	101	85	91	90	115	99	106	74	80	57
	2006	543	104	87	91	89	110	91	94	64	67	46
	2016	615	103	85	89	86	103	82	83	55	57	39
	2026	836	121	99	101	96	111	87	85	55	56	37
	2036	1,100	140	114	115	108	123	94	90	57	57	38
90+	1996	35	13	12	14	15	23	25	33	29	40	35
	2006	51	17	16	18	20	29	30	39	34	45	40
	2016	72	21	19	22	23	33	32	40	33	42	35
	2026	103	27	23	26	27	37	35	42	34	41	33
	2036	169	38	33	36	37	49	44	51	39	46	36
All	1996	18,863	611	470	469	435	488	377	357	238	236	157
	2006	19,554	606	469	465	429	471	358	333	219	216	143
	2016	20,543	619	479	471	431	465	346	315	204	197	127
	2026	21,115	640	496	486	442	472	347	312	200	191	122
	2036	21,310	640	498	486	442	470	343	308	196	187	119

Table 28K(M). Number of males with disabilities (thousands), Model K

Age Group	Year	Able	OPCS Disability Category 1	2	3	4	5	6	7	8	9	10
20–59	1996	15,123	255	143	121	112	102	70	63	50	41	18
	2006	15,502	283	160	135	123	112	77	69	54	44	19
	2016	15,568	294	166	140	127	116	79	71	55	45	19
	2026	14,808	280	158	133	121	110	75	67	52	43	18
	2036	14,271	263	148	125	114	104	71	63	49	40	17
60–69	1996	1,987	167	97	80	70	62	38	36	27	24	9
	2006	2,209	184	107	88	77	68	42	39	30	26	10
	2016	2,656	227	133	109	95	84	52	48	37	32	12
	2026	3,164	264	154	126	110	97	60	55	42	37	14
	2036	2,935	255	149	122	107	94	58	53	41	35	13
70–79	1996	1,077	177	110	93	85	78	48	47	37	35	14
	2006	1,113	187	117	99	90	83	51	50	40	37	15
	2016	1,309	219	136	116	106	97	60	58	46	42	16
	2026	1,581	273	171	146	133	122	75	73	58	53	21
	2036	1,943	327	205	175	159	144	89	85	67	61	24
80–89	1996	194	76	54	50	51	54	37	42	39	42	19
	2006	227	90	64	60	61	64	44	49	45	48	21
	2016	256	104	74	70	71	75	51	57	52	55	24
	2026	325	132	95	90	91	95	65	72	65	68	29
	2036	390	163	118	113	116	121	83	92	82	86	37
90+	1996	5	4	4	4	5	6	5	7	8	11	6
	2006	8	7	6	7	8	10	9	11	13	17	9
	2016	10	9	8	9	11	14	12	16	17	22	11
	2026	13	11	11	12	15	19	16	21	23	28	14
	2036	18	16	15	18	22	27	23	29	32	39	19
All	1996	18,386	679	407	349	322	302	199	195	162	153	65
	2006	19,060	751	453	389	359	337	222	218	181	172	73
	2016	19,800	853	517	444	411	385	253	249	207	196	82
	2026	19,893	961	589	508	471	444	291	288	240	229	96
	2036	19,557	1,024	636	553	517	491	323	323	271	261	110

Table 28K(F). Number of females with disabilities (thousands), Model K

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,693	212	154	151	138	142	104	86	55	45	22
	2006	14,980	233	170	166	150	155	112	92	59	47	23
	2016	14,974	238	174	169	153	157	114	93	59	48	24
	2026	14,264	226	165	161	145	149	108	88	56	45	22
	2036	13,799	214	156	153	138	142	103	84	53	43	21
60–69	1996	2,149	132	99	94	82	86	60	51	29	25	15
	2006	2,323	141	106	100	87	92	64	54	31	27	15
	2016	2,760	172	129	123	107	112	78	66	37	32	18
	2026	3,180	194	146	139	121	126	87	73	41	35	20
	2036	2,920	184	139	132	115	120	83	69	39	34	19
70–79	1996	1,405	169	132	131	120	136	102	95	58	55	34
	2006	1,322	162	126	126	116	131	98	90	55	51	32
	2016	1,490	181	142	142	130	147	108	99	59	55	34
	2026	1,767	221	174	175	161	181	134	122	73	68	42
	2036	2,081	256	202	203	185	207	152	137	81	75	45
80–89	1996	440	101	84	91	91	119	104	113	79	87	62
	2006	446	103	87	95	95	123	106	113	78	83	58
	2016	442	104	89	97	98	126	108	114	78	82	57
	2026	534	126	109	119	121	154	130	136	92	95	65
	2036	626	153	133	147	150	192	162	167	113	116	78
90+	1996	31	12	11	13	15	23	25	34	31	41	36
	2006	35	14	13	16	19	29	32	44	39	53	46
	2016	38	16	15	19	22	34	37	49	43	56	47
	2026	42	18	18	22	26	41	44	57	49	63	51
	2036	55	24	24	31	37	57	60	77	65	81	65
All	1996	18,718	625	479	480	445	507	394	378	252	253	169
	2006	19,105	652	503	504	467	530	412	393	261	261	175
	2016	19,703	710	549	550	510	577	445	421	277	274	180
	2026	19,788	785	612	616	574	651	503	476	311	306	200
	2036	19,481	831	655	666	626	718	559	535	351	349	229

Table 28L(M). Number of males with disabilities (thousands), Model L

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,132	252	141	120	111	101	70	63	49	41	17
	2006	15,533	274	155	132	120	109	75	67	52	42	18
	2016	15,625	279	158	134	122	110	75	67	52	42	18
	2026	14,884	259	147	125	113	103	70	62	48	39	17
	2036	14,360	238	135	115	105	95	65	58	44	36	15
60–69	1996	1,994	165	96	79	69	61	38	35	27	23	9
	2006	2,235	177	104	85	74	65	40	37	28	24	9
	2016	2,712	213	125	102	89	78	48	44	33	29	11
	2026	3,260	240	140	115	100	87	53	49	37	32	12
	2036	3,054	225	132	107	93	81	49	45	34	29	11
70–79	1996	1,087	175	109	92	84	77	47	46	36	33	13
	2006	1,143	183	114	97	88	80	49	47	37	34	13
	2016	1,367	209	130	110	100	90	55	52	41	37	14
	2026	1,687	256	159	135	122	109	66	63	49	44	17
	2036	2,100	301	186	157	141	125	76	71	55	48	18
80–89	1996	199	76	54	50	51	53	37	41	38	41	18
	2006	244	91	64	59	60	62	42	46	42	44	19
	2016	290	104	73	68	68	70	47	52	46	48	21
	2026	388	133	93	86	85	87	58	62	55	56	24
	2036	490	165	115	107	106	107	71	76	66	68	29
90+	1996	6	4	4	4	5	6	5	7	8	10	5
	2006	9	7	6	7	8	10	8	11	13	16	8
	2016	13	10	9	10	12	14	12	15	16	20	10
	2026	18	13	12	13	16	19	15	20	21	25	12
	2036	27	20	17	19	23	27	21	27	28	33	16
All	1996	18,418	674	404	346	320	299	197	192	158	149	63
	2006	19,164	732	442	379	349	326	214	208	171	161	68
	2016	20,007	815	495	424	390	362	237	230	188	176	74
	2026	20,237	901	551	474	436	405	262	255	209	196	82
	2036	20,031	948	586	506	468	436	283	276	227	214	89

Table 28L(F). Number of females with disabilities (thousands), Model L

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,701	210	153	150	137	141	103	85	55	44	22
	2006	15,010	227	166	162	147	151	109	89	57	46	22
	2016	15,027	228	167	163	148	151	109	88	56	45	22
	2026	14,335	212	155	152	138	140	101	82	52	42	20
	2036	13,885	197	145	142	129	131	94	76	49	39	19
60–69	1996	2,157	131	98	93	81	85	59	50	29	25	14
	2006	2,349	137	103	98	85	88	61	51	29	25	14
	2016	2,816	163	123	117	101	104	72	60	34	29	16
	2026	3,271	179	135	128	111	113	78	64	36	31	17
	2036	3,032	166	125	119	103	105	71	59	33	28	16
70–79	1996	1,417	168	131	130	119	135	100	93	56	53	33
	2006	1,356	159	124	124	113	127	94	85	51	48	30
	2016	1,557	175	137	136	124	137	100	90	53	49	30
	2026	1,885	210	165	164	149	164	119	106	63	57	35
	2036	2,259	238	187	184	167	182	130	114	67	61	37
80–89	1996	448	101	85	91	91	119	103	111	78	84	60
	2006	470	104	88	95	95	121	102	108	74	78	54
	2016	485	105	90	97	97	122	102	105	71	73	50
	2026	610	128	109	118	117	145	119	121	80	81	54
	2036	746	155	133	144	144	177	143	143	94	94	63
90+	1996	32	12	11	13	15	23	25	34	30	41	35
	2006	38	15	14	17	19	30	32	43	38	50	43
	2016	45	17	17	20	23	35	37	47	40	51	42
	2026	54	21	20	25	28	42	43	54	45	55	43
	2036	78	29	28	35	40	59	59	71	57	68	53
All	1996	18,755	622	478	478	443	503	390	373	248	247	164
	2006	19,223	641	495	495	459	517	398	376	249	246	162
	2016	19,930	688	533	532	493	549	419	390	254	247	160
	2026	20,156	749	585	586	543	606	460	427	275	266	170
	2036	20,000	785	619	624	582	653	497	464	299	290	186

Table 28M(M). Number of males with disabilities (thousands), Model M

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,141	249	140	119	110	100	69	62	48	40	17
	2006	15,562	266	151	128	117	106	73	65	50	41	17
	2016	15,675	264	151	128	116	105	72	64	49	40	17
	2026	14,948	241	138	117	107	96	66	58	44	36	15
	2036	14,432	217	125	106	97	88	60	53	40	33	14
60–69	1996	2,002	163	95	78	68	60	37	34	26	23	9
	2006	2,261	171	100	82	71	62	38	35	27	23	9
	2016	2,767	200	117	96	83	72	44	40	30	26	10
	2026	3,350	217	127	104	90	77	47	42	32	27	10
	2036	3,163	197	116	94	81	70	42	38	28	24	9
70–79	1996	1,097	174	108	92	83	76	47	45	35	32	13
	2006	1,170	178	111	94	85	76	47	44	35	31	12
	2016	1,416	201	124	105	94	84	51	47	37	33	12
	2026	1,775	240	149	125	112	99	59	55	42	37	14
	2036	2,226	276	169	142	126	110	66	61	46	41	15
80–89	1996	203	77	54	50	51	53	36	41	37	40	18
	2006	262	91	63	58	58	59	40	44	39	41	18
	2016	326	104	72	66	65	66	43	47	41	42	18
	2026	453	130	89	81	79	78	51	53	46	46	19
	2036	596	160	109	99	95	93	60	62	52	52	22
90+	1996	6	5	4	4	5	6	5	7	8	10	5
	2006	10	7	7	7	8	10	8	11	12	15	8
	2016	15	11	9	10	12	14	11	14	15	18	9
	2026	23	15	13	14	16	19	15	18	19	22	11
	2036	38	23	19	20	23	26	20	24	24	27	13
All	1996	18,449	668	401	344	317	296	195	189	155	146	61
	2006	19,264	713	432	370	340	315	206	199	162	151	63
	2016	20,200	779	474	405	371	341	221	212	172	158	66
	2026	20,550	844	516	442	403	369	237	226	183	168	69
	2036	20,456	874	538	462	422	387	247	237	191	177	73

Table 28M(F). Number of females with disabilities (thousands), Model M

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,709	208	152	149	136	140	102	84	54	44	21
	2006	15,037	222	163	159	144	147	107	87	56	44	22
	2016	15,075	219	161	157	142	145	104	84	54	43	21
	2026	14,398	200	147	144	131	132	95	77	49	39	19
	2036	13,956	183	135	133	121	122	88	70	45	36	17
60–69	1996	2,165	129	97	92	80	84	59	49	28	24	14
	2006	2,374	133	100	95	82	85	58	48	27	23	13
	2016	2,868	154	117	110	96	97	66	55	31	26	15
	2026	3,352	165	125	118	102	102	69	56	31	26	15
	2036	3,129	149	113	106	92	92	61	50	28	23	13
70–79	1996	1,429	167	130	129	118	133	99	91	55	52	32
	2006	1,389	156	122	121	110	122	89	81	48	45	27
	2016	1,621	168	132	130	118	128	92	81	48	44	27
	2026	1,995	198	155	153	137	148	105	92	54	49	29
	2036	2,419	219	171	167	149	159	111	96	55	49	30
80–89	1996	455	101	85	92	92	118	102	109	76	82	58
	2006	494	104	88	95	94	118	99	102	69	72	49
	2016	528	106	90	96	95	117	95	96	64	65	44
	2026	685	128	108	115	113	136	108	106	69	69	45
	2036	867	154	131	138	135	160	126	122	78	77	50
90+	1996	33	13	11	14	15	24	25	34	30	40	34
	2006	42	16	15	18	20	31	32	42	36	47	40
	2016	53	19	18	22	25	36	36	45	37	46	37
	2026	69	23	22	27	30	43	42	50	40	47	37
	2036	104	34	32	38	42	59	56	65	49	57	42
All	1996	18,791	619	476	476	442	499	386	367	244	242	160
	2006	19,336	630	488	487	452	504	386	360	237	232	151
	2016	20,144	666	517	515	475	523	394	362	233	224	142
	2026	20,498	714	558	556	513	562	420	382	243	231	145
	2036	20,475	739	582	582	539	591	441	402	255	242	152

Table 28N(M). Number of males with disabilities (thousands), Model N

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,158	244	138	118	108	99	68	61	47	39	17
	2006	15,614	251	144	123	112	101	69	61	47	38	16
	2016	15,760	240	138	118	108	97	66	58	44	35	15
	2026	15,050	212	123	105	96	86	59	51	39	31	14
	2036	14,539	187	109	94	86	77	53	46	35	28	12
60–69	1996	2,017	160	94	77	67	59	36	33	25	22	8
	2006	2,310	158	93	76	66	57	35	31	24	20	7
	2016	2,867	174	103	84	72	62	37	33	24	21	8
	2026	3,500	178	105	86	73	62	37	32	24	20	7
	2036	3,334	152	90	73	62	52	31	26	19	16	6
70–79	1996	1,114	171	106	90	82	74	45	43	34	30	12
	2006	1,214	170	106	90	80	71	43	40	31	27	10
	2016	1,500	184	114	95	85	74	44	40	31	27	10
	2026	1,917	211	129	108	95	82	49	44	34	29	11
	2036	2,445	228	138	114	99	85	50	45	34	30	11
80–89	1996	213	77	54	50	50	52	35	39	35	38	16
	2006	299	90	62	57	55	55	36	38	33	34	14
	2016	399	100	68	61	58	56	36	37	31	31	13
	2026	580	120	80	71	66	61	38	37	30	29	12
	2036	786	142	94	82	75	68	41	40	32	30	12
90+	1996	6	5	4	5	5	7	5	7	8	10	5
	2006	12	8	7	8	9	10	8	10	11	13	7
	2016	22	13	10	11	12	14	10	13	13	15	7
	2026	38	18	15	15	16	18	13	15	14	16	7
	2036	68	27	21	20	21	23	16	18	17	18	8
All	1996	18,507	657	396	339	312	290	190	183	150	139	58
	2006	19,449	678	412	353	322	295	191	181	146	132	55
	2016	20,548	711	434	370	335	302	194	180	143	128	53
	2026	21,086	738	452	384	346	309	195	180	141	126	51
	2036	21,172	735	451	383	344	305	191	175	137	122	49

Table 28N(F). Number of females with disabilities (thousands), Model N

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,725	205	150	147	135	138	101	82	54	43	21
	2006	15,087	212	157	153	139	141	102	82	53	42	20
	2016	15,158	202	150	147	134	134	96	77	49	39	19
	2026	14,499	180	134	131	120	120	85	68	44	34	16
	2036	14,066	161	120	118	109	108	77	61	40	31	14
60–69	1996	2,180	127	96	91	79	82	57	47	27	23	13
	2006	2,420	125	95	90	78	79	53	43	24	20	11
	2016	2,959	139	106	99	86	85	57	46	25	21	12
	2026	3,486	142	108	101	87	84	56	44	24	20	11
	2036	3,282	122	93	87	74	71	46	36	20	16	9
70–79	1996	1,451	165	129	128	117	130	96	87	53	49	30
	2006	1,451	150	117	116	105	114	82	72	42	39	23
	2016	1,736	155	122	118	106	112	78	67	39	35	21
	2026	2,187	174	136	132	117	121	83	70	40	36	21
	2036	2,687	182	142	136	119	120	81	67	38	33	19
80–89	1996	471	102	86	92	92	117	100	106	73	78	54
	2006	541	105	89	94	93	113	92	93	61	63	42
	2016	611	105	89	93	90	106	83	81	52	51	34
	2026	831	124	103	106	102	116	88	82	51	49	32
	2036	1,094	144	119	122	115	128	94	86	53	50	32
90+	1996	35	13	12	14	16	24	25	33	29	38	32
	2006	51	18	16	19	22	32	32	40	34	42	34
	2016	71	22	21	24	26	37	35	41	32	37	29
	2026	101	28	26	29	32	42	38	42	31	35	26
	2036	165	40	36	41	43	55	47	50	35	38	27
All	1996	18,862	612	472	472	438	492	379	356	236	231	151
	2006	19,549	609	474	472	437	479	361	331	215	205	131
	2016	20,535	624	487	481	442	474	349	311	197	183	113
	2026	21,103	647	507	499	456	483	350	306	191	174	106
	2036	21,294	649	511	503	459	482	346	300	185	169	102

Table 28Q(M). Number of males with disabilities (thousands), Model Q

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	15,132	250	141	120	110	101	70	64	50	42	18
	2006	15,537	269	153	129	118	108	76	69	55	45	19
	2016	15,636	269	153	129	118	108	77	70	55	46	19
	2026	14,907	246	140	119	109	99	71	65	52	42	18
	2036	14,395	221	126	107	99	91	65	59	47	39	16
60–69	1996	1,989	164	96	78	68	61	39	37	29	26	10
	2006	2,220	173	101	83	73	66	44	43	34	30	11
	2016	2,688	206	120	99	87	79	55	54	44	38	14
	2026	3,232	230	134	110	97	88	62	62	50	43	16
	2036	3,032	213	124	102	90	82	59	58	47	41	15
70–79	1996	1,081	174	108	91	83	76	49	48	39	37	15
	2006	1,124	177	110	93	85	80	54	55	46	42	17
	2016	1,334	198	123	104	96	91	65	66	56	51	20
	2026	1,641	239	148	126	116	111	81	83	71	65	26
	2036	2,053	277	170	145	133	127	94	96	81	73	29
80–89	1996	196	75	52	49	49	52	37	43	41	45	20
	2006	236	86	60	56	56	59	44	51	48	53	24
	2016	273	95	66	61	62	67	52	61	59	64	29
	2026	358	118	81	75	76	82	66	77	75	81	37
	2036	449	145	99	92	93	101	83	97	94	102	46
90+	1996	6	4	4	4	5	6	5	7	8	11	6
	2006	8	6	5	6	7	9	8	11	14	18	10
	2016	12	8	7	8	9	12	11	15	19	25	14
	2026	16	11	9	10	12	15	15	20	25	33	18
	2036	25	16	13	14	17	21	20	28	34	44	24
All	1996	18,403	667	400	342	316	297	201	199	168	160	68
	2006	19,125	711	429	367	339	321	227	229	197	188	81
	2016	19,943	777	469	401	372	356	260	267	233	224	97
	2026	20,154	844	512	439	409	396	295	308	273	265	115
	2036	19,954	872	533	460	431	422	320	338	304	299	130

Table 28Q(F). Number of females with disabilities (thousands), Model Q

Age Group	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
20–59	1996	14,702	209	152	149	136	141	103	86	56	45	22
	2006	15,017	222	163	159	145	149	110	91	59	48	24
	2016	15,047	220	161	157	143	147	109	90	59	47	23
	2026	14,368	200	147	144	131	135	100	83	55	44	22
	2036	13,930	183	135	132	121	124	93	77	51	41	20
60–69	1996	2,153	130	97	92	81	85	60	52	30	26	15
	2006	2,335	134	100	95	83	88	65	57	34	30	17
	2016	2,795	157	118	112	98	104	79	69	42	37	21
	2026	3,248	171	128	122	106	113	87	76	48	41	23
	2036	3,014	156	117	111	97	103	80	71	45	39	22
70–79	1996	1,415	167	130	129	117	134	101	95	58	56	35
	2006	1,342	154	120	119	109	125	98	93	59	56	35
	2016	1,524	165	129	127	117	135	110	105	69	66	41
	2026	1,841	195	152	151	139	161	133	128	85	81	50
	2036	2,209	219	170	168	154	178	148	142	94	89	55
80–89	1996	444	99	82	88	88	115	102	113	82	91	66
	2006	461	99	82	88	87	114	103	113	82	91	65
	2016	465	96	80	85	85	111	105	116	87	97	69
	2026	573	112	93	99	99	130	125	140	107	119	85
	2036	701	133	110	117	118	155	152	170	131	145	103
90+	1996	31	12	10	12	14	21	24	34	31	44	39
	2006	36	13	12	14	16	25	29	42	40	58	54
	2016	41	15	13	15	17	27	33	46	45	64	59
	2026	48	16	15	17	19	31	37	53	52	74	68
	2036	70	23	20	24	26	42	50	70	69	97	88
All	1996	18,744	616	472	471	436	495	392	379	257	262	178
	2006	19,191	622	478	476	440	500	405	396	275	283	196
	2016	19,872	652	501	497	460	525	435	427	302	311	214
	2026	20,079	694	535	532	495	569	482	481	347	360	248
	2036	19,924	713	552	552	517	602	522	530	390	411	287

The number of healthy people in each of the models shows a very similar pattern to the number of people in total shown in Table 27. The number of able people aged 20 to 59 peaks in 2016 in all of the projections except for models A and K for females in which the peak occurs in 2006. The healthy population of people aged 60 to 69 peaks around 2026 in all models and for older ages the healthy population continues to rise up to the year 2036. The number of healthy adults generally peaks in 2026 rather than 2036 (the year with the largest total population). The only models in which the number of healthy adults is largest in 2036 are those with the strongest trends, i.e. models D and N.

The model with the greatest number of healthy people in 2036 is D (the number is only slightly lower in model N). This is true for both sexes and all age groups. The model with the fewest healthy people is K (although the numbers in model A are similar). By 2036 the difference between the number of healthy adults in models D and K is around one and a half million males and two million females. These differences amount to somewhat less than 10% of the healthy adult population. The relative differences are much greater for elderly people. The number of healthy males aged over 90 ranges from 18,000 in model K to 69,000 in model D. The corresponding figures for females over 90 are 55,000 and 169,000.

The number of healthy adults under 60 is projected to fall between now and 2036 in all of the models and the number of healthy adults over 60 is projected to rise by 2036 in all of the models.

The models A, B, C and D differ from each other only in the changes in the probability of deterioration. Model A has no change in the probability over time and model D has the strongest trend. It is because people are less likely to deteriorate in model D that the number of healthy people is highest in that model.

Models K, L, M and N (respectively) differ from models A, B, C and D (respectively) in that they include a trend that reduces the extra likelihood of deterioration from disabled states. This trend only has a very minor effect on the number of healthy people.

In terms of the probability of deterioration, model Q has a trend similar to models C and M at ages up to 60 and has a weaker trend at higher ages (see table 23). In addition it includes a trend that leads to a higher mortality rate for healthy people than is present in the other models. This is why the number of healthy people at high ages in model Q is lower than it is in models B or L, which have weaker deterioration trends.

The patterns shown by the projected population with category 10 disabilities is complex. A rough summary for the total number of adults with category 10 disabilities is that this number is projected to increase between 1996 and 2036 except in the models incorporating the strongest trends. The number decreases in models D and N for both males and females and also for females in model M.

The relative number of category 10 disabilities in each of the age groups in models A, B, C and D is as expected, being highest in model A and lowest in model D. Likewise, models K, L, M and N have fewer people with category 10 disabilities than have models A, B, C and D, respectively. The differences between the two sets of models (i.e. the set K to N and the set A to D) in terms of the number of disabled people are greatest for the old age groups. Model Q has a similar projected number of people with category 10 disabilities as the no trend model, A, has.

The projected number of males with category 10 disabilities in 2036 ranges from 49,000 in model N to 130,000 in models A and Q. For females, the corresponding projected numbers range from 102,000 in model N and 293,000 in model A (and 287,000 in model Q). The differences for adults aged under 60 are much smaller. For males the range in 2036 is from 12,000 in models D and N to 17,000 in models A and K. For females the range is from 14,000 in model N to 22,000 in model A.

The number of people in the three most severe categories of disability in 2036 ranges from 764,000 in model N to 1,821,000 in model Q. This is an enormous difference in the number of people who might need a substantial amount of long-term care.

The trend in the probability of deterioration is more important than the trend in the extra deterioration from the disabled categories in terms of the number of people with severe disabilities. The differences in the numbers between models A and B, for example, are greater than between models A and K.

Model A has no trends and is therefore the most pessimistic model (in the sense that it is likely to project relatively high numbers of severely disabled lives). The main features of the projection are as follows:

- For adults aged less than 60 the number who are healthy is projected to fall and the number in each of the disability categories is roughly constant.

- For the higher ages, the number of people in all categories of disability is expected to increase, as is the number who are healthy.
- The number of adult males who are severely disabled (categories 8, 9 and 10) is projected to increase by 321,000 from 384,000 in 1996 to 705,000 in 2036. This increase is made up from a decrease of 1,000 males aged less than 60 and increases of 32,000, 76,000, 131,000 and 82,000 at the higher age groups (60 to 69, 70 to 79, 80 to 89 and 90 plus).
- For adult females the projected increase in the number who are severely disabled is 380,000 — from 689,000 to 1,069,000. This comprises a decrease of 3,000 aged under 60 and increases of 28,000, 75,000, 131,000 and 149,000 at the higher age groups. (These numbers differ from those in Table 28A due to rounding.)
- The overall increase in the number severely disabled is larger for females than males in this projection. The difference is entirely due to the 90 plus age category.

Model N has the strongest trends and is therefore the most optimistic model. The main features of the projection are as follows:

- In the 20 to 59 age group the number of males and females in each disability category, as well as the number who are healthy, is projected to fall between 1996 and 2036.
- In the 60 to 69 age group, the number of healthy people is projected to rise while the number of disabled people is expected to fall (this applies to all disability categories). The changes in numbers in each category over time are not monotonic.
- In the 70 to 79 age group, the number of healthy males and the number of males in disability categories 1 to 7 are projected to rise while the number of males in disability categories 8 to 10 is projected to stay roughly constant. For females in this age group, there is projected to be an increase in the number who are healthy and in the number in disability categories 1 to 4 and a decrease in the number in the higher categories.
- In the 80 to 89 age group, the number of healthy males and the number of males in disability categories 1 to 7 are projected to rise while the number of males in disability categories 8 to 10 is projected to fall. For females in this age group, there is projected to be an increase in the number who are healthy and in the number in disability categories 1 to 5 and a fall in the number in the higher categories.
- For males aged 90 and over, there is projected to be an increase in the number healthy and the number in each disability category. For females there is projected to be an increase in the number who are healthy and the number in disability categories 1 to 8 and a decrease in the number in category 10.
- Combining all of these age groups, there is projected to be an increase in the number of males who are healthy or who are in disability categories 1 to 6 and a decrease in the number of males who are more severely disabled. For females there is projected to be an increase in the number who are healthy or who are in disability categories 1 to 4 and a decrease in the number who are more severely disabled.

7.3 *Projected disability prevalence rates*

The projected numbers produced by the various models can be converted to prevalence rates, and some of these are shown in Table 29. A table of prevalence rates shows similar information to a table of projected numbers, so we show the prevalence rates for a reduced set of years and ages. We show the rates for individual ages rather than age bands.

Table 29A(M). Prevalence rates (per 1,000), males, Model A

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	757	67	39	32	28	25	15	14	11	10	4
	2016	756	67	39	32	28	25	15	14	11	10	4
	2036	756	67	39	32	28	25	15	14	11	10	4
80	1996	403	121	79	71	68	67	44	47	41	42	18
	2016	402	121	79	70	68	67	44	47	41	42	18
	2036	402	121	79	70	67	67	44	47	41	42	18
95	1996	43	43	42	49	63	85	77	115	147	214	123
	2016	42	42	41	48	62	84	77	115	148	216	126
	2036	41	42	40	47	61	83	76	115	149	219	128

Table 29A(F). Prevalence rates (per 1,000), females, Model A

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	757	48	36	34	29	31	22	18	11	9	5
	2016	757	48	36	34	29	31	22	18	11	9	5
	2036	757	48	36	34	29	31	22	18	11	9	5
80	1996	425	77	63	65	62	76	61	62	40	41	28
	2016	425	77	62	65	62	76	61	62	41	41	28
	2036	425	77	62	65	62	76	61	62	41	42	28
95	1996	70	32	30	36	42	71	85	130	129	192	183
	2016	69	32	29	36	41	70	85	129	130	194	185
	2036	68	31	29	35	41	69	84	129	130	196	187

Table 29B(M). Prevalence rates (per 1,000), males, Model B

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	760	66	38	31	27	24	15	14	11	9	4
	2016	775	62	36	30	26	23	14	13	10	9	3
	2036	790	59	34	28	24	21	13	12	9	8	3
80	1996	412	120	79	70	67	66	43	46	39	40	17
	2016	446	117	76	67	63	62	40	42	35	36	15
	2036	483	114	73	64	60	57	36	37	31	31	13
95	1996	45	44	43	50	64	86	78	115	145	210	120
	2016	53	49	46	53	67	88	78	113	140	199	112
	2036	65	55	50	56	69	90	78	111	134	187	104

Table 29B(F). Prevalence rates (per 1,000), females, Model B

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	760	47	35	34	29	31	21	18	10	9	5
	2016	773	45	34	32	28	29	20	17	10	8	5
	2036	787	43	32	30	26	27	19	15	9	8	4
80	1996	431	77	62	65	62	75	60	61	39	40	27
	2016	456	76	62	63	60	72	57	57	36	37	24
	2036	484	75	60	61	58	68	53	52	33	33	22
95	1996	73	33	31	37	43	72	86	130	128	189	178
	2016	86	37	34	41	47	76	88	129	123	177	163
	2036	102	41	37	44	50	80	89	127	118	165	148

Table 29C(M). Prevalence rates (per 1,000), males, Model C

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	763	65	38	31	27	24	15	14	11	9	3
	2016	791	58	34	28	24	21	13	12	9	8	3
	2036	819	51	30	24	21	18	11	10	7	6	2
80	1996	421	120	78	69	66	65	42	44	38	39	16
	2016	491	113	73	64	59	56	35	36	30	30	12
	2036	561	104	66	57	52	48	29	29	23	22	9
95	1996	46	45	44	51	65	87	78	115	144	207	118
	2016	67	57	52	58	71	92	79	111	132	182	100
	2036	98	70	60	65	76	94	77	104	118	156	83

Table 29C(F). Prevalence rates (per 1,000), females, Model C

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	763	47	35	33	29	30	21	18	10	9	5
	2016	788	43	32	30	26	27	18	15	9	7	4
	2036	812	39	29	27	23	24	16	13	7	6	4
80	1996	437	77	62	65	62	75	60	60	39	39	26
	2016	486	75	60	62	58	68	53	51	33	32	21
	2036	539	72	57	57	53	61	46	44	27	27	17
95	1996	76	34	31	38	44	74	87	130	127	185	173
	2016	105	42	38	45	51	82	90	127	116	160	143
	2036	144	50	45	52	57	86	90	120	104	136	116

Table 29D(M). Prevalence rates (per 1,000), males, Model D

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	770	64	37	30	26	23	14	13	10	9	3
	2016	821	51	30	24	21	18	11	10	7	6	2
	2036	864	39	23	19	16	13	8	7	5	4	2
80	1996	440	118	77	68	65	63	40	42	36	36	15
	2016	570	102	66	57	52	47	28	27	22	20	8
	2036	649	89	56	47	42	37	22	21	16	14	6
95	1996	50	48	46	53	67	89	79	114	142	200	112
	2016	102	72	62	67	79	96	78	103	115	149	78
	2036	195	95	74	74	81	91	68	83	86	103	51

Table 29D(F). Prevalence rates (per 1,000), females, Model D

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	769	46	35	33	28	29	20	17	10	8	5
	2016	813	39	29	27	24	23	16	13	7	6	3
	2036	852	31	24	22	19	18	12	9	5	4	2
80	1996	448	77	62	64	61	73	58	57	37	37	24
	2016	543	72	58	58	54	61	45	42	26	25	16
	2036	638	63	50	48	44	47	34	30	18	17	11
95	1996	82	36	33	40	47	76	89	130	125	179	164
	2016	149	51	47	54	60	89	92	119	101	130	109
	2036	246	64	56	62	66	90	83	98	76	90	70

Table 29K(M). Prevalence rates (per 1,000), males, Model K

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	757	67	39	32	28	25	15	14	11	10	4
	2016	756	67	39	32	28	25	15	14	11	9	4
	2036	756	67	39	32	28	25	15	14	11	9	3
80	1996	403	121	80	71	68	68	44	47	40	41	17
	2016	402	122	81	72	69	68	44	46	39	39	16
	2036	401	123	82	74	70	69	44	46	38	38	16
95	1996	43	44	43	51	65	89	80	117	146	206	116
	2016	41	44	45	55	72	97	87	122	144	191	101
	2036	40	45	47	59	78	104	92	125	142	178	90

Table 29K(F). Prevalence rates (per 1,000), females, Model K

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	757	48	36	34	30	31	22	18	10	9	5
	2016	757	48	36	34	30	31	22	18	10	9	5
	2036	757	48	36	35	30	31	21	18	10	9	5
80	1996	425	78	63	66	63	77	61	61	40	40	27
	2016	423	79	65	68	65	78	62	60	38	38	24
	2036	421	80	66	70	67	80	62	59	37	36	23
95	1996	70	33	31	38	45	75	89	133	130	186	170
	2016	66	33	33	43	52	87	100	141	129	171	144
	2036	63	34	35	47	59	96	108	145	126	159	127

Table 29L(M). Prevalence rates (per 1,000), males, Model L

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	760	66	38	31	27	24	15	14	11	9	4
	2016	774	63	37	30	26	23	14	13	10	8	3
	2036	790	59	34	28	24	21	13	12	9	8	3
80	1996	412	121	79	71	67	67	43	45	39	40	17
	2016	445	119	78	69	65	63	40	41	34	33	14
	2036	482	116	75	66	61	58	36	36	29	28	11
95	1996	44	45	44	52	66	90	81	117	145	203	113
	2016	52	51	51	60	77	100	87	119	136	175	91
	2036	63	59	58	68	85	107	90	117	126	153	75

Table 29L(F). Prevalence rates (per 1,000), females, Model L

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	760	47	35	34	29	31	21	18	10	9	5
	2016	773	45	34	32	28	29	20	16	9	8	4
	2036	786	43	33	31	27	27	18	15	8	7	4
80	1996	431	78	63	65	63	76	61	60	39	39	26
	2016	454	78	64	66	63	74	57	55	34	33	21
	2036	481	77	63	65	62	71	54	50	31	29	18
95	1996	73	34	32	39	46	77	90	133	129	183	166
	2016	83	38	38	48	58	92	102	138	121	155	128
	2036	96	43	44	56	67	103	108	136	111	133	103

Table 29M(M). Prevalence rates (per 1,000), males, Model M

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	763	65	38	31	27	24	15	14	10	9	3
	2016	791	58	34	28	24	21	13	12	9	7	3
	2036	819	51	30	24	21	18	11	10	7	6	2
80	1996	421	120	79	70	67	65	42	44	38	38	16
	2016	490	114	74	65	61	57	35	35	29	28	11
	2036	560	105	68	59	53	48	29	28	22	20	8
95	1996	46	46	45	53	68	91	81	117	144	200	111
	2016	66	58	56	65	81	103	87	115	128	160	81
	2036	95	73	67	75	90	108	86	106	110	128	61

Table 29M($\dot{F}$). Prevalence rates (per 1,000), females, Model M

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	763	47	35	33	29	30	21	18	10	9	5
	2016	787	43	33	31	27	27	18	15	8	7	4
	2036	811	39	29	28	24	24	16	13	7	6	3
80	1996	436	78	63	65	62	75	60	59	38	38	25
	2016	484	76	62	64	60	70	53	50	31	30	19
	2036	537	73	60	60	56	63	46	42	25	24	15
95	1996	76	34	32	40	47	78	91	133	127	180	161
	2016	101	43	42	53	62	96	103	133	113	141	113
	2036	137	53	52	63	73	106	104	124	96	110	82

Table 29N(M). Prevalence rates (per 1,000), males, Model N

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	770	64	37	30	26	23	14	13	10	9	3
	2016	821	51	30	24	21	18	11	9	7	6	2
	2036	863	39	23	19	16	13	8	7	5	4	1
80	1996	440	118	78	69	65	63	40	42	35	35	15
	2016	570	103	67	58	53	47	28	27	21	19	7
	2036	648	90	57	48	43	37	22	20	15	13	5
95	1996	50	48	47	55	70	92	82	116	141	193	105
	2016	100	74	66	74	87	105	83	105	110	132	64
	2036	191	98	80	82	90	99	72	83	79	87	40

Table 29N(F). Prevalence rates (per 1,000), females, Model N

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	769	46	35	33	29	29	20	17	10	8	5
	2016	813	39	29	28	24	24	16	13	7	6	3
	2036	851	32	24	22	19	18	12	9	5	4	2
80	1996	448	77	63	65	62	74	58	57	36	36	23
	2016	541	73	59	60	56	62	45	41	25	23	15
	2036	636	64	51	50	45	48	34	29	17	16	9
95	1996	82	36	34	42	49	81	93	133	125	173	153
	2016	144	53	51	61	70	101	101	122	97	114	87
	2036	238	67	62	72	78	102	90	97	69	74	52

Table 29Q(M). Prevalence rates (per 1,000), males, Model Q

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	757	66	38	31	27	24	15	15	12	10	4
	2016	766	61	35	29	25	23	16	16	13	11	4
	2036	782	56	33	27	24	22	15	15	12	11	4
80	1996	406	119	78	69	66	66	44	48	42	43	18
	2016	419	111	72	64	62	62	46	51	46	46	20
	2036	445	106	68	60	58	59	45	50	45	45	19
95	1996	44	43	42	49	62	85	78	115	147	212	122
	2016	48	42	39	45	56	77	80	118	153	218	125
	2036	62	48	43	48	60	80	79	115	147	203	114

Table 29Q(F). Prevalence rates (per 1,000), females, Model Q

Age	Year		OPCS Disability Category									
		Able	1	2	3	4	5	6	7	8	9	10
65	1996	759	47	35	33	29	31	22	19	11	9	5
	2016	767	44	33	31	27	29	22	19	12	10	6
	2036	781	41	31	29	25	27	21	18	12	10	6
80	1996	429	77	62	64	61	75	61	62	41	42	28
	2016	437	72	58	60	57	71	62	64	44	45	30
	2036	461	69	55	57	55	67	60	61	43	44	29
95	1996	69	31	29	35	40	69	85	130	131	196	186
	2016	74	31	28	34	39	67	86	130	133	195	182
	2036	87	33	30	36	42	69	86	128	131	188	172

Tables 29A(M) and 29A(F) show that the prevalence rates of disability at ages 65, 80 and 95 are quite stable over time for model A. Since model A is the "no trend" model, this is plausible. However, model A does incorporate changes in the overall mortality rate and so some changes in prevalence rates may be expected to occur.

In the other models, with the partial exception of model Q, the prevalence rates in the severe disability categories fall over time.

Model N shows the lowest prevalence rates at severe disabilities due to its having the strongest trends. At ages 65 and 80 the prevalence rate falls over time for all disability categories for both sexes. At age 95 the prevalence rates for disability categories 6 to 10 fall and the prevalence rates for

disability categories 1 to 5 rise, as does the prevalence rate of healthy. For disability categories 9 and 10, the reductions in prevalence rates are by factors of 2 and 3. The projected proportion of 95 year old males who are healthy in 2036 is nearly four times as high as in 1996. For females the proportion nearly trebles over the period.

7.4 *Projected healthy life expectancy*

Healthy life expectancies have been calculated for the projections in four years (2006, 2016, 2026 and 2036). The results are presented in the same manner as for Table 21 and Table 25.

Table 30A1. Life expectancies in 2006, Model A

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.51	54.44%	14.39	91.99%	1.25
	70	5.71	46.87%	10.94	89.76%	1.25
	75	3.36	36.56%	7.91	85.93%	1.29
	80	1.69	24.79%	5.43	79.83%	1.37
	85	0.73	14.38%	3.58	70.75%	1.48
Females	65	9.68	51.13%	16.87	89.12%	2.06
	70	6.60	44.04%	12.97	86.45%	2.03
	75	4.11	35.80%	9.48	82.50%	2.01
	80	2.28	26.74%	6.53	76.52%	2.00
	85	1.10	17.64%	4.19	67.41%	2.02

Table 30A2. Life expectancies in 2016, Model A

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.80	53.18%	15.12	91.37%	1.43
	70	5.93	45.63%	11.57	89.04%	1.43
	75	3.51	35.50%	8.43	85.13%	1.47
	80	1.76	24.07%	5.79	78.99%	1.54
	85	0.76	13.99%	3.78	69.94%	1.62
Females	65	9.94	50.01%	17.58	88.42%	2.30
	70	6.85	42.99%	13.64	85.68%	2.28
	75	4.30	34.93%	10.06	81.70%	2.25
	80	2.38	26.14%	6.89	75.74%	2.21
	85	1.13	17.28%	4.37	66.72%	2.18

Table 30A3. Life expectancies in 2026, Model A

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.95	52.39%	15.53	90.91%	1.55
	70	6.04	44.83%	11.93	88.50%	1.55
	75	3.59	34.77%	8.73	84.49%	1.60
	80	1.81	23.50%	6.03	78.26%	1.67
	85	0.78	13.63%	3.95	69.12%	1.76
Females	65	10.10	49.11%	18.03	87.70%	2.53
	70	6.96	42.08%	14.03	84.85%	2.51
	75	4.40	34.05%	10.42	80.72%	2.49
	80	2.46	25.35%	7.23	74.62%	2.46
	85	1.18	16.71%	4.63	65.53%	2.43

Table 30A4. Life expectancies in 2036, Model A

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.04	51.92%	15.79	90.63%	1.63
	70	6.11	44.36%	12.15	88.16%	1.63
	75	3.64	34.35%	8.91	84.10%	1.68
	80	1.84	23.18%	6.17	77.81%	1.76
	85	0.79	13.41%	4.05	68.60%	1.85
Females	65	10.18	48.66%	18.26	87.32%	2.65
	70	7.02	41.65%	14.24	84.42%	2.63
	75	4.44	33.65%	10.59	80.23%	2.61
	80	2.49	25.00%	7.37	74.04%	2.58
	85	1.20	16.42%	4.73	64.85%	2.57

Table 30B1. Life expectancies in 2006, Model B

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.75	55.95%	14.47	92.55%	1.16
	70	5.93	48.65%	11.03	90.51%	1.16
	75	3.57	38.76%	8.00	86.99%	1.20
	80	1.82	26.75%	5.52	81.17%	1.28
	85	0.80	15.82%	3.66	72.45%	1.39
Females	65	9.95	52.55%	17.00	89.82%	1.93
	70	6.84	45.58%	13.10	87.32%	1.90
	75	4.30	37.42%	9.61	83.61%	1.88
	80	2.42	28.33%	6.65	77.97%	1.88
	85	1.18	19.05%	4.31	69.32%	1.91

Table 30B2. Life expectancies in 2016, Model B

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.24	55.84%	15.28	92.34%	1.27
	70	6.33	48.68%	11.74	90.31%	1.26
	75	3.88	39.19%	8.60	86.91%	1.30
	80	2.01	27.44%	5.96	81.27%	1.37
	85	0.89	16.54%	3.93	72.83%	1.47
Females	65	10.44	52.52%	17.82	89.63%	2.06
	70	7.28	45.71%	13.88	87.18%	2.04
	75	4.65	37.79%	10.30	83.60%	2.02
	80	2.63	28.95%	7.12	78.21%	1.98
	85	1.30	19.79%	4.58	69.95%	1.97

Table 30B3. Life expectancies in 2026, Model B

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.60	56.22%	15.77	92.30%	1.32
	70	6.63	49.18%	12.17	90.30%	1.31
	75	4.13	39.98%	8.99	87.00%	1.34
	80	2.18	28.34%	6.28	81.48%	1.43
	85	0.99	17.32%	4.18	73.21%	1.53
Females	65	10.84	52.74%	18.39	89.46%	2.17
	70	7.61	46.02%	14.39	87.01%	2.15
	75	4.93	38.17%	10.78	83.46%	2.14
	80	2.85	29.42%	7.58	78.16%	2.12
	85	1.44	20.34%	4.95	70.13%	2.11

Table 30B4. Life expectancies in 2036, Model B

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.91	56.91%	16.10	92.43%	1.32
	70	6.89	50.00%	12.47	90.48%	1.31
	75	4.35	41.08%	9.25	87.32%	1.34
	80	2.34	29.52%	6.50	81.96%	1.43
	85	1.08	18.31%	4.36	73.88%	1.54
Females	65	11.17	53.42%	18.74	89.61%	2.17
	70	7.89	46.81%	14.71	87.22%	2.16
	75	5.16	39.06%	11.06	83.76%	2.14
	80	3.02	30.34%	7.82	78.60%	2.13
	85	1.55	21.21%	5.17	70.78%	2.13

Table 30C1. Life expectancies in 2006, Model C

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.98	57.41%	14.56	93.08%	1.08
	70	6.13	50.33%	11.12	91.20%	1.07
	75	3.77	40.92%	8.10	88.00%	1.10
	80	1.96	28.78%	5.61	82.47%	1.19
	85	0.88	17.34%	3.75	74.10%	1.31
Females	65	10.21	53.92%	17.12	90.48%	1.80
	70	7.06	47.09%	13.22	88.14%	1.78
	75	4.48	39.02%	9.73	84.66%	1.76
	80	2.55	29.93%	6.77	79.35%	1.76
	85	1.27	20.49%	4.42	71.15%	1.79

Table 30C2. Life expectancies in 2016, Model C

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.66	58.38%	15.42	93.21%	1.12
	70	6.70	51.54%	11.89	91.43%	1.11
	75	4.24	42.79%	8.76	88.53%	1.14
	80	2.27	31.04%	6.11	83.41%	1.22
	85	1.05	19.35%	4.08	75.57%	1.32
Females	65	10.93	54.95%	18.04	90.73%	1.84
	70	7.70	48.37%	14.10	88.53%	1.83
	75	5.00	40.62%	10.51	85.33%	1.81
	80	2.89	31.81%	7.32	80.47%	1.78
	85	1.47	22.42%	4.78	72.95%	1.77

Table 30C3. Life expectancies in 2026, Model C

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	10.23	59.85%	15.98	93.50%	1.11
	70	7.18	53.22%	12.38	91.83%	1.10
	75	4.65	44.97%	9.21	89.18%	1.12
	80	2.59	33.59%	6.50	84.43%	1.20
	85	1.23	21.56%	4.40	77.01%	1.31
Females	65	11.56	56.22%	18.71	90.99%	1.85
	70	8.24	49.85%	14.70	88.91%	1.83
	75	5.46	42.27%	11.09	85.86%	1.83
	80	3.25	33.58%	7.88	81.29%	1.81
	85	1.71	24.23%	5.25	74.29%	1.82

Table 30C4. Life expectancies in 2036, Model C

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	10.73	61.59%	16.36	93.91%	1.06
	70	7.61	55.19%	12.73	92.36%	1.05
	75	5.02	47.37%	9.53	89.97%	1.06
	80	2.89	36.48%	6.79	85.65%	1.14
	85	1.42	24.13%	4.64	78.65%	1.26
Females	65	12.12	57.94%	19.14	91.52%	1.77
	70	8.74	51.79%	15.11	89.58%	1.76
	75	5.87	44.42%	11.46	86.75%	1.75
	80	3.57	35.85%	8.21	82.50%	1.74
	85	1.93	26.44%	5.54	75.97%	1.75

Table 30D1. Life expectancies in 2006, Model D

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.41	60.19%	14.70	94.02%	0.93
	70	6.51	53.44%	11.27	92.42%	0.92
	75	4.14	45.01%	8.26	89.81%	0.94
	80	2.25	33.08%	5.78	84.94%	1.02
	85	1.04	20.64%	3.91	77.24%	1.15
Females	65	10.71	56.56%	17.35	91.67%	1.58
	70	7.50	50.00%	13.44	89.63%	1.56
	75	4.84	42.14%	9.95	86.58%	1.54
	80	2.82	33.11%	6.98	81.89%	1.54
	85	1.46	23.45%	4.63	74.56%	1.58

Table 30D2. Life expectancies in 2016, Model D

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	10.44	63.13%	15.67	94.69%	0.88
	70	7.38	56.81%	12.13	93.31%	0.87
	75	4.87	49.24%	9.03	91.21%	0.87
	80	2.83	38.64%	6.40	87.30%	0.93
	85	1.39	25.74%	4.35	80.60%	1.05
Females	65	11.83	59.52%	18.41	92.61%	1.47
	70	8.51	53.45%	14.47	90.87%	1.45
	75	5.68	46.13%	10.88	88.32%	1.44
	80	3.41	37.52%	7.68	84.42%	1.42
	85	1.83	27.91%	5.12	78.28%	1.42

Table 30D3. Life expectancies in 2026, Model D

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	11.35	66.44%	16.30	95.39%	0.79
	70	8.17	60.58%	12.70	94.22%	0.78
	75	5.53	53.55%	9.55	92.48%	0.78
	80	3.42	44.36%	6.89	89.43%	0.81
	85	1.80	31.56%	4.78	83.68%	0.93
Females	65	12.88	62.65%	19.22	93.47%	1.34
	70	9.43	57.04%	15.21	91.97%	1.33
	75	6.48	50.16%	11.59	89.77%	1.32
	80	4.06	41.91%	8.38	86.44%	1.31
	85	2.29	32.47%	5.74	81.24%	1.33

Table 30D4. Life expectancies in 2036, Model D

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	12.16	69.81%	16.74	96.09%	0.68
	70	8.88	64.46%	13.11	95.11%	0.67
	75	6.13	57.90%	9.92	93.66%	0.67
	80	3.95	49.86%	7.24	91.32%	0.69
	85	2.25	38.06%	5.11	86.66%	0.79
Females	65	13.82	66.07%	19.75	94.41%	1.17
	70	10.28	60.95%	15.71	93.15%	1.16
	75	7.21	54.58%	12.06	91.30%	1.15
	80	4.66	46.77%	8.81	88.50%	1.14
	85	2.74	37.54%	6.14	84.12%	1.16

Table 30K1. Life expectancies in 2006, Model K

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.51	54.40%	14.44	92.37%	1.19
	70	5.71	46.83%	11.00	90.28%	1.19
	75	3.36	36.51%	7.98	86.69%	1.22
	80	1.68	24.72%	5.51	81.03%	1.29
	85	0.72	14.31%	3.68	72.67%	1.38
Females	65	9.66	51.04%	17.00	89.81%	1.93
	70	6.59	43.93%	13.10	87.35%	1.90
	75	4.10	35.66%	9.62	83.72%	1.87
	80	2.27	26.57%	6.67	78.25%	1.85
	85	1.08	17.45%	4.35	69.96%	1.87

Table 30K2. Life Expectancies in 2016, Model K

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.79	53.12%	15.22	91.99%	1.32
	70	5.92	45.56%	11.68	89.88%	1.32
	75	3.50	35.41%	8.55	86.35%	1.35
	80	1.76	23.96%	5.93	80.89%	1.40
	85	0.75	13.88%	3.94	72.93%	1.46
Females	65	9.91	49.85%	17.80	89.54%	2.08
	70	6.81	42.79%	13.87	87.12%	2.05
	75	4.27	34.69%	10.30	83.63%	2.02
	80	2.35	25.84%	7.14	78.46%	1.96
	85	1.11	16.95%	4.62	70.65%	1.92

Table 30K3. Life expectancies in 2026, Model K

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.94	52.31%	15.68	91.78%	1.40
	70	6.03	44.73%	12.09	89.67%	1.39
	75	3.58	34.65%	8.90	86.17%	1.43
	80	1.80	23.36%	6.23	80.82%	1.48
	85	0.77	13.47%	4.18	73.10%	1.54
Females	65	10.05	48.88%	18.35	89.27%	2.21
	70	6.91	41.81%	14.36	86.85%	2.18
	75	4.35	33.72%	10.77	83.39%	2.15
	80	2.42	24.95%	7.59	78.31%	2.10
	85	1.15	16.27%	5.00	70.80%	2.06

Table 30K4. Life expectancies in 2036, Model K

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.03	51.82%	15.98	91.72%	1.44
	70	6.10	44.24%	12.35	89.62%	1.43
	75	3.62	34.20%	9.13	86.18%	1.46
	80	1.82	23.00%	6.42	80.95%	1.51
	85	0.78	13.23%	4.33	73.47%	1.57
Females	65	10.12	48.39%	18.67	89.28%	2.24
	70	6.97	41.31%	14.66	86.90%	2.21
	75	4.39	33.24%	11.03	83.51%	2.18
	80	2.44	24.51%	7.82	78.57%	2.13
	85	1.16	15.89%	5.20	71.31%	2.09

Table 30L1. Life expectancies in 2006, Model L

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.74	55.91%	14.53	92.89%	1.11
	70	5.93	48.60%	11.09	90.97%	1.10
	75	3.56	38.70%	8.07	87.68%	1.13
	80	1.81	26.68%	5.59	82.27%	1.21
	85	0.80	15.75%	3.76	74.24%	1.30
Females	65	9.93	52.46%	17.12	90.46%	1.81
	70	6.82	45.47%	13.22	88.15%	1.78
	75	4.28	37.28%	9.74	84.74%	1.75
	80	2.40	28.16%	6.79	79.58%	1.74
	85	1.17	18.85%	4.45	71.71%	1.76

Table 30L2. Life expectancies in 2016, Model L

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.23	55.78%	15.37	92.87%	1.18
	70	6.32	48.61%	11.83	91.03%	1.17
	75	3.87	39.10%	8.71	87.96%	1.19
	80	2.00	27.33%	6.08	82.91%	1.25
	85	0.89	16.41%	4.08	75.47%	1.33
Females	65	10.41	52.36%	18.02	90.61%	1.87
	70	7.25	45.52%	14.08	88.44%	1.84
	75	4.62	37.54%	10.51	85.30%	1.81
	80	2.61	28.65%	7.34	80.61%	1.76
	85	1.27	19.45%	4.81	73.46%	1.74

Table 30L3. Life expectancies in 2026, Model L

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.59	56.14%	15.89	93.00%	1.20
	70	6.62	49.08%	12.30	91.24%	1.18
	75	4.12	39.86%	9.13	88.35%	1.20
	80	2.17	28.19%	6.44	83.57%	1.27
	85	0.98	17.14%	4.37	76.55%	1.34
Females	65	10.80	52.52%	18.66	90.76%	1.90
	70	7.57	45.75%	14.67	88.68%	1.87
	75	4.89	37.84%	11.06	85.68%	1.85
	80	2.81	29.01%	7.88	81.26%	1.82
	85	1.40	19.87%	5.27	74.63%	1.79

Table 30L4. Life expectancies in 2036, Model L

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.90	56.82%	16.24	93.25%	1.18
	70	6.87	49.88%	12.62	91.58%	1.16
	75	4.33	40.93%	9.41	88.88%	1.18
	80	2.33	29.34%	6.69	84.37%	1.24
	85	1.07	18.09%	4.59	77.75%	1.31
Females	65	11.12	53.15%	19.06	91.14%	1.85
	70	7.84	46.48%	15.04	89.17%	1.83
	75	5.10	38.65%	11.40	86.36%	1.80
	80	2.97	29.84%	8.18	82.22%	1.77
	85	1.51	20.63%	5.55	76.03%	1.75

Table 30M1. Life expectancies in 2006, Model M

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.97	57.38%	14.60	93.39%	1.03
	70	6.13	50.28%	11.17	91.62%	1.02
	75	3.76	40.87%	8.16	88.62%	1.05
	80	1.95	28.71%	5.68	83.48%	1.12
	85	0.87	17.26%	3.83	75.76%	1.23
Females	65	10.19	53.83%	17.24	91.07%	1.69
	70	7.05	46.98%	13.33	88.90%	1.66
	75	4.47	38.88%	9.85	85.71%	1.64
	80	2.54	29.75%	6.90	80.85%	1.63
	85	1.26	20.29%	4.56	73.38%	1.65

Table 30M2. Life expectancies in 2016, Model M

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.65	58.33%	15.50	93.67%	1.05
	70	6.69	51.47%	11.97	92.05%	1.03
	75	4.23	42.70%	8.85	89.42%	1.05
	80	2.27	30.92%	6.22	84.82%	1.11
	85	1.04	19.21%	4.21	77.89%	1.19
Females	65	10.89	54.79%	18.21	91.59%	1.67
	70	7.67	48.18%	14.27	89.64%	1.65
	75	4.97	40.38%	10.69	86.82%	1.62
	80	2.87	31.50%	7.52	82.59%	1.58
	85	1.44	22.06%	4.98	76.08%	1.57

Table 30M3. Life expectancies in 2026, Model M

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	10.21	59.77%	16.07	94.06%	1.01
	70	7.16	53.12%	12.48	92.57%	1.00
	75	4.63	44.85%	9.32	90.24%	1.01
	80	2.58	33.43%	6.63	86.11%	1.07
	85	1.22	21.37%	4.56	79.76%	1.16
Females	65	11.52	56.01%	18.93	92.07%	1.63
	70	8.20	49.59%	14.93	90.28%	1.61
	75	5.42	41.94%	11.32	87.70%	1.59
	80	3.21	33.17%	8.13	83.87%	1.56
	85	1.68	23.74%	5.52	78.08%	1.55

Table 30M4. Life expectancies in 2036, Model M

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	10.71	61.50%	16.46	94.52%	0.95
	70	7.59	55.08%	12.84	93.17%	0.94
	75	5.00	47.23%	9.65	91.12%	0.94
	80	2.88	36.29%	6.93	87.45%	1.00
	85	1.41	23.89%	4.82	81.63%	1.08
Females	65	12.07	57.69%	19.39	92.71%	1.53
	70	8.68	51.48%	15.36	91.09%	1.50
	75	5.81	44.03%	11.72	88.77%	1.48
	80	3.52	35.35%	8.49	85.34%	1.46
	85	1.89	25.83%	5.85	80.14%	1.45

Table 30N1. Life expectancies in 2006, Model N

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.41	60.16%	14.74	94.28%	0.89
	70	6.51	53.40%	11.31	92.77%	0.88
	75	4.14	44.95%	8.31	90.33%	0.89
	80	2.24	33.01%	5.83	85.78%	0.97
	85	1.04	20.55%	3.98	78.67%	1.08
Females	65	10.69	56.48%	17.45	92.17%	1.48
	70	7.48	49.89%	13.54	90.28%	1.46
	75	4.83	42.01%	10.05	87.47%	1.44
	80	2.81	32.93%	7.09	83.18%	1.43
	85	1.44	23.23%	4.75	76.51%	1.46

Table 30N2. Life expectancies in 2016, Model N

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	10.44	63.07%	15.72	95.02%	0.82
	70	7.38	56.74%	12.19	93.75%	0.81
	75	4.86	49.15%	9.09	91.84%	0.81
	80	2.82	38.52%	6.47	88.31%	0.86
	85	1.38	25.59%	4.45	82.34%	0.95
Females	65	11.81	59.37%	18.54	93.26%	1.34
	70	8.48	53.27%	14.60	91.71%	1.32
	75	5.65	45.89%	11.02	89.45%	1.30
	80	3.39	37.22%	7.83	86.03%	1.27
	85	1.80	27.53%	5.28	80.70%	1.26

Table 30N3. Life expectancies in 2026, Model N

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	11.34	66.37%	16.36	95.74%	0.73
	70	8.16	60.49%	12.77	94.68%	0.72
	75	5.52	53.43%	9.62	93.13%	0.71
	80	3.41	44.20%	6.97	90.45%	0.74
	85	1.79	31.35%	4.88	85.45%	0.83
Females	65	12.84	62.47%	19.36	94.18%	1.20
	70	9.40	56.81%	15.36	92.88%	1.18
	75	6.44	49.86%	11.75	90.99%	1.16
	80	4.02	41.52%	8.55	88.17%	1.15
	85	2.26	31.96%	5.92	83.84%	1.14

Table 30N4. Life expectancies in 2036, Model N

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	12.15	69.74%	16.79	96.42%	0.62
	70	8.87	64.37%	13.17	95.54%	0.61
	75	6.12	57.77%	9.98	94.27%	0.61
	80	3.94	49.68%	7.31	92.25%	0.61
	85	2.23	37.82%	5.21	88.26%	0.69
Females	65	13.78	65.86%	19.89	95.10%	1.03
	70	10.24	60.69%	15.86	94.02%	1.01
	75	7.16	54.24%	12.21	92.47%	0.99
	80	4.61	46.33%	8.97	90.17%	0.98
	85	2.70	36.95%	6.32	86.62%	0.98

Table 30Q1. Life expectancies in 2006, Model Q

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	8.61	55.05%	14.30	91.46%	1.34
	70	5.80	47.59%	10.87	89.18%	1.32
	75	3.45	37.48%	7.85	85.35%	1.35
	80	1.75	25.78%	5.39	79.23%	1.41
	85	0.77	15.19%	3.55	70.12%	1.51
Females	65	9.81	51.83%	16.81	88.81%	2.12
	70	6.73	44.86%	12.92	86.15%	2.08
	75	4.22	36.70%	9.45	82.21%	2.04
	80	2.35	27.53%	6.49	76.14%	2.04
	85	1.13	18.17%	4.15	66.86%	2.06

Table 30Q2. Life expectancies in 2016, Model Q

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.00	54.40%	14.98	90.57%	1.56
	70	6.10	46.94%	11.45	88.11%	1.55
	75	3.66	37.00%	8.33	84.11%	1.57
	80	1.88	25.62%	5.71	77.91%	1.62
	85	0.83	15.31%	3.72	68.93%	1.68
Females	65	10.17	51.17%	17.46	87.83%	2.42
	70	7.04	44.18%	13.54	85.01%	2.39
	75	4.45	36.12%	9.97	80.97%	2.34
	80	2.49	27.34%	6.83	75.10%	2.27
	85	1.20	18.36%	4.34	66.30%	2.21

Table 30Q3. Life expectancies in 2026, Model Q

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.32	54.53%	15.41	90.16%	1.68
	70	6.35	47.11%	11.82	87.64%	1.67
	75	3.85	37.26%	8.63	83.58%	1.70
	80	2.00	25.96%	5.96	77.31%	1.75
	85	0.89	15.64%	3.90	68.34%	1.81
Females	65	10.49	51.02%	17.90	87.05%	2.66
	70	7.29	44.06%	13.91	84.11%	2.63
	75	4.64	35.96%	10.31	79.87%	2.60
	80	2.62	27.01%	7.14	73.67%	2.55
	85	1.27	17.99%	4.57	64.71%	2.49

Table 30Q4. Life expectancies in 2036, Model Q

		HLE(0)	HLE(0)/*e*	HLE(7)	HLE(7)/*e*	DLE(7)
Males	65	9.62	55.23%	15.72	90.23%	1.70
	70	6.60	47.89%	12.09	87.75%	1.69
	75	4.04	38.16%	8.87	83.81%	1.71
	80	2.14	26.95%	6.16	77.76%	1.76
	85	0.98	16.65%	4.09	69.27%	1.81
Females	65	10.81	51.68%	18.21	87.07%	2.70
	70	7.55	44.79%	14.20	84.17%	2.67
	75	4.86	36.77%	10.57	80.02%	2.64
	80	2.77	27.87%	7.36	73.97%	2.59
	85	1.37	18.82%	4.76	65.26%	2.54

The proportion of life spent free of any disability, as measured by the ratio HLE(0)/*e* increases over time in most of the models. The exceptions are models A and K, which have the weakest trends, and, for some ages, model Q (for females only). By 2036 the lowest values for this ratio are in model K and the highest are in model D. For a male aged 85 in 2036, the fraction of future life spent healthy could range from 13% (model K) to 38% (model D). The corresponding figures for females are 16% (model K) and 38% (model D).

Note that models C and M keep this ratio fairly constant over the ten year period from 1986 to 1996 (see Tables 25C and 25M). This is quite similar to what the data available suggest has been happening (see Table 11b). When the models are projected to 2036, however, the ratios do not stay constant, but they rise.

Although the increases in the ratio HLE(0)/*e* over forty years in some of the models are quite large compared to those indicated by the data over the last twenty years, they are produced by models that do produce only small changes initially and, therefore, are not inconsistent with the data.

The number of years spent severely disabled, as measured by DLE(7), increases in most models. The exceptions are models D, M and N, which are the ones with the strongest trends. In model N the severely disabled life expectancy in 2036 is around 0.65 years for males and 1 year for females at the ages covered by the tables. In models A and Q the corresponding life times are around 1.7 years for males and 2.6 years for females.

The changes over time are quite erratic in some of the models. For example, in model C, DLE(7) initially increases for males and then decreases. For females in model C, DLE(7) increases at some ages and decreases at others over the same period.

Note that the changes over fifty years from 1986 to 2036 in DLE(7) are typically less than 0.4 years, whether they are up or down. The data in Table 12c and Table 12d show bigger changes than this over a ten year period at some ages. None of the changes produced by the models should, therefore, be considered extreme.

8. UNCERTAINTIES

8.1 *The population over the age of 80*

In section 8 we discuss some of the uncertainties surrounding the projections. We have discussed the uncertainties due to ambiguous trend data in other sections (Part I section 2.3, Part II section 5, and section 7). Apart from the difficulty of identifying the most likely trends, the most important uncertainty is the subject of section 8.1. This uncertainty relates to the fact that published data for the population over the age of 80 have not been sub-divided into age bands. The stationary population assumption, which is covered in section 8.2, is also important. The other uncertainties are probably of less significance.

Table 27 shows that the number of people over the age of 80 is expected to rise greatly over the next 40 years. The level of disabilities amongst the elderly population will be absolutely critical to the need for long term care provision and hence any weakness in the model relating to this age group is important.

We have determined the parameters in our transition rate model by using the OPCS disability survey prevalence rates. The oldest age group for which disability prevalence rates are known covers everyone aged 80 and above. The original data for the OPCS survey do include information on the exact ages of the people who were questioned in the survey, so it is possible to gain more detailed information on the disabilities of the elderly population. We believe that this kind of analysis has been carried out but, as far as we know, has not been published.

Since the prevalence rates in the most severe disability categories rise extremely rapidly between people in their seventies and people older than that (see Table 1), the prevalence rates may well be very much higher for people in their nineties than for people in their eighties. Our transition rate model does produce rapidly increasing prevalence rates of severe disabilities and, therefore, the results produced by the model are plausible. The results are not, however, well constrained. If the rise in the prevalence rates of severe disability were to tail off at ages around, say, 90 this would have virtually no effect on the reported prevalence rates in the OPCS survey (because there were so few people over 90 at the time of the survey).

There is one graph in the OPCS disability survey report that provides extra information on disabilities at ages over 80 (Martin et al, 1988, Fig 3.3). The following numbers have been obtained from that graph by inspection. Note that the figures are for males and females combined, and that there will be some measurement error in the numbers.

Table 31. OPCS Survey disability prevalence rates (per 1,000) in five-year age bands

Age		OPCS Disability Categories				
	Healthy	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10
70 – 74	653	133	93	53	40	27
75 – 79	520	153	107	107	67	47
80 – 84	347	173	147	133	113	87
85+	153	133	120	187	193	213

These numbers show the very rapid increase in severe disabilities. The following pair of tables show the rates derived from our transition rate model for the same age bands (Table 32a) and the difference between the rates in the data and the model (Table 32b).

Table 32a. Model prevalence rates (per 1,000) in five-year age bands

Age		OPCS Disability Categories				
	Healthy	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10
70 – 74	638	127	90	74	45	25
75 – 79	513	151	115	104	72	45
80 – 84	365	158	136	142	115	83
85+	188	123	127	171	193	199

Table 32b. Difference in prevalence rates (per 1,000): *Data – Model*

Age		OPCS Disability Categories				
	Healthy	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10
70 – 74	15	6	3	-20	-5	2
75 – 79	7	2	-9	3	-5	2
80 – 84	-18	15	11	-9	-2	4
85+	-34	11	-7	15	1	14

Since the figures in Table 31 have been obtained fairly crudely, small differences between the data and the model are inevitable.

The difference in the prevalence of the "healthy" category in the two highest age groups is unexpected. There is no difference between the data and model prevalence rates in the 80+ category in Table 18a or Table 18b. The only way in which the model can overshoot on both subgroups (80 to 84 and 85+) is if the age structure of the 1986 population that we use is quite different from that used in the OPCS report. Table 18 also shows that the prevalence rates of category 1 and 2 disabilities is the same for the model as it is for the data for ages 80 and over. It is strange that the model undershoots the prevalence rates in both of the age subgroups (80 to 84 and 85+).

The increase in the prevalence rates between the 80 to 84 age group and the 85 and over age group in the two severest disability categories is not quite as steep in our model as is indicated by the data.

Note that the changes in the model prevalence rates between ages 80 to 84 and ages 85 and over, whether they are increases or decreases, are smaller in all six categories shown in the tables than the changes shown by the data. This suggests that the prevalence rates produced by the transition rate model are not as sensitive to age as they should be. If this is true, our projections might be underestimating the number of severely disabled people in future years.

8.2 *The stationary population assumption*

The transition rates that we use in the population projections are derived from the prevalence rate data. In doing this, an assumption had to be made regarding the underlying population structure. The assumption which we have made is that the population is stationary.

This assumption is clearly not valid. The 1986 prevalence rates would have depended on mortality, deterioration and improvement rates in earlier years. The mortality rates had certainly been changing in those years and the other rates may have been changing as well. The projections in section 7.3 show that future prevalence rates are strongly dependent on future changes in transition rates and the same would have been true in the past.

The stationary population assumption was made for two reasons: it is easier to derive transition rates under this assumption than under any other assumption; and we do not have any evidence of what sort of changes had been taking place regarding deterioration and improvement in disability. We would, therefore, not have been any more confident about any transition rates derived from assumptions about past changes than those derived from an assumption of no change.

Projection model A provides some defence for the stationary population assumption. In model A, mortality changes over time but there are no other trends. As shown in Table 29A, disability prevalence rates at ages over 60 change very little for this model. This suggests that the derivation of transition rates may not be very sensitive to any changes in mortality rates prior to 1986.

By using a stationary population assumption, the derived transition rates are effectively averages of transition rates which had applied in preceding years; i.e. they are out of date. If, as is likely, the probabilities of deterioration had been decreasing, the rates of deterioration derived from the prevalence rate data would be too high. The effect of this would be that the transition rates we use in the projections are out of date and therefore pessimistic. The assumption may, therefore, mean that the models overestimate the number of people who will be disabled.

8.3 *Projections based on prevalence rates*

The transition rate model is quite complex as it involves a great number of transitions. It is possible to make the projections in a much simpler way by using prevalence rates rather than transition rates. The method is as follows:

(a) Find the initial prevalence rates (i.e. in 1986).
(b) Choose a parameter, p, close to 1 and postulate that the prevalence rates in year 1986 + t are given by p^t times the rates in 1986. (In principle, p might depend on age and the time dependence may not be a simple power law.)
(c) Calculate the future number of disabled people by multiplying the future population estimates by the postulated prevalence rates.

We have made some projections using this method. There are two reasons for including these projections:

- To show that the results of the transition rate model projections are determined by the trend assumptions and the healthy life expectancy data that were used to guide the choice of assumptions.
- To show that a prevalence rate model cannot be used as a substitute for transition rate models.

We will consider, in particular, how p can be constrained by trends in healthy life expectancy data over the ten year period from 1986 and what implications the value of p has in terms of the number of severely disabled people in 2036. Note that this is essentially the same approach as we have adopted for the transition rate models: trends were chosen with reference to HLE trend data (Part II, section 5) and the resulting numbers of disabled people in 2036 were calculated (section 7.2).

As a starting point, we need prevalence rates for 1986. It would be possible to use the rates derived from the transition rate model but that would reduce the independence of the results of the two projection methods. Instead, we assume that prevalence rates at each age may be described by a particular formula. The prevalence rates over ten-year age bands are compared with those shown by the OPCS data, i.e. the values in Table 2 and the parameters in the formula were chosen to achieve as close agreement as possible with the crude prevalence rates. The following formula is used for cumulative prevalence rates (i.e. the probability that someone of age x has a disability of category n or worse):

$$Prev(x \geq n) = A(n) + \frac{1 - A(n)}{1 + B(n)^{C(n)-x}}$$

This formula applies only to disability categories 8, 9 and 10 (since we are only considering severe disabilities) and has been fitted only to ages 60 and above. The three parameters are A, B and C, and are different for each category. In determining the three parameters for each category four constraints were applied: the prevalence rates in three age bands (60 to 69, 70 to 79 and 80 and over) and also the prevalence rate at age 100. The last constraint was given a lower weight than were the others. The required prevalence rate at age 100 is the one given by the population produced in 1986 by the transition rate model. If this constraint were not imposed there could be substantial differences between the projections produced by the prevalence rate model and the transition rate model. These differences would solely be due to different starting populations. (Such differences can exist because of the paucity of constraints on the disabilities of the population over the age of 80. See section 8.1.)

The parameters of the models are given in Table 33.

Table 33. Parameters in the prevalence rate formula

	Parameter	Disability category, n		
		8	9	10
Males	$A(n)$	0.0110	0.0023	0.0000
	$B(n)$	1.1618	1.1487	1.1374
	$C(n)$	94.8691	99.5282	110.1589
Females	$A(n)$	0.0231	0.0111	0.0008
	$B(n)$	1.1754	1.1670	1.1500
	$C(n)$	95.0152	98.4993	105.9868

These parameters lead to the following life expectancies in 1986. They should be compared with the numbers in Table 21.

Table 34. Life expectancies in 1986 (Prevalence Rate Model)

		HLE(7)	DLE(7)
Males	65	12.51	1.00
	70	9.47	1.04
	75	6.90	1.11
	80	4.80	1.21
	85	3.17	1.35
Females	65	15.62	1.68
	70	12.03	1.66
	75	8.81	1.66
	80	6.04	1.69
	85	3.85	1.75

The life expectancies for females are very similar to those in Table 21 but the healthy life expectancies for males are lower using the fit for the prevalence rate model than the fit for the transition rate model.

The resulting life expectancies in 1996 are shown in Table 35 for two values of p: 1 and 0.99.

Table 35. Life expectancies in 1996 (Prevalence Rate Model)

		$p = 1$		$p = 0.99$	
		HLE(7)	DLE(7)	HLE(7)	DLE(7)
Males	65	13.40	1.17	13.51	1.06
	70	10.17	1.20	10.29	1.08
	75	7.41	1.26	7.53	1.14
	80	5.14	1.35	5.27	1.22
	85	3.38	1.47	3.52	1.33
Females	65	16.09	1.84	16.27	1.66
	70	12.45	1.82	12.62	1.64
	75	9.20	1.83	9.37	1.66
	80	6.36	1.87	6.54	1.69
	85	4.10	1.93	4.29	1.75

The $p = 1$ model is similar to model A in terms of these life expectancies after allowing for the differences in 1986 (i.e. the increases in HLE(7) and DLE(7) are similar). The effect of the $p = 0.99$ model is similar to model N. (Note that model A is the most pessimistic of the transition rate models projected to 2036 and model N is the most optimistic).

The output from these models for 2036 is given in two forms in the following two tables. In Table 36 the healthy life expectancies in 2036 are given and in Table 37 the number of people in disability categories 9 and 10 combined is given. Table 36 should be compared with the Table 30 series and Table 37 should be compared with the Table 28 series.

Table 36. Life expectancies in 2036 (Prevalence Rate Model)

		$p = 1$		$p = 0.99$	
		HLE(7)	DLE(7)	HLE(7)	DLE(7)
Males	65	15.70	1.72	16.38	1.04
	70	12.05	1.74	12.73	1.05
	75	8.82	1.77	9.52	1.07
	80	6.09	1.84	6.82	1.11
	85	3.97	1.93	4.73	1.17
Females	65	18.32	2.59	19.35	1.57
	70	14.32	2.55	15.32	1.54
	75	10.67	2.53	11.67	1.53
	80	7.42	2.53	8.42	1.53
	85	4.76	2.54	5.76	1.53

The model with $p = 1$ is once again similar to model A in terms of healthy life expectancy (see Table 30A4). The results of the model with $p = 0.99$ are not similar to the results of model N, however. Model N has much lower disabled life expectancies, DLE(7). The results for this model are intermediate between those of model L and model M.

Table 37. The number of people with category 9 or 10 disabilities in 2036 (thousand)

		$p = 1$	$p = 0.99$
Males	60–69	42	25
	70–79	106	64
	80–89	152	92
	90+	75	45
Females	60–69	65	40
	70–79	129	78
	80–89	232	140
	90+	189	114

The numbers produced by the $p = 1$ model are again similar to those produced by model A, although the match is not so close as it was for Table 36. The numbers produced by the $p = 0.99$ model are generally between those produced by models L and M.

Although the results of the projection using the prevalence rate method are different from those produced by the transition rate method, they illustrate an important, if obvious, point:

- If the trends incorporated in the projection are set so that disabled life expectancies are long then the projected number of disabled people will be high. This is the case with transition rate model A and the prevalence rate method with $p = 1$, for example.
- If the trends incorporated in the projection are set so that disabled life expectancies are short then the projected number of disabled people will be low. This is the case with transition rate model N and the prevalence rate method with $p = 0.99$, for example.
- Hence, it is the HLE trend assumption that is fundamentally responsible for whether the projected number of disabled people is large or small. It is not the complexity or simplicity of the projection method that determines whether the projection shows an increase or decrease in the number of disabled people.

There are two main reasons why we believe that the transition rate method is better than the prevalence rate method for making projections: the former method is both more meaningful and more useful. The next two paragraphs explain what we mean by the terms "meaningful" and "useful".

The number of disabled people in the future will differ from the number of disabled people now for two reasons: changes in the size and structure of the population and changes in levels of health at the individual level. The first component can be incorporated in either a transition rate projection or a prevalence rate projection. We have done this by using the latest GAD population projection. Changes in health will affect the number of disabled people via several processes. There may be changes in mortality due to disability; changes in the probability of becoming disabled; changes in the severity of disabilities of those becoming disabled; changes in the probability that a disabled person deteriorates further; and changes in the probability that a disabled person improves to some extent. These are exactly the processes included in the transition rate model. The sort of trends that we are able to include in the projections using the transition rate model are, therefore, meaningful in the sense that they can be interpreted directly in terms of identifiable processes. The same is not true of the trends underlying the prevalence rate based projections. These trends are in terms of the outcome rather than in terms of the cause of the outcome. The results of such projections are therefore tautologies: disability prevalence rates in a future year are x% lower than now because this was input as a trend. With the transition rate model the results are more interesting than that. For example: disability prevalence rates in a future year are x% lower than now due to a decrease of y% per year in the probability that someone becomes disabled.

The complexity of the transition rate model makes it more useful than the simple prevalence rate model. The model allows us to examine, for example, whether a reduction in the probability of becoming disabled might have a bigger effect on the future number of severely disabled people than an increase in the probability that a disabled person recovers. This sort of question could be important. It would be desirable in terms of social policy to be able to reduce the number of people who are severely disabled in the future and it would be useful to know whether the best way to achieve a large reduction were to target resources more at the prevention of the onset of disability or the prevention of deterioration of people with moderate levels of disabilities. A projection based on a prevalence rate approach could not address this issue.

We also note that the prevalence rate model described above covers fewer disability categories and a smaller age range than the transition rate model. Were we to extend the range of the prevalence rate model, then this could lead to an increase in the number of parameters.

Another difference between the transition rate model and a prevalence rate model is that the transition rate model can make direct use of more information. If more data became available relating to, say, the link between mortality and disability this could be fed directly into the transition rate model projections.

8.4 *A comparison with earlier projections*

In one of our projections, model Q, we included trends that had been used in the central projection of Nuttall et al (1994). In Table 38 we compare the output from our projection and Nuttall et al's projection. The numbers for the Nuttall et al projection are taken from table 3 of Nuttall et al (1994). Four categories of care need are considered by Nuttall et al. These categories correspond directly with the OPCS disability categories. "Low" means disability categories 1 and 2. "Moderate" means OPCS disability categories 3, 4 and 5. "Regular" means disability categories 6, 7 and 8. "Continuous" means disability categories 9 and 10. The Nuttall et al (1994) projections stopped in 2031.

Table 38. Projected number of disabled adults in 2031 (thousand)

Care Need	Nuttall et al (1994)	Our Model Q
Low	2,556	2,646
Moderate	2,745	2,931
Regular	2,058	2,312
Continuous	1,184	1,064
Total	8,543	8,952

The projected numbers differ between the two projections. In the most important category, continuous care, our model has 10% fewer people than the earlier projection model produced. There are many possible reasons for the differences:

- The underlying population model is different. We used the 1996 GAD projection while Nuttall et al (1994) used the 1991 version. According to the 1996 projection there will be 49.0 million adults (over 20) in 2031, 18.7 million of whom will be over 60, and according to the 1991 projection there will be 47.8 million adults in 2031, 18.1 million of whom will be over 60.
- We have separate models for males and females, whereas Nuttall et al (1994) used a single model.
- We used a full population projection model (including migration) which exactly reproduces the GAD projection. We believe that Nuttall et al (1994) used a simpler projection.
- There are more transitions in our model. Nuttall et al (1994) did not include movements between disabled states.
- There are more categories in our model. Nuttall et al (1994) used four categories of disability, whereas we used 10.
- Our projections are started in 1986 rather than in 1991.
- There will be a difference in the "graduation" of the initial prevalence rate data. Although we are using the same data as Nuttall et al (1994) for these rates, the data are given in ten year age bands. Hence, the prevalence rates for individual ages may disagree.
- We were unable to implement the Nuttall et al (1994) trend assumptions exactly (see Part II, section 5).
- In our model, the mortality rates for people in disability categories 1 to 5 are the same as the rates for healthy people of the same age. In the Nuttall et al (1994) projections, the mortality rates for these disabled people were higher than for healthy people.

As well as making a central projection, Nuttall et al (1994) ran six other models with different trend assumptions. These assumptions led to a range of results, which we now compare with the range produced by the nine projections that were described in section 7.

There were two types of trends in the Nuttall et al (1994) projections. One was in terms of the annual decrease in mortality of people with disabilities compared with the overall decrease in mortality according to the GAD population model. The other trend was in the annual decrease in the probability of becoming disabled. The assumed trends for the seven models considered by Nuttall et al (1994) are listed in Table 39. The mortality improvements are given as multiples of the overall mortality improvements. The decrease in the onset of disability is an annual quantity. (Basis A is their central projection, which is the one we have approximated by our model Q.)

Table 39. Trends used by Nuttall et al (1994)

Basis	Decrease in disabled mortality	Decrease in onset of disability
A	1.5 times	0.5%
B	none	0.5%
C	1 time	0.5%
D	2 times	0.5%
E	1.5 times	0.0%
F	1.5 times	1.0%
G	1.5 times	2.0%

The output from the projections based on these assumptions is given in Table 40a. These numbers are given in Appendix D of Nuttall et al (1994). The values are the number of disabled per 1,000 of population in 2031 (both the numerator and denominator include only adults). The categories are cumulative (1 to 10, 3 to 10, 6 to 10 and 9 to 10). In table 40b the corresponding numbers are given for the nine projection models considered in section 5 of this paper.

Table 40a. Number of disabled (per thousand) in 2031 in Nuttall et al (1994)

Category	Basis						
	A	B	C	D	E	F	G
1 to 10	185	155	176	193	203	169	140
3 to 10	130	104	121	137	144	117	95
6 to 10	70	51	64	76	80	62	48
9 to 10	26	16	22	29	30	22	16

Table 40b. Number disabled (per thousand) in 2031 in our projections

Category	Model								
	A	B	C	D	K	L	M	N	Q
1 to 10	196	179	163	135	197	179	163	136	183
3 to 10	135	121	109	88	134	120	108	88	129
6 to 10	67	58	51	38	64	56	48	37	69
9 to 10	21	17	15	10	18	15	13	9	22

The basis that gives the highest disability prevalence rates amongst those reported in Nuttall et al (1994) is basis E. That model projects a higher number of disabled people than do any of our models. The reason that there are so many disabled people in the Nuttall et al (1994) basis E projection is that there is no reduction in the onset of disability but people live longer when they become disabled.

The basis that gives the lowest disability prevalence rates amongst those reported in Nuttall et al (1994) is basis G, which includes a larger reduction of the probability of becoming disabled than the other bases. However, some of our models lead to even lower prevalence rates. Our models D and N produce lower rates for all of the cumulative disability categories. Models C, L and M also produce a lower rate in disability categories 9 and 10.

Our most pessimistic model in terms of disabilities in categories 9 or 10 is model Q. Several of the bases considered by Nuttall et al (1994) lead to higher projected proportions of severely disabled people. None of our models projects as many people needing continuous care as Nuttall et al (1994) find with their central projection.

The differences between our most pessimistic projected prevalence rates and our most optimistic are similar to the differences between the most pessimistic and optimistic of the Nuttall et al (1994) projections. For disability categories 1 to 10 the gap between the highest and lowest prevalence rates is 61 (per 1,000) among our models and 63 among the Nuttall et al (1994) projections. For categories 3 to 10 the two differences are 47 and 49. For categories 6 to 10 they are 32 and 32. For categories 9 to 10 they are 13 and 14.

In summary, there is much overlap of the ranges of disability prevalence rates in the two sets of models. Our models tend to produce lower prevalence rates. This is especially so in the severe disability categories.

8.5 *Sensitivity to the ingredients of the transition rate model*

There were some aspects of the transition rate model that were determined from data (e.g. the deterioration model was required to be compatible with the prevalence rate data). Some elements, however, were simply put into the model. One of these was the probability of improvement for people with a disability. We have used a probability of improvement of 10% for all people. We have explained this choice in Part II, section 4.4 but other values and models would be equally plausible. In this section, we investigate how sensitive the projected number of people with disabilities is to this assumption. We similarly test one other assumption: the extra mortality due to disability. These two models are called R and S.

In model R the probability of improvement is set to nil. The parameters of the deterioration model have been recalculated. This means that, for example, there is a lower probability of deterioration in the new model than in the transition rate models that have allowed for some improvement among disabled people. (The quality of the new fit, for females, is a little below that of the original model that included improvements at 10%.) We have run this model forward to 2036 using the no trend assumption (i.e. the same as used in model A). The output, shown in Table 41R, is given in terms of numbers of people in each disability category for a range of years and age groups. The model has only been run for females, so Table 41R should be compared with Table 28A(F).

In model S the extra mortality component has been changed. In other models, the extra mortality applies only to disability categories 6 to 10. In model S it applies to all disability categories. The equation in Part II, section 3.2.2 is replaced by:

$$ExtraMort(x, n) = \frac{0.20}{1 + 1.1^{50-x}} \cdot \frac{n}{10}$$

The parameters of the deterioration model have been recalculated in order that the transition rate model produces the right initial prevalence rates. (The quality of the fit, for males, is slightly better than when the extra mortality is restricted to the higher disability categories.) We have run this model forward with the same assumptions as used in model N — this is the model which results in the lowest number of severely disabled people. The model has only been run for males, so the results, which are shown in Table 41S, should be compared with those in Table 28N(M).

Table 41R. Number of females with disabilities (thousands), Model R

Age Group	Year	Able	OPCS Disability Category 1	2	3	4	5	6	7	8	9	10
20–59	1996	14,753	215	130	126	115	145	104	80	53	53	28
	2006	15,045	236	145	139	126	157	112	87	57	56	29
	2016	15,038	241	148	143	129	160	114	88	57	56	29
	2026	14,325	228	140	135	122	152	109	84	54	53	28
	2036	13,858	216	133	128	116	144	103	80	52	51	27
60–69	1996	2,157	131	96	90	78	89	61	51	29	25	14
	2006	2,333	140	102	96	82	94	65	54	31	26	15
	2016	2,772	170	124	117	101	115	80	67	38	32	18
	2026	3,195	192	140	132	113	129	90	75	42	36	20
	2036	2,933	182	133	125	108	123	85	72	40	35	20
70–79	1996	1,404	168	132	130	117	139	104	96	58	54	34
	2006	1,322	160	126	124	112	133	99	92	56	53	33
	2016	1,492	178	140	138	124	148	110	102	62	58	36
	2026	1,770	216	171	168	152	181	136	126	78	73	45
	2036	2,087	249	196	193	174	207	155	143	88	82	51
80–89	1996	435	100	86	91	89	117	103	113	82	89	64
	2006	443	101	87	92	90	119	104	114	82	90	64
	2016	440	101	87	93	91	119	105	116	84	92	66
	2026	534	122	105	112	109	144	126	139	101	111	80
	2036	628	147	126	135	132	175	155	173	126	140	101
90+	1996	30	12	11	13	14	22	24	33	31	43	40
	2006	34	14	13	15	17	26	28	41	39	57	55
	2016	37	15	15	17	18	28	31	45	43	63	62
	2026	42	17	16	19	21	32	36	52	49	73	73
	2036	56	23	22	26	28	42	47	69	66	98	99
All	1996	18,780	626	455	451	413	511	395	373	253	264	179
	2006	19,176	651	473	467	427	528	409	389	265	281	196
	2016	19,779	706	515	507	463	570	441	418	284	301	211
	2026	19,866	776	572	566	517	637	496	476	325	346	246
	2036	19,562	817	610	607	557	691	545	536	372	406	297

Table 41S. Number of males with disabilities (thousands), Model S

Age Group	Year	Able	OPCS Disability Category 1	2	3	4	5	6	7	8	9	10
20–59	1996	15,170	237	139	120	107	96	65	59	47	40	18
	2006	15,646	240	142	122	107	96	64	58	46	39	17
	2016	15,811	225	133	114	100	89	60	54	42	36	16
	2026	15,115	194	114	98	87	78	52	46	37	31	14
	2036	14,614	166	99	85	76	68	46	41	32	27	12
60–69	1996	2,009	164	95	77	64	57	35	34	27	25	10
	2006	2,312	161	93	75	62	54	33	32	25	23	9
	2016	2,880	175	101	80	65	56	34	33	26	24	9
	2026	3,525	177	101	80	64	55	33	32	25	23	9
	2036	3,366	148	84	66	53	45	27	26	20	18	7
70–79	1996	1,123	175	106	88	75	68	42	42	35	33	13
	2006	1,229	174	104	86	72	64	40	39	32	30	12
	2016	1,518	187	111	90	75	67	41	40	33	30	12
	2026	1,942	213	124	101	83	74	45	44	36	33	13
	2036	2,477	228	131	105	86	76	46	45	36	34	14
80–89	1996	215	77	54	51	49	50	34	38	35	38	17
	2006	308	91	61	55	51	51	34	37	33	35	15
	2016	417	101	66	58	52	51	33	35	31	32	14
	2026	607	121	76	65	57	54	35	36	31	31	13
	2036	820	142	88	74	64	59	37	38	33	32	14
90+	1996	6	4	4	5	5	7	5	7	8	10	5
	2006	12	8	7	8	9	10	8	11	11	14	7
	2016	22	13	10	11	12	13	10	13	13	15	8
	2026	39	18	14	14	15	16	12	15	15	17	8
	2036	71	27	20	20	20	21	15	18	17	20	9
All	1996	18,523	658	398	341	300	277	181	180	152	147	63
	2006	19,507	674	407	346	301	275	179	177	148	141	60
	2016	20,647	702	420	353	305	276	179	175	145	137	59
	2026	21,228	722	430	358	307	277	178	173	143	135	57
	2036	21,349	712	421	350	299	269	172	168	138	131	56

The results of model R are similar to those of model A at ages 70 and above. There are some larger discrepancies at ages under 60. The greater number of people under 60 with category 10 disabilities in model R is due to the initial prevalence rates used for the projection. Table 18a shows that the transition rate model used for projection model A (and all other models from B to Q) reproduced the OPCS prevalence rates in category 10 almost perfectly for ages below 60. A new set of transition rate parameters was needed for model R owing to the removal of the 10% probability of improvements. This model had marginally higher category 10 prevalence rates below age 60.

The fact that model R and model A produce results that generally agree well suggests that the projections are not very sensitive to the assumption regarding improvements which we have made in the transition rate model, so long as the transition rate model is constrained to reproduce the prevalence rate data.

The results of the model S projection are quite similar to those of the model N projection but there are some systematic differences. Below age 60, model S projects more able people in 2036 than does model N but fewer in each disability category. At the other ages, model S projects more able people and also more in disability categories 8, 9 and 10 and fewer people in disability categories 2 to 7. The differences between the results of model S and model N are considerably smaller than the

differences between the results of model M and model N. This suggests that trend assumptions (such as those which distinguish model M from model N) are probably far more important to the projections than are the details of the parameters of the transition rate model. This assumes that the parameters of the transition rate model are constrained by the data.

8.6 *Other uncertainties*

There are a number of other factors that affect the outcome of the projections. Where there is uncertainty in the factors, there will be uncertainty in the resulting projections.

We have used a single population projection throughout this paper — the central projection of the Government Actuary. When such projections are published, they are accompanied by variant projections because there is inevitably considerable uncertainty in projecting the population over many years. We have not yet seen the 1996-based variant projections, so the following numbers relate to the 1994-based projections. There are variants for the fertility assumptions, mortality assumptions and migration assumptions. The effect on the projected population in 2034 is as follows.

- The projections with the variant assumption for fertility cause a difference of 3.3 million in the UK population. (Two sets of variant assumptions were considered, one leading to a larger population and the other leading to a smaller population than the principal projection.) Obviously, the difference is all for people under age 40.
- The variant mortality assumptions make a difference of around 800,000, over 700,000 of whom are at ages 60 and above.
- The variant migration assumptions make a difference of 2,100,00 people. About 300,000 of these people are over 60.

If we used any of these variants for the population projection, the projected numbers of disabled people would certainly change. The prevalence rates would be affected to a lesser extent.

A potentially important source of uncertainty is the initial data. The initial prevalence rates are crucial to the projected results because the transition rates are derived from them. In tables 3.1 and 3.2 of their report on the OPCS disability survey, Martin et al (1988) include some confidence intervals for the number of people with disabilities and for disability prevalence rates. For example, the total number of people with category 10 disabilities was estimated to be 210,000 and the 95% confidence interval is given as ±26,000. The number of people with category 1 disability is estimated to be 1.198 million, with a 95% confidence interval of ±59,000.

There are several aspects of the procedure which we use to fit the prevalence rate data that could be treated differently and hence could alter the projected results. These aspects include:

- The choice of "best fit" statistic.
- The trade-offs between various parameters. For example, part of the model is concerned with the probability of becoming severely disabled directly from a healthy state while another part is concerned with the probability of a mildly disabled person becoming severely disabled. There are constraints on the number of people who are severely disabled. But this number will include a mix of people newly disabled and people who had had a lesser disability and recently deteriorated. The data are not sufficiently detailed to allow a determination of the relative sizes of these two components. We have not used any other data to determine the split.
- The functional forms chosen for the transition rates.
- The simplicity of the model for improvement in health.

It is unlikely that any of these aspects are important in terms of the resulting projected numbers. This is for the same reason as was mentioned in section 8.5. So long as the transition rate model can reproduce the OPCS prevalence rates, we believe that the details of the model are not crucial.

A potentially important feature of our trend assumptions, especially those relating to the probability of deterioration, is that they maintain their strength over time. The changes in the probabilities are uniform, e.g. at a rate of 1 in 10 in the terminology of section 5. This is in contrast to what happens in population projections, such as those carried out by the Government Actuary, where improvements in mortality tend to diminish over time. We have not imposed this tendency on our trends, because there is so much uncertainty in the trends in the first place that we believe that any further refinement is unwarranted.

9. Conclusion

We draw two main conclusions from the results projected in this paper. The first of these is a cause for optimism. However, it may unfortunately be swamped by the second conclusion.

- Although there will be a large increase in the number of elderly people in the UK the implications for the number of people needing long-term care will be ameliorated to some extent by a reduction in the proportion of older people who are severely disabled.
- The data that have shown changes in the prevalence of severe disabilities among the elderly do not present a clear picture of what has been happening in the recent past. As a result of this lack of clarity, there is a large amount of uncertainty surrounding the results of our projections and it is quite plausible that the first conclusion is wrong.

Fundamentally, the number of people with severe disabilities in 40 years' time will depend on what happens to the probabilities of deterioration and improvement in health and on what happens to the mortality rate of people with severe disabilities. These influences are all included in our projection model. We have tried to make sense of the data on healthy life expectancies as measured at intervals over the past two decades in order to input appropriate trends to the model. The data, however, do not provide a unique message. It is possible to take from them the view that people are spending less time, on average, with severe disabilities. On the other hand, the opposite view can also be taken.

Although we are not experts at interpreting healthy life expectancy data, we have consulted people who are and have read what has been published in this area regarding British data. The conclusions of these researchers, who are more familiar with life expectancy data than we are, seems to be that the situation is improving. At worst, people are spending the same proportion of their lives severely disabled — so gains in life expectancy are split between time spent healthy and time spent in poor health. At best, the trend over the last twenty years has been for the increase in life expectancy to lead to an equal increase in healthy life expectancy and no change in disabled life expectancy.

If we choose assumptions for trends that reflect this optimistic view, the result is that disability prevalence rates fall and consequently the disabled population does not rise in line with the total number of elderly people, and may even fall.

As we pointed out in section 7.2, the range for the projected number of severely disabled adults in 2036 (according to one particular definition of severity) is between 0.8 million and 1.8 million for the models we have run. Moreover, some more extreme models may also be compatible with existing trends data. Such a wide funnel of doubt is inevitable when projecting forward for 40 years on the basis of inconclusive data.

There are many other aspects of the projection model which could be refined or even overhauled. However, we do not feel that the model itself is an important source of uncertainty. Indeed, apart from the doubts over trends, the most important shortcoming of the projections is probably the lack of data on the prevalence rates of disability for people over the age of 85. If such data, which do exist, are published it may be possible to improve the reliability of the output from the projection model.

Another theme which underpins the work described in this paper is the lack of reliable data. For example, we described in section 4 how we derived the transition rates for our multiple state model from prevalence rate data applicable to 1985 and 1986. Future research in the area of long term care would be greatly assisted if regular national surveys were undertaken which enabled longitudinal data to be collected (i.e. an appropriate cross section of the UK population could be tracked at each survey

date so that transition rates could be computed directly from the data). Ideally, the surveys should be undertaken at least biennially since, as noted in section 2.2 in the context of Table 7, we are most interested in calculating probabilities of transition from one year to the next.

Finally, we have projected, under various assumptions, the disabled population over the next 40 years. The next step would be to assess the care needs of this population, being careful to distinguish between formal and informal provision.

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