

# Supplementary Appendices

## **The productivity benefits of preventing type 2 diabetes in Australia: a ten-year analysis**

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## **Supplementary Appendices**

Appendix S1: Age and sex specific prevalence of type 2 diabetes for the Australian working age population (ages 20-69) and the number of people with type 2 diabetes in 2019.

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Appendix S1: Age and sex specific prevalence of type 2 diabetes for the Australian working age population (ages 20-69) and the number of people with type 2 diabetes in 2019.

Age	Males			Females		
	Total population	Prevalence (%)	Total number with diabetes	Total population	Prevalence (%)	Total number with diabetes
20	170573	0.06	102	159941	0.09	146
21	172247	0.07	126	163318	0.11	178
22	177491	0.09	156	169687	0.13	221
23	187255	0.11	197	177844	0.15	273
24	195569	0.12	244	185186	0.18	333
25	193863	0.15	285	185934	0.21	388
26	190926	0.17	327	186091	0.24	449
27	189888	0.20	377	188419	0.28	522
28	191533	0.37	700	192879	0.27	512
29	193101	0.38	739	195927	0.41	803
30	188331	0.41	774	193157	0.55	1058
31	187806	0.45	849	192798	0.68	1314
32	185711	0.51	943	190567	0.81	1547
33	186948	0.58	1085	191884	0.94	1805
34	184534	0.67	1238	189905	1.07	2031
35	184055	0.78	1439	187866	1.20	2253
36	182996	0.91	1671	185783	1.33	2476
37	178017	1.07	1901	179673	1.47	2643
38	173376	1.25	2160	174779	1.62	2824
39	166365	1.45	2411	168013	1.77	2972
40	161234	1.68	2707	163277	1.93	3154
41	158179	1.93	3060	160230	2.11	3374
42	157010	2.22	3483	158716	2.29	3639
43	158384	2.53	4006	159711	2.49	3982
44	158425	2.87	4545	160525	2.71	4349
45	162607	3.24	5262	164812	2.94	4848
46	164105	3.63	5960	168712	3.19	5384
47	169012	4.05	6853	175094	3.46	6056
48	169535	4.51	7638	178101	3.74	6669
49	159631	4.98	7954	166485	4.05	6741
50	156081	5.49	8561	164356	4.37	7188
51	151360	6.01	9100	158682	4.72	7484
52	147334	6.56	9669	154025	5.08	7822
53	148029	7.13	10561	153921	5.46	8402
54	147506	7.73	11397	153469	5.86	8989
55	152966	8.34	12752	158963	6.27	9972
56	154053	8.96	13807	159733	6.71	10710
57	153027	9.60	14694	158423	7.15	11331
58	151379	10.25	15521	157785	7.61	12012
59	145651	10.91	15895	153011	8.09	12372
60	141941	11.58	16435	148627	8.57	12736
61	138840	12.25	17005	146648	9.06	13287
62	134993	12.92	17436	142310	9.56	13602
63	133251	13.58	18098	139686	10.06	14051
64	126871	14.24	18068	135021	10.56	14261
65	122967	14.89	18311	131858	11.06	14588
66	122028	15.53	18947	129414	11.56	14961
67	118665	16.15	19160	124854	12.05	15046
68	117382	16.75	19656	123361	12.53	15458
69	114291	17.32	19796	120029	13.00	15601

Appendix S2: Polynomial functions used to determine the prevalence of i) type 2 diabetes and ii) no type 2 diabetes for a) males and b) females.

a) Males

i) Type 2 diabetes (aged 12-27 years)

$$y = 0.000000230616141x^3 - 0.000004597313685x^2 + 0.000029538768311x$$

$$R^2 = 0.996998948963982$$

N.B. for ages <12 year, prevalence was zero.

Type 2 diabetes (aged 28-100 years)

$$y = 0.000000000013219x^6 - 0.000000003830368x^5 + 0.000000378606485x^4 - 0.000015029462557x^3 + 0.000246561324246x^2 - 0.001174334679718x$$

$$R^2 = 0.996457395938875$$

ii) No type 2 diabetes

$$y = 1 - (\text{type 2 diabetes})$$

b) Females

i) Type 2 diabetes (aged 12-27 years)

$$y = 0.000000272625984x^3 - 0.000004658870780x^2 + 0.000029639477987x$$

$$R^2 = 0.997973234339184$$

N.B. for ages <12 year, prevalence was zero.

Type 2 diabetes (aged 28-100 years)

$$y = 0.000000000016837x^6 - 0.000000005428267x^5 + 0.000000643650918x^4 - 0.000035239047080x^3 + 0.000933700492837x^2 - 0.009504027528124x$$

$$R^2 = 0.996615963745227$$

ii) No type 2 diabetes

$$y = 1 - (\text{type 2 diabetes})$$

where x denotes year of age; y denotes the estimated prevalence

Appendix S3: Polynomial functions used to determine the incidence of type 2 diabetes for a) males and b) females.

a) Males

i) Type 2 diabetes (aged 10-31 years)

$$y = 0.000032507459442x^3 - 0.001688215437892x^2 + 0.028897911959595x - 0.150834358583757$$

$$R^2 = 1.0000000000000540$$

N.B. for ages <12 year, incidence was zero.

Type 2 diabetes (aged 32-100 years)

$$y = 0.000000000486043x^6 - 0.000000136846820x^5 + 0.000014780691461x^4 - 0.000772575726245x^3 + 0.019993461489776x^2 - 0.202529037116619x$$

$$R^2 = 0.996376443706221$$

b) Females

i) Type 2 diabetes (aged 10-31 years)

$$y = 0.000014077224316x^3 - 0.000655140960758x^2 + 0.010878949971964x - 0.053528246349662$$

$$R^2 = 1.0000000000000530$$

N.B. for ages <12 year, incidence was zero.

Type 2 diabetes (aged 32-100 years)

$$y = 0.000000000076070x^6 - 0.000000017564259x^5 + 0.000001305949275x^4 - 0.000031422997722x^3 + 0.000008003848961x^2 + 0.007668471549550x$$

$$R^2 = 0.996070878646343$$

where x denotes year of age; y denotes the estimated incidence

Appendix S4: Exponential functions used to determine mortality in i) individuals with type 2 diabetes and ii) individuals without type 2 diabetes for a) males and b) females.

a) Males

i) With type 2 diabetes

$$y = 0.59586579e^{0.05932771x}$$

$$R^2 = 0.96668606$$

N.B. for ages <7 year, mortality remained the same as 7 years old.

N.B. for ages >92 year, mortality remained the same as 92 years old.

ii) Without type 2 diabetes

$$\text{Mortality}_{(\text{total})} - (\text{Mortality}_{(\text{diabetes})} \times \text{prevalence}_{(\text{diabetes})}) / (1 - \text{Prevalence}_{(\text{diabetes})})$$

b) Females

i) With type 2 diabetes

$$y = 0.23311414e^{0.06646266x}$$

$$R^2 = 0.91770125$$

N.B. for ages <7 year, mortality remained the same as 7 years old.

N.B. for ages >92 year, mortality remained the same as 92 years old.

ii) Without type 2 diabetes

$$\text{Mortality}_{(\text{total})} - (\text{Mortality}_{(\text{diabetes})} \times \text{prevalence}_{(\text{diabetes})}) / (1 - \text{Prevalence}_{(\text{diabetes})})$$

where x denotes year of age; y denotes the estimated mortality

Appendix S5: Estimated full-time workers using the Australian Bureau of Statistics labour force data for a) males and b) females.

a) Males

Age group (years)	Employed	Mean number of hours worked	Unemployed	Not in the labour force	Total number of full time workers	Proportion of full time workers in the total population
15-19	254,118	20	70,449	366,502	127,059	18%
20-24	510,658	32	76,674	156,340	408526	55%
25-29	622,212	39	49,215	91,939	606657	79%
30-34	671,460	41	37,143	71,897	688247	88%
35-39	623,792	42	31,475	67,158	654982	91%
40-44	622,889	42	31,317	73,668	654033	90%
45-49	609,023	42	30,929	82,867	639474	88%
50-54	571,887	42	30,512	97,601	600481	86%
55-59	500,078	40	29,642	133,130	500078	75%
60-64	349,759	37	25,473	215,270	323527	55%
65-69	169,675	33	6,103	365,555	139982	26%
70-74	64,911	29	1,962	332,195	47060	12%
75 and over	37,305	27	1,042	584,762	25181	4%
<b>Total 20 to 69</b>			<b>348,483</b>	<b>1,355,425</b>	<b>5215987</b>	<b>71%</b>

b) Females

Age group (years)	Employed	Mean number of hours worked	Unemployed	Not in the labour force	Total number of full time workers	Proportion of full time workers in the total population
15-19	280,834	15	63,765	315,126	105,313	16%
20-24	486,356	28	58,019	178,629	340,449	47%
25-29	571,385	33	42,119	170,356	471,393	60%
30-34	581,229	31	36,467	192,466	450,452	56%
35-39	535,603	30	32,973	175,355	401,702	54%
40-44	570,496	32	33,604	157,591	456,397	60%
45-49	581,761	33	30,998	151,183	479,953	63%
50-54	539,942	33	27,059	163,962	445,452	61%
55-59	459,061	32	22,148	220,653	367,249	52%
60-64	292,699	29	14,425	319,460	212,207	34%
65-69	120,351	25	2499	444,922	75,219	13%
70-74	38,292	22	811	383,383	21,061	5%
75 and over	18,051	21	616	785,627	9477	1%
<b>Total 20 to 69</b>			<b>300,311</b>	<b>2,174,577</b>	<b>3,700,473</b>	<b>49%</b>



Total number of full-time workers =

[mean number of working hours for each age category/40 (average full time working hours per week)] x total number of employed individuals for each age category

Proportion of full-time workers in the total population = total number of full time workers /total number in the labour force (employed, unemployed and not in the labour force).

Full time assumes average full-time working hours of 40 hours per week.

According to the Australian Bureau of Statistics (ABS), “not in the labour force” is defined as persons aged 15 years and over who are neither employed nor unemployed. Examples of those not in the labour force includes persons who are retired or voluntarily inactive; performing home duties or caring for children; attending an educational institution; experiencing a long-term health condition or disability; experiencing a short-term illness or injury; looking after an ill or disabled person; on a travel, holiday or leisure activity; working in an unpaid voluntary job; in institutions (hospitals, jails, sanatoriums, etc.); permanently unable to work; and members of contemplative religious orders.

Appendix S6: The discounted years of life lived, PALYs and cost of PALYs for the Australian working age from 2020 to 2029 for a) males and b) females.

a) Males

Year	Years of life lived			PALYs			Cost of PALYs		
	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total
2020	7759613	374046	8133658	5794883	225481	6020364	\$1,143,091,882,003	\$44,478,082,460	\$1,187,569,964,463
2021	7495268	356317	7851585	5598193	214584	5812777	\$1,117,184,141,069	\$42,822,672,506	\$1,160,006,813,575
2022	7234329	339786	7574115	5403153	204340	5607493	\$1,090,703,656,718	\$41,248,888,870	\$1,131,952,545,588
2023	6978834	324318	7303151	5212495	194774	5407269	\$1,064,219,597,740	\$39,766,329,422	\$1,103,985,927,162
2024	6730907	309835	7040742	5027754	185826	5213580	\$1,038,079,078,039	\$38,367,382,330	\$1,076,446,460,370
2025	6490109	296222	6786331	4849113	177493	5026606	\$1,012,361,399,010	\$37,055,563,472	\$1,049,416,962,482
2026	6256103	283077	6539180	4675419	169571	4844990	\$986,865,128,927	\$35,792,182,443	\$1,022,657,311,371
2027	6030466	270495	6300961	4506538	162057	4668594	\$961,595,686,496	\$34,579,311,800	\$996,174,998,295
2028	5812693	258577	6071270	4343302	155026	4498328	\$936,766,269,457	\$33,436,140,743	\$970,202,410,199
2029	5601120	247209	5848329	4185576	148424	4334000	\$912,386,088,144	\$32,353,914,504	\$944,740,002,648
<b>Total</b>	<b>66389441</b>	<b>3059882</b>	<b>69449322</b>	<b>49596426</b>	<b>1837573</b>	<b>51434000</b>	<b>\$10,263,252,927,603</b>	<b>\$379,900,468,550</b>	<b>\$10,643,153,396,153</b>

b) Females

Years	Years of life lived			PALYs			Cost of PALYs		
	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total
2020	7975366	313224	8288590	4062652	127233	4189885	\$801,393,992,217	\$25,097,757,799	\$826,491,750,016
2021	7704842	299107	8003948	3921590	121157	4042747	\$782,598,590,941	\$24,178,289,916	\$806,776,880,857
2022	7437934	285769	7723703	3782520	115400	3897920	\$763,555,754,950	\$23,295,209,339	\$786,850,964,289
2023	7175819	273085	7448904	3646574	109950	3756523	\$744,510,062,882	\$22,448,100,825	\$766,958,163,708
2024	6919415	260955	7180370	3514155	104780	3618935	\$725,566,686,185	\$21,633,915,222	\$747,200,601,407
2025	6669638	249417	6919055	3385971	99923	3485895	\$706,897,640,614	\$20,861,268,465	\$727,758,909,080
2026	6427544	238329	6665873	3262163	95305	3357468	\$688,561,786,206	\$20,116,509,502	\$708,678,295,708
2027	6193977	227688	6421665	3142851	90916	3233767	\$670,615,137,203	\$19,399,404,970	\$690,014,542,173
2028	5968032	217480	6185512	3028141	86772	3114914	\$653,111,489,978	\$18,715,136,591	\$671,826,626,568
2029	5748617	207712	5956329	2917280	82847	3000127	\$635,918,592,726	\$18,059,291,032	\$653,977,883,758
<b>Total</b>	<b>68221185</b>	<b>2572765</b>	<b>70793950</b>	<b>34663897</b>	<b>1034283</b>	<b>35698181</b>	<b>\$7,172,729,733,903</b>	<b>\$213,804,883,661</b>	<b>\$7,386,534,617,564</b>

All costs are reported in Australian dollars (AUD \$) and are specific to each year, in line with the GDP per EFT which ranged from \$197,259 in 2020 to \$217,983 in 2029.

Appendix S7: The undiscounted years of life lived, PALYs and cost of PALYs for the Australian working age from 2020 to 2029 for a) males and b) females.

a) Males

Year	Years of life lived			PALYs			Cost of PALYs		
	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total
2020	7759613	374046	8133658	5794883	225481	6020364	\$1,143,091,882,003	\$44,478,082,460	\$1,187,569,964,463
2021	7870031	374133	8244164	5878103	225313	6103415	\$1,173,043,348,122	\$44,963,806,132	\$1,218,007,154,254
2022	7975848	374614	8350462	5956976	225285	6182261	\$1,202,500,781,532	\$45,476,899,979	\$1,247,977,681,511
2023	8078872	375438	8454310	6034115	225475	6259589	\$1,231,967,211,834	\$46,034,497,097	\$1,278,001,708,931
2024	8181459	376607	8558066	6111266	225872	6337138	\$1,261,791,607,351	\$46,635,793,019	\$1,308,427,400,370
2025	8283207	378063	8661269	6188834	226530	6415364	\$1,292,058,188,144	\$47,293,332,447	\$1,339,351,520,591
2026	8383776	379350	8763126	6265509	227241	6492750	\$1,322,493,657,160	\$47,964,947,661	\$1,370,458,604,821
2027	8485472	380613	8866085	6341151	228030	6569181	\$1,353,061,696,892	\$48,656,564,248	\$1,401,718,261,141
2028	8587995	382036	8970031	6417035	229044	6646079	\$1,384,030,424,367	\$49,400,408,160	\$1,433,430,832,526
2029	8689175	383503	9072678	6493202	230254	6723456	\$1,415,410,282,404	\$50,191,540,468	\$1,465,601,822,872
<b>Total</b>	<b>82295447</b>	<b>3778402</b>	<b>86073850</b>	<b>61481074</b>	<b>2268525</b>	<b>63749599</b>	<b>\$12,779,449,079,809</b>	<b>\$471,095,871,670</b>	<b>\$13,250,544,951,479</b>

b) Females

Year	Years of life lived			PALYs			Cost of PALYs		
	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total	No diabetes	Diabetes	Total
2020	7975366	313224	8288590	4062652	127233	4189885	\$801,393,992,217	\$25,097,757,799	\$826,491,750,016
2021	8090084	314062	8404146	4117669	127215	4244884	\$821,728,520,488	\$25,387,204,412	\$847,115,724,900
2022	8200322	315061	8515383	4170228	127229	4297457	\$841,820,219,833	\$25,682,968,296	\$867,503,188,129
2023	8306908	316130	8623037	4221365	127281	4348645	\$861,863,461,544	\$25,986,482,718	\$887,849,944,262
2024	8410592	317193	8727784	4271477	127361	4398838	\$881,930,841,850	\$26,296,159,164	\$908,227,001,014
2025	8512337	318326	8830663	4321453	127530	4448983	\$902,200,425,291	\$26,624,852,312	\$928,825,277,603
2026	8613524	319383	8932907	4371611	127718	4499329	\$922,738,647,996	\$26,958,046,688	\$949,696,694,684
2027	8715548	320379	9035927	4422308	127928	4550235	\$943,622,842,998	\$27,296,910,933	\$970,919,753,931
2028	8817501	321317	9138819	4473944	128202	4602146	\$964,943,126,269	\$27,650,780,437	\$992,593,906,706
2029	8917992	322230	9240222	4525659	128523	4654182	\$986,518,455,961	\$28,015,887,739	\$1,014,534,343,699
<b>Total</b>	<b>84560174</b>	<b>3177304</b>	<b>87737478</b>	<b>42958365</b>	<b>1276219</b>	<b>44234584</b>	<b>\$8,928,760,534,446</b>	<b>\$264,997,050,499</b>	<b>\$9,193,757,584,945</b>

All costs are reported in Australian dollars (AUD \$) and are specific to each year, in line with the GDP per EFT which ranged from \$197,259 in 2020 to \$217,983 in 2029.