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INCOPORATING ETHNIC AND DEPRIVATION VARIATION TO CANCER INCIDENCE ESTIMATES OVER 2006-2026 FOR ABC-CBA

Burden of Disease Epidemiology, Equity and Cost-Effectiveness Programme

Technical Report: Number 5

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Competing Interests

The authors have no competing interests.

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Executive Summary

Objectives: To provide cancer incidence estimates and projections (2006 to 2026; for 28 cancer sites; by sex, age, ethnicity and deprivation) to be used in economic decision modelling of cancer interventions in the Aotearoa Burden of Cancer and Comparative Benefit Analysis project (ABC-CBA).

Methods: Three data sources are combined in the estimations:

1. Ministry of Health projections (2006 to 2026) of cancer incidence by sex and age [1, 2].
2. Population distribution (in 2006 from census data) by ethnicity (Māori, non-Māori) and deprivation (NZDep deciles 1-3, 4-7 and 8-10), within sex by age groups.
3. Incidence rate ratios comparing Māori in the three deprivation categories, and non-Māori in deciles 4-7 and 8-10, all with non-Māori in deciles 1-3 (i.e. five rate ratios for each cancer, within each sex by age combination).

The latter rate ratios were calculated using count regression analyses on CancerTrends data. In particular, Poisson/Negative Binomial models were fitted for each cancer, and used a stepwise procedure to generate the 'best fit' model for main effects of sex, age, age^2, year (data from 1981 to 2004 included in analyses), ethnicity and deprivation, and any significant two-way interactions of these variables. We then used the 'best' model for each cancer to predict the ethnicity-deprivation rate ratios for any combination of sex and age, and year (2006 as default; all years 2006 to 2026 inclusive as an option [see below]).

The three data sources were mathematically combined to generate cancer incidence rates for any combination of sex, age (single year of age, but more pragmatically as midpoint of each five year age group), ethnicity, deprivation and year (2006 to 2026).

Outputs of ethnic by deprivation rates and rate ratios by various combinations of sex, age and year were plotted and assessed for plausibility.

Cancer site definitions in terms of ICD-10 codes were the same as the Burden of Cancer report.

Results: The method worked satisfactorily. As expected, cancers with greater incidence numbers and/or marked variations in incidence by sociodemographics – and interactions of the same – were likely to have more complex regression models.

The lung cancer output up to 2026 appeared consistent with recent tobacco consumption patterns that vary by socio-demographic groups. Colorectal cancer projections suggested ongoing increases in Māori rates, but falls in non-Māori rates. This is consistent with past trends, although the validity of projections is moot. Breast cancer rate projections appeared plausible.

Conclusions: The method seems to generate plausible baseline estimates for future modelling. We do not attempt here to select the best model by cancer. Rather, that will be done at the time of modelling cancer interventions. However, we propose the following default options to be selected from in the future (with possible scenario/sensitivity analyses about variations in the choice):

1. Use the full 'best regression model' with projections of varying ethnic and deprivation differences out to 2026 (i.e. allowing rate ratios to vary from 2006-2026). This is our baseline scenario.
2. Use the estimates produced in this report for 2006, and hold ethnic and deprivation incidence rate ratios constant thereafter. Thus cancer rates will vary out to 2026, but with constant relative differences between ethnic and deprivation groupings.
3. Assume cancer incidence rates do not vary by ethnicity and deprivation, and just use the underlying sex by age projections from the Ministry out to 2026, and then hold constant.

In the future, these estimates could be updated if warranted when: the Ministry of Health revises its sex by age projections, and/or CancerTrends data is extended to the 2006-11 cohort.

A similar method to that above will be used for projecting excess mortality rates (i.e. cancer survival), although data is more limited. (See subsequent BODE^3 Technical Report.)

Introduction

In the previous Burden of Cancer report [3], we allowed for ethnic variation in cancer incidence rates for 2006 by combining MoH incidence rates [4], ethnic incidence rate ratios from CancerTrends [5] and corresponding 2006 census proportions from Statistics New Zealand [6]. For the Aotearoa Burden of Cancer and Comparative Benefit Assessment project (ABC-CBA), we use a similar approach to generate cancer incidence rates by both ethnicity and deprivation, applying a more general method to estimate the ethnic and deprivation incidence rate ratios that also allow us to obtain these incidence projections up to 2026. Cancer site definitions in terms of ICD-10 codes remained the same as the Burden of Cancer report [3].

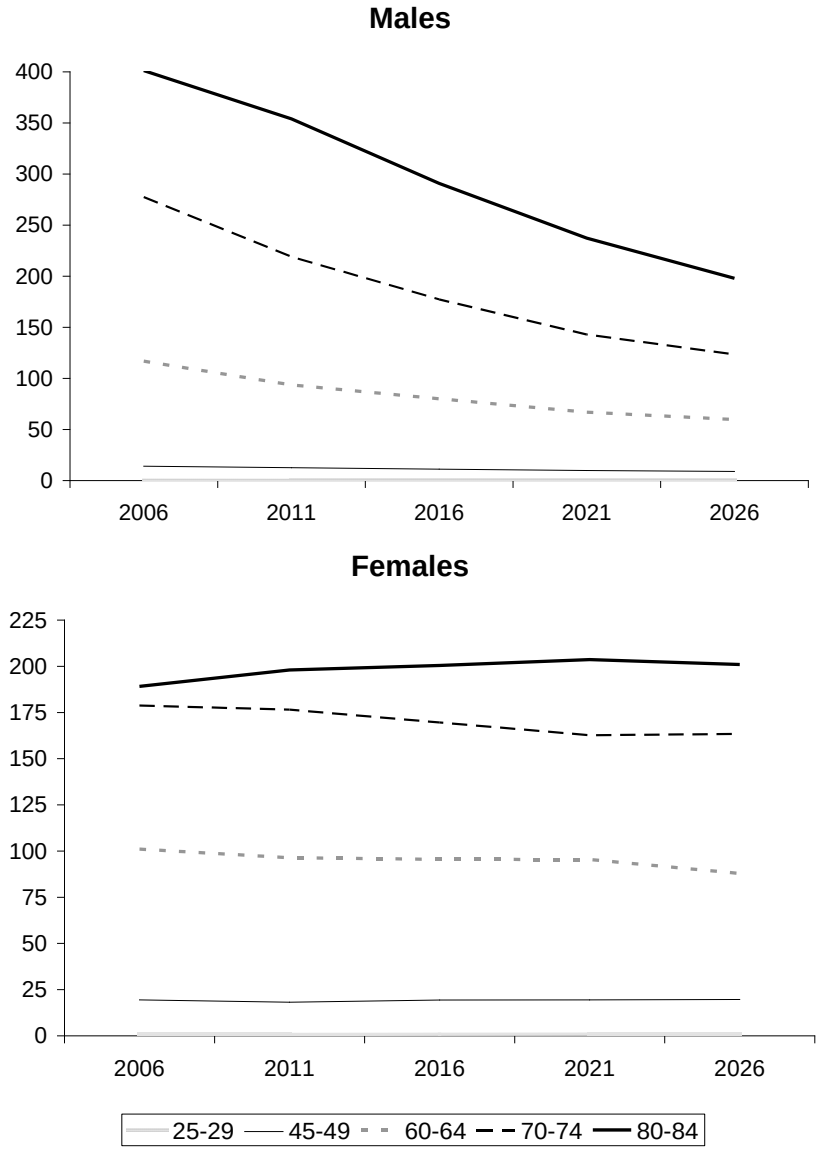
We now describe these three components, the methodology for generating the rates and the results for some selected cancer sites.

Method and Outputs

Incidence projections by sex and age for 2006-2026:

Regarding our first source, the Ministry of Health (MoH) has undertaken analysis on trends and projections of cancer incidence in New Zealand up to 2026 by sex and age [4]. We use these estimates, rather than actual rates, because future scenario modelling may require rates estimated for decades into the future. These incidence projection models are only by sex and age, due to a lack of ethnic and socioeconomic data back to 1950 – the data that was used to drive the projection models. Figure 1 presents these projections for the case of lung cancer.

Figure 1: Lung cancer incidence rates by sex and age group for 2006-2026



Source: MoH, 2010 [3].

***Population proportions by sex, age, ethnicity and deprivation for 2006*:**

Population proportions for each combination of sex by age by ethnicity by deprivation for 2006 were needed to generate ethnicity and deprivation rates. We held the distribution by ethnicity and deprivation (within each sex by age group) constant at 2006 levels for future projections. However, as we were using MoH sex by age projections of rates into the future, our method only fixed the ethnicity and deprivation structure within strata of sex by age. Table 1 presents the ethnic-deprivation distributions by strata of sex and age (selected age groups).

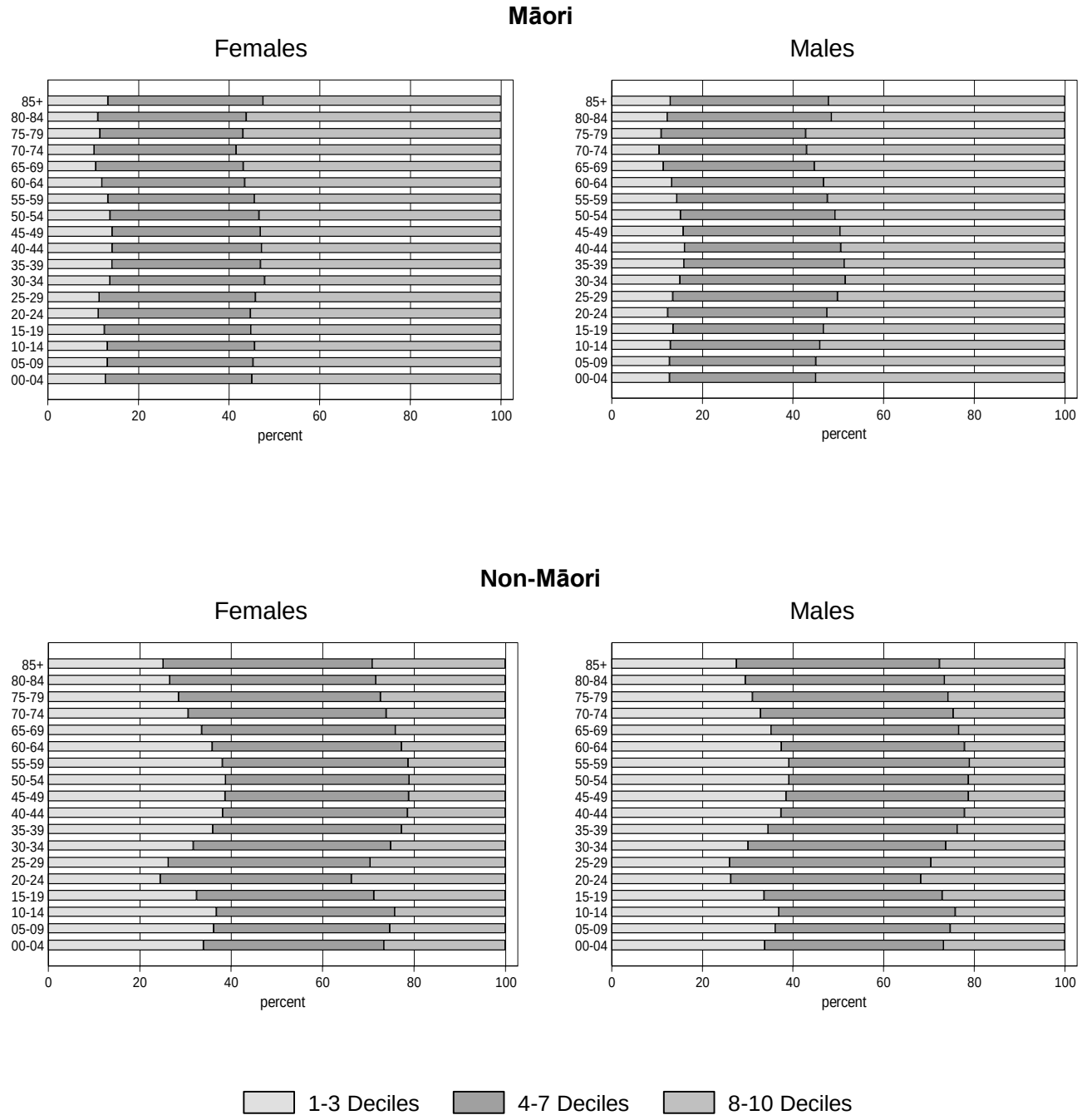
Table 1: Ethnicity and deprivation distributions (%) by sex and age for 2006

		Females		Males	
Age Group	NZ Dep Deciles	Māori	Non-Māori	Māori	Non-Māori
0- 4	1-3	3.2	25.5	3.2	25.2
	4-7	8.1	29.5	8.1	29.5
	8-10	13.8	19.9	13.9	20.0
5- 9	1-3	3.2	27.5	3.1	27.3
	4-7	7.8	29.2	7.8	29.3
	8-10	13.2	19.1	13.3	19.1
15-19	1-3	2.6	25.7	2.7	27.0
	4-7	6.7	30.7	6.6	31.5
	8-10	11.5	22.8	10.6	21.7
25-29	1-3	2.0	21.8	2.1	21.9
	4-7	5.9	36.5	5.8	37.3
	8-10	9.3	24.5	8.0	24.9
35-39	1-3	1.9	31.1	2.1	30.0
	4-7	4.5	35.7	4.6	36.3
	8-10	7.2	19.6	6.4	20.6
45-49	1-3	1.7	34.2	1.7	34.3
	4-7	3.8	35.5	3.8	35.8
	8-10	6.2	18.7	5.4	19.0
55-59	1-3	1.1	34.8	1.2	35.9
	4-7	2.8	37.1	2.7	36.6
	8-10	4.7	19.5	4.2	19.4
60-64	1-3	0.9	33.1	0.9	34.8
	4-7	2.4	38.3	2.4	37.5
	8-10	4.3	20.9	3.8	20.5
65-69	1-3	0.8	31.2	0.8	32.7
	4-7	2.3	39.3	2.3	38.5
	8-10	4.1	22.3	3.9	21.8
75-79	1-3	0.5	27.4	0.4	30.0
	4-7	1.3	42.3	1.2	41.6
	8-10	2.4	26.2	2.1	24.8
85-89	1-3	0.2	25.0	0.2	27.1
	4-7	0.6	44.5	0.6	44.1
	8-10	1.0	28.8	0.9	27.2
90-94	1-3	0.1	24.2	0.2	27.3
	4-7	0.5	46.0	0.6	43.8
	8-10	0.6	28.5	0.8	27.3
>95	1-3	0.3	24.9	0.8	25.7
	4-7	0.9	45.5	0.4	46.0
	8-10	0.6	27.7	1.2	25.9

Source: Statistics New Zealand, 2006 Census [6].

As a complement to Table 1, Figure 2 shows the deprivation distributions within strata of ethnicity, sex, and age group.

Figure 2: Deprivation distributions (%) by ethnicity, sex, and age. 2006 Census population



Source: Statistics New Zealand, 2006 Census [6].

As it can be seen, for 2006 Māori and non-Māori populations had very different structures both by age and deprivation. Firstly and as widely known, Māori are younger than non-Māori. Secondly, Māori live in more deprived areas than non- Māori. In particular, the lowest deciles of deprivation (8-10) have the highest proportion of the Māori population, regardless of age group. This contrasts with the situation of non-Māori who are mostly found in the middle deprivation deciles (4-7).

Sex, age, ethnic and deprivation incidence rate ratios for 2006-2026:

Thirdly, we used CancerTrends data [5] to estimate ethnic (Māori and non-Māori) and deprivation (Dep1-3, Dep4-7 and Dep8-10) specific incidence rate ratios for each cancer site, by sex by age for 2006-2026. This was done by running Poisson regressions (or Negative binomial when over-dispersion was present) to estimate rates by sex, age, ethnicity, and deprivation, and year for each cancer site; including interaction terms where relevant (see Appendix 1 that presents all models). The goal of the regression modelling is to produce incidence rate ratios by ethnicity (Māori, Non-Māori only) and deprivation (deciles 1-3, 4-7, and 8-10), within any stratum of sex by age by year. Within each stratum of age by sex by year, non-Māori from deciles 1-3 of deprivation were made the reference group meaning that there were five non-referent rate ratios for the remaining ethnicity by deprivation categories. We followed a similar approach to that used for NZCMS analyses of rate ratios that was used to build sub-population lifetables [6].

In more detail, the steps are as follows:

- 1981-2004 CancerTrends data is treated as one data-set for analysis, but each cancer is modelled separately. For adult cancers, less than 25 year old person-time is excluded. Highly cross-classified counts of incident cases and person years were extracted from the SNZ Data Laboratory, and modelled using grouped Poisson/Negative Binomial regression at the University of Otago, Wellington (UOW).
- Variables are specified as follows:
    - Age, using single year of age [centered on 62.5]
    - Age squared [continuous; to allow for rate ratios that often peak in middle age]
    - Sex [dichotomous, male referent]
    - Year [year of census, continuous, centered on 2006][1]
    - Ethnicity [dichotomous, non-Māori referent]
    - Deprivation [trichotomous, deciles 1-3 referent][2]

The initial model run for each cancer site included all the above covariates as main effects, and all two-way interactions in the regression. The model was then reduced to the most parsimonious model by a backwards elimination strategy, removing any

[1] Centering on 2006 means that all other coefficients can be directly interpreted for year 2006. It would be possible to include year squared too, but the data is unlikely to support robust examination of non-linear trends over time.

[2] 1991-1996 registrants had NZDep1991 value; 1996-2001 had NZDep1996; 2001-2004 registrants had NZDep2001 value; but 1980's registrants were assigned the NZDep96 scores.

covariate or interaction if either was non-significant (Wald type III p value is greater than 0.1), or the AIC statistic did not decrease when excluding the covariate (or interaction term). Other requirements were that main effects had to remain in the model if the interaction was significant, even if the main effect was not; and age had to remain in the model if age squared was in the model.

Table 2 shows the regression coefficients (main effects and interaction terms that were significant), rates and rate ratios for the case of lung cancer (25+). In this case, a Negative Binomial model was used due to over-dispersion and the statistically significant terms were: interactions of age with ethnicity, sex, deprivation and year; non-linear interactions of age with ethnicity, sex and deprivation (although they were small); interactions of sex with ethnicity, deprivation and year; interactions of year with ethnicity and deprivation. Main effects for age (linear and non-linear terms), sex, ethnicity, deprivation and year were also statistically significant. The interactions are consistent with lung cancer rates washing through society in phased epidemics (due to smoking).

Table 2: (Negative Binomial) Regression for Lung cancer (25+)

Variable	Coefficient	SE	RR	95% RR Lower Bound	95% RR Upper Bound
Intercept	-7.052309	0.047534	0.00	0.00	0.00
AgeYr	0.113983	0.001248	1.12	1.12	1.12
AgeYr2	-0.002698	0.000060	1.00	1.00	1.00
SexFem	-0.104419	0.039572	0.90	0.83	0.97
Year	-0.025558	0.002668	0.97	0.97	0.98
EthMaori	0.861977	0.038995	2.37	2.19	2.56
NZDep8-10	0.724559	0.054138	2.06	1.86	2.29
NZDep4-7	0.512406	0.054866	1.67	1.50	1.86
AgeYr*SexFem	-0.027257	0.000824	0.97	0.97	0.97
AgeYr2*SexFem	0.000196	0.000000	1.00	1.00	1.00
AgeYr*Year	0.000647	0.000059	1.00	1.00	1.00
AgeYr*EthMaori	-0.008950	0.000000	0.99	0.99	0.99
AgeYr2*EthMaori	-0.000590	0.000000	1.00	1.00	1.00
AgeYr*NZDep8-10	-0.009971	0.001042	0.99	0.99	0.99
AgeYr*NZDep4-7	-0.005828	0.001045	0.99	0.99	1.00
AgeYr2*NZDep8-10	-0.000266	0.000054	1.00	1.00	1.00
AgeYr2*NZDep4-7	-0.000283	0.000054	1.00	1.00	1.00
SexFem*Year	0.038186	0.002285	1.04	1.03	1.04
SexFem*EthMaori	0.439684	0.033689	1.55	1.45	1.66
SexFem*NZDep8-10	-0.101686	0.000000	0.90	0.90	0.90
SexFem*NZDep4-7	-0.102614	0.000000	0.90	0.90	0.90
Year*EthMaori	0.008872	0.000000	1.01	1.01	1.01
Year*NZDep8-10	0.008015	0.002838	1.01	1.00	1.01
Year*NZDep4-7	0.007681	0.002869	1.01	1.00	1.01

See Appendix 1 for details of the regression coefficients for all cancer sites.

Using the final model for each cancer site, incidence rates for each stratum of sex, age, ethnicity and deprivation were predicted for 2006-2026. Then taking Non-Māori of deprivation 1-3 deciles as the reference group, 5 incidence rate ratios for the remaining strata (Non-Māori 4-7 deciles, Non-Māori 8-10 deciles, Māori 1-3 deciles, Māori 4-7 deciles, and Māori 8-10 deciles) were computed for each cancer site for stratum of sex and age over 2006-2026.

Note these regression predictions are by single year of age but the other inputs by five-year age groups. Thus, rates predicted by the regression were first averaged across five-year age groups and then converted into ethnicity and deprivation rate ratios. These latter rate ratios were the ones combined with population proportions and the MoH rate projections.

Finally, the rate ratios, and their trends into the future, were assessed by the BODE^3 team members for plausibility, and broadly considered to be so. (However, we leave the exact choice of projection option to the future when we are undertaking actual intervention modelling. See Conclusion.)

Incidence rates by sex, age, ethnicity and deprivation for 2006-2026

Given these three inputs, we can calculate the incidence rate for each stratum of sex, age, ethnicity and deprivation. In order to do that, we express the (age and sex) incidence rate, total rate henceforth, as a weighted average of the incidence rates for each combination of (sex, age) ethnicity and deprivation, where the weights are the corresponding population proportions.

More specifically, given a 'total' sex by age rate (R_T), a reference rate for non-Māori in deciles 1-3 in that age group (R_{11}), and proportions of each sex by age strata in each of the six combinations of ethnicity by deprivation (P_{ij}); we have that:

$$R_T = \sum_{i=1}^{2}\sum_{j=1}^{3} R_{ij}P_{ij} \qquad \textit{where:} \quad \begin{array}{l} i = \textit{Non- Māori, Māori} \\ j = \textit{Dep1-3, Dep4-7, Dep8-10} \end{array}$$

Dividing everything by the incidence rate of referent group (R_{11}) and rearranging terms, we can get expressions for the incidence rates of each stratum of ethnicity and deprivation (R_{ij}), within a given sex by age stratum.

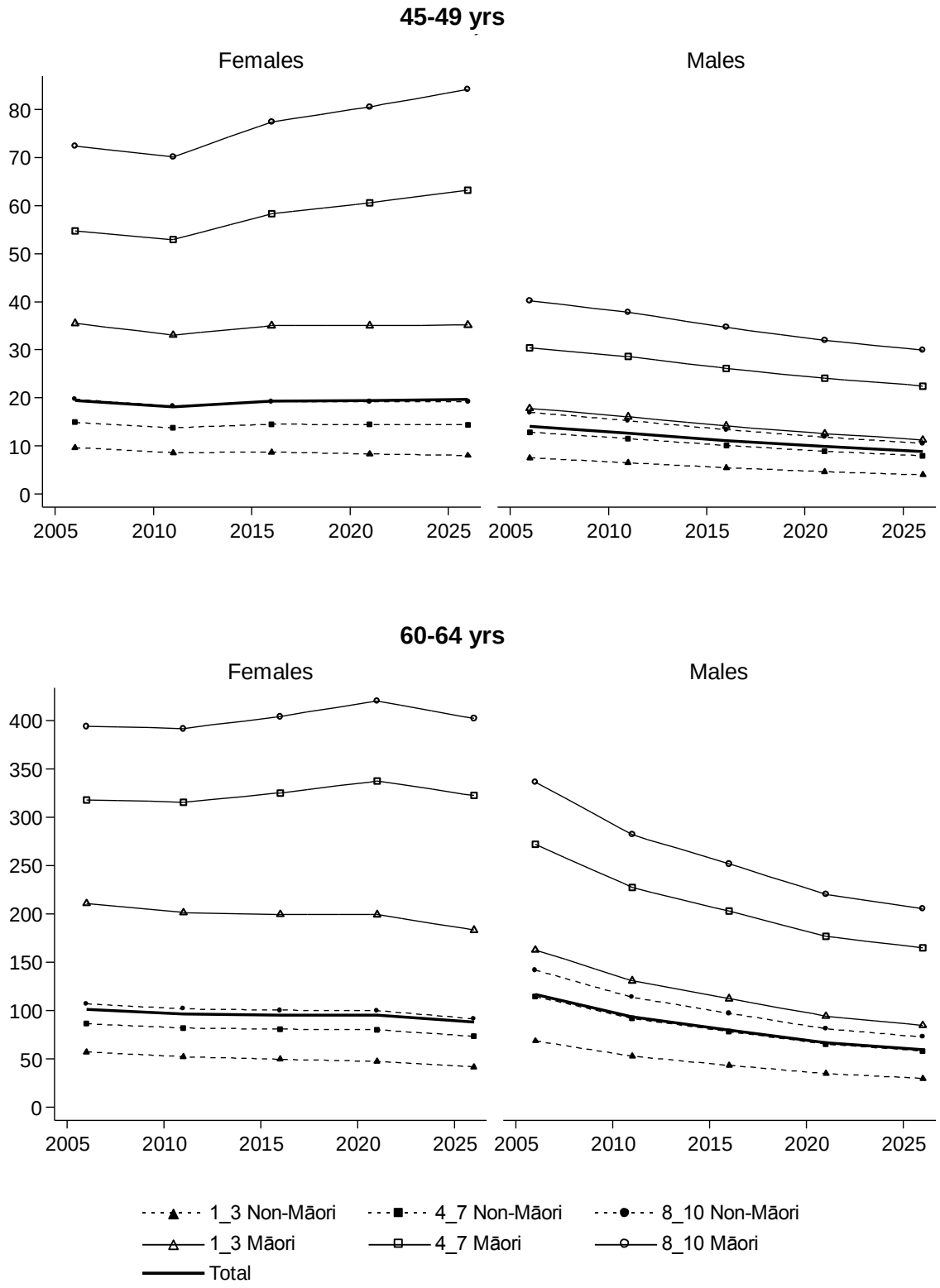
$$R_{11} = \frac{R_T}{(P_{11} + P_{12}RR_{12} + P_{13}RR_{13} + P_{21}RR_{21} + P_{22}RR_{22} + P_{23}RR_{23})} \text{ , and}$$

$$R_{ij} = RR_{ij}R_{11} \text{ for } i, j \neq 1$$

These are the expressions that we used to calculate each of the six ethnicity by deprivation rate ratios (R_{ij}). Finally, note that the other inputs are by five-year age groups (e.g. 40-44 year olds) so that the resulting rates by deprivation and ethnicity are also for the same age- groupings.

Figure 3 shows the final incidence rates by sex, age, ethnicity and deprivation for the case of lung cancer between 2006 and 2026 for people aged 45-49 and 60-64 years.

Figure 3: Lung cancer incidence rates (per 100,000) by sex, ethnicity and deprivation for 2006-2026 for 45- 49 and 60-64 years old



Additionally**,** Table 3 details all inputs used to calculate rates for selected age groups for lung cancer. Complete results for all cancer sites are graphed in Appendix 20.

Since these rates are an extrapolation of ethnicity by deprivation RR trends in 1981 to 2004. We also need to apply some expert judgment as to whether these trends will continue into the future. The projection rates for males look plausible, and possibly so for females (although one would expect Māori female rates to peak sometime in 2006-2026).

Table 3: Lung cancer final incidence rates for 2006 and 2026 by sex, age, ethnicity and deprivation and its inputs.

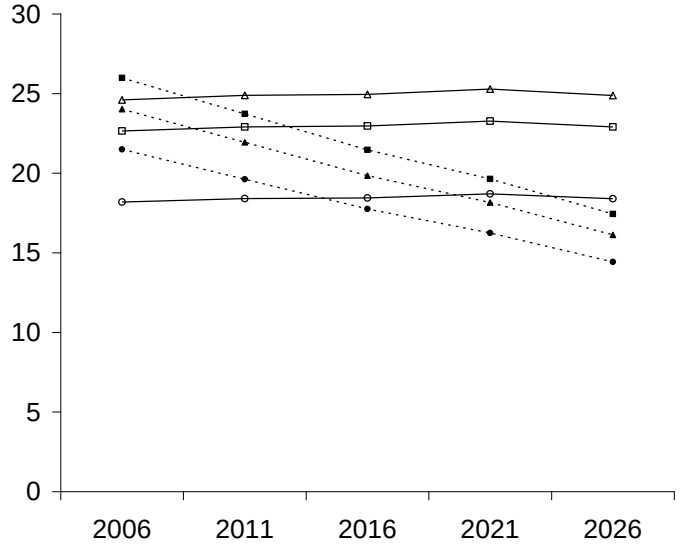
					2006			2026		
Sex	Age	Ethnicity	NZ Dep 2006	2006 Eth-Dep Proportion	Rate MoH	RR	Rate	Rate MoH	RR	Rate
Females	25-29	Non-Māori	1_3	21.8	0.7	1.00	0.4	0.9	1.00	0.4
			4_7	36.5	0.7	1.89	0.5	0.9	1.89	0.6
			8_10	24.5	0.7	2.52	0.7	0.9	2.52	0.9
		Māori	1_3	2.0	0.7	1.85	0.9	0.9	2.23	1.2
			4_7	5.9	0.7	3.49	1.2	0.9	4.22	1.8
			8_10	9.3	0.7	4.65	1.8	0.9	5.62	2.6
	45-49	Non-Māori	1_3	34.2	19.5	1.00	9.7	19.7	1.00	8.0
			4_7	35.5	19.5	1.56	14.9	19.7	1.56	14.4
			8_10	18.7	19.5	1.98	19.7	19.7	1.98	19.2
		Māori	1_3	1.7	19.5	3.45	35.5	19.7	4.17	35.2
			4_7	3.8	19.5	5.38	54.7	19.7	6.51	63.2
			8_10	6.2	19.5	6.83	72.4	19.7	8.25	84.2
	60-64	Non-Māori	1_3	33.1	101.0	1.00	57.2	87.8	1.00	41.7
			4_7	38.3	101.0	1.35	86.3	87.8	1.35	73.3
			8_10	20.9	101.0	1.65	107.0	87.8	1.65	91.5
		Māori	1_3	0.9	101.0	3.87	210.7	87.8	4.67	183.3
			4_7	2.4	101.0	5.23	317.9	87.8	6.32	322.3
			8_10	4.3	101.0	6.40	394.0	87.8	7.73	402.1
	80-84	Non-Māori	1_3	25.9	189.1	1.00	150.7	200.9	1.00	139.5
			4_7	43.9	189.1	1.12	182.0	200.9	1.12	196.3
			8_10	27.6	189.1	1.30	209.1	200.9	1.30	227.0
		Māori	1_3	0.3	189.1	2.81	371.9	200.9	3.40	410.7
			4_7	0.9	189.1	3.14	449.6	200.9	3.80	578.7
			8_10	1.5	189.1	3.66	516.7	200.9	4.42	669.4
Males	25-29	Non-Māori	1_3	21.9	0.3	1.00	0.2	0.3	1.00	0.1
			4_7	37.3	0.3	1.89	0.3	0.3	1.89	0.2
			8_10	24.9	0.3	2.52	0.4	0.3	2.52	0.3
		Māori	1_3	2.1	0.3	1.20	0.3	0.3	1.45	0.2
			4_7	5.8	0.3	2.26	0.4	0.3	2.74	0.4
			8_10	8.0	0.3	3.01	0.6	0.3	3.64	0.6
	45-49	Non-Māori	1_3	34.3	14.1	1.00	7.5	8.9	1.00	4.0
			4_7	35.8	14.1	1.56	12.9	8.9	1.56	8.0
			8_10	19.0	14.1	1.98	17.0	8.9	1.98	10.6
		Māori	1_3	1.7	14.1	2.23	17.8	8.9	2.69	11.3
			4_7	3.8	14.1	3.48	30.5	8.9	4.20	22.5
			8_10	5.4	14.1	4.41	40.2	8.9	5.33	29.9
	60-64	Non-Māori	1_3	34.8	116.9	1.00	68.6	59.8	1.00	29.9
			4_7	37.5	116.9	1.35	114.6	59.8	1.35	58.3
			8_10	20.5	116.9	1.65	141.8	59.8	1.65	72.6
		Māori	1_3	0.9	116.9	2.50	162.6	59.8	3.02	84.6
			4_7	2.4	116.9	3.38	271.7	59.8	4.08	164.9
			8_10	3.8	116.9	4.13	336.3	59.8	4.99	205.5
	80-84	Non-Māori	1_3	28.8	401.2	1.00	305.5	197.9	1.00	132.1
			4_7	42.8	401.2	1.12	408.5	197.9	1.12	205.9
			8_10	25.9	401.2	1.30	468.9	197.9	1.30	237.9
		Māori	1_3	0.3	401.2	1.81	485.1	197.9	2.19	250.3
			4_7	0.9	401.2	2.03	649.4	197.9	2.45	390.6
			8_10	1.3	401.2	2.36	745.5	197.9	2.85	451.3

Figure 4 illustrates both scenarios for colorectal cancer for 2006-2026 of females aged 45-49 years. Because of the increased rates of colorectal cancer for Māori (compared to a peaking for non-Māori) in recent decades, the future projections for the baseline scenario (which are just extrapolation of past trends in relative inequalities) suggest ongoing modest increases in Māori female colorectal cancer incidence, but large falls in Non-Māori female colorectal cancer incidence. However, it might be that in the near future Māori rates peak and also start to fall. Thus, the choice between the 'baseline scenario' and 'scenario 2' (where rate ratios are held constant at their 2006 level) will be important in future models.

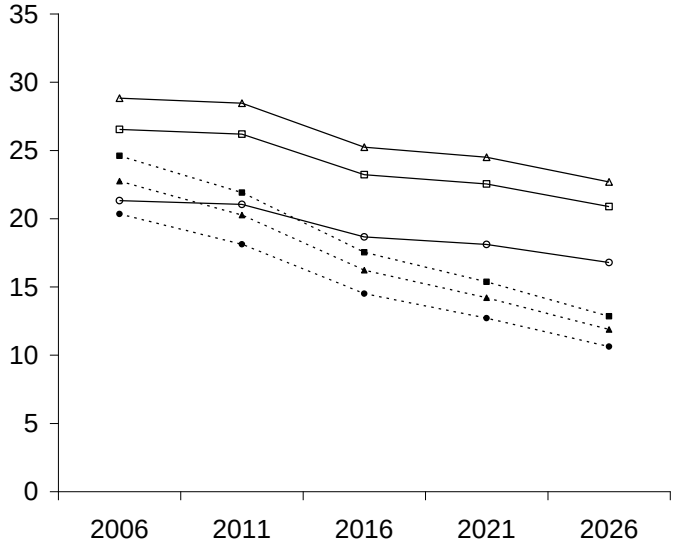
Figure 4 : Colorectal cancer incidence rates for females 45-49 years old by ethnicity and deprivation for 2006-2026

Baseline scenario

Females

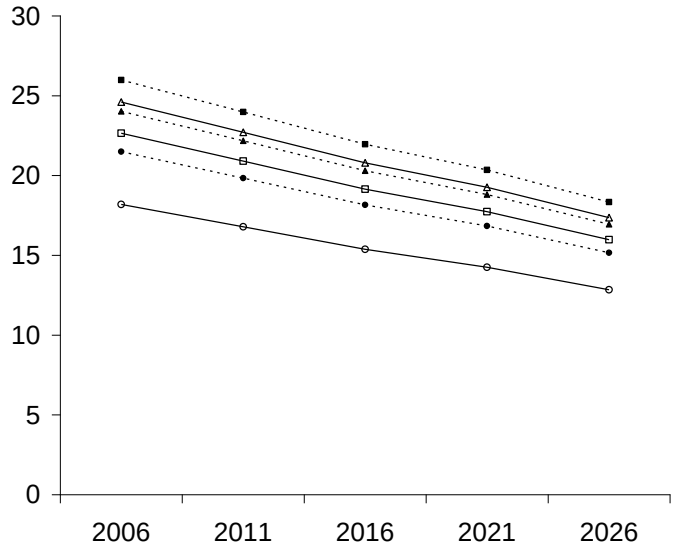


Males

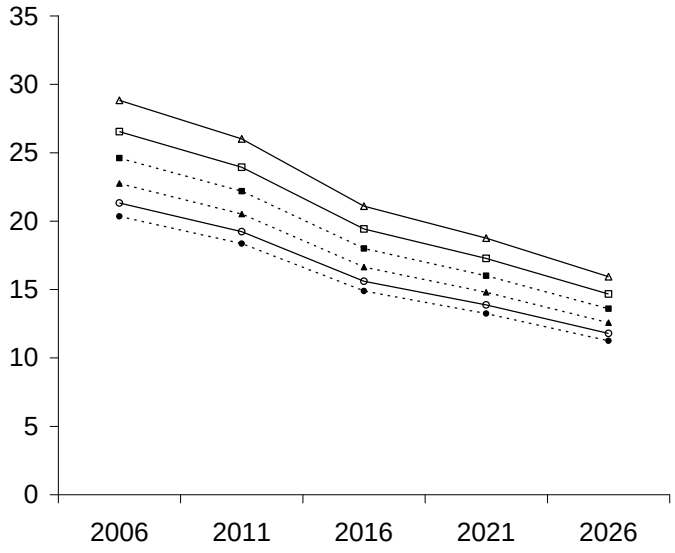


Scenario 2: Relative differences between ethnic and deprivation groups constant at 2006 level

Females



Males



Non-Māori - 1_3 Non-Māori - 4_7 Non-Māori - 8_10
Māori - 1_3 Māori - 4_7 Māori - 8_10

A final option will also be available for selection in future ABC-CBA modelling. That is to simply assume that there is no ethnic or deprivation variation – either at 2006 or anytime thereafter – and simply use the Ministry of Health sex by age projections uniformly across deprivation by ethnicity strata.

All the inputs and outputs described here are available in the BODE³ directory (G:\Data\BODE3\Incidence\Outputs\incidence_2026_allstrata_final.xml).

Conclusions

The method seems to generate plausible baseline estimates for future modelling. We do not attempt here to select the best model by cancer. Rather, that will be done at the time of modelling cancer interventions. However, we propose the following default options to be selected in the future (with possible scenario/sensitivity analyses about variations in the choice):

1. Use the full 'best regression model' with projections of varying ethnic and deprivation differences out to 2026. This is our baseline scenario.
2. Use the estimates produced in this report for 2006, and hold ethnic and deprivation rate ratios constant thereafter. Thus cancer rates will vary out to 2026, but with constant relative differences between ethnic and deprivation groupings.
3. Assume cancer incidence rates do not vary by ethnicity and deprivation, and just use the underlying sex by age projections from the Ministry, and then hold constant.

In the future, these estimates could be updated if warranted when: the Ministry of Health revises its sex by age projections, and/or CancerTrends data is extended to the 2006-2011 cohort.

A similar method to that above will be used for projecting excess mortality rates (i.e. cancer survival), although data is more limited. (See subsequent BODE^3 Technical Report.)

A final issue is that the MoH estimates (by sex and age only) are for 2011, 2016, 2021 and 2026 only, i.e. not every year. Hence, linear intrapolation was used to generate rates for each year over 2006-2011.

References

1. Ministry of Health. *Cancer Incidence Projections: 1999–2003 update.* Ministry of Health: Wellington, 2007.

2. Ministry of Health. *Cancer in New Zealand: Trends and Projections*. Ministry of Health: Wellington, 2002.

3. Blakely, T., Costilla, R., and Tobias, M. *The Burden of Cancer: New Zealand 2006*. Ministry of Health: Wellington, 2010.

4. Ministry of Health. *Cancer Projections Incidence 2004–08 to 2014–18*. Ministry of Health: Wellington, 2010.

5. Blakely, T., Shaw, C., Atkinson, J., Tobias, M., Bastiampillai, N., Sloane, K., Sarfati, D., Cunningham, R. *Cancer Trends: Trends in Incidence by Ethnic and Socioeconomic Group, New Zealand 1981-2004*. University of Otago and Ministry of Health: Wellington, 2010.

6. Statistics New Zealand. *2006 Census*. Statistics New Zealand, 2006.

7. Carter, K., Blakely, T., and Soeberg, M. *Trends in survival and life expectancy by ethnicity, income and smoking: 1980s to 2000s*. NZ Med J. 2010; 123 (1320): 1-13.

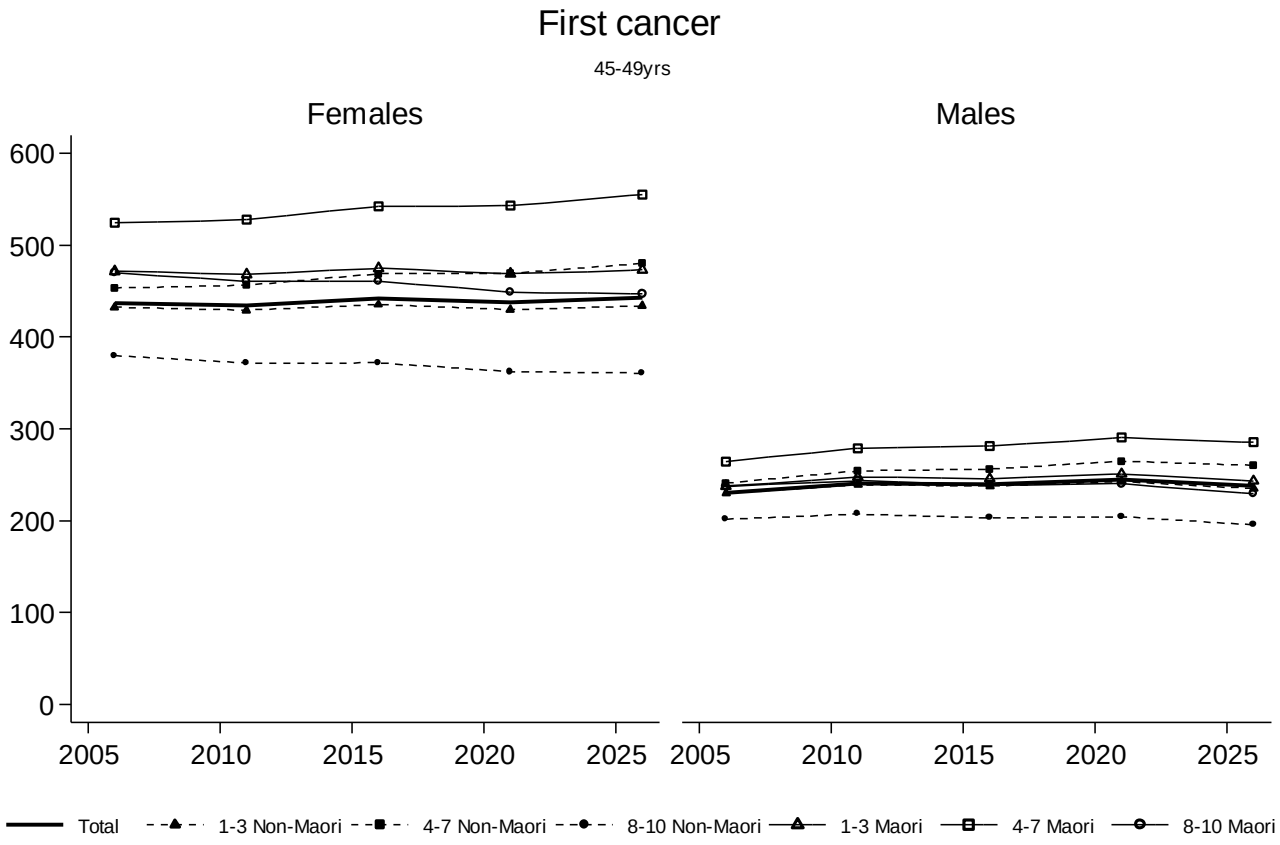
Appendix 1: Coefficients for “best” models from Cancer Trends used to generate the incidence projections for ABC-CBA

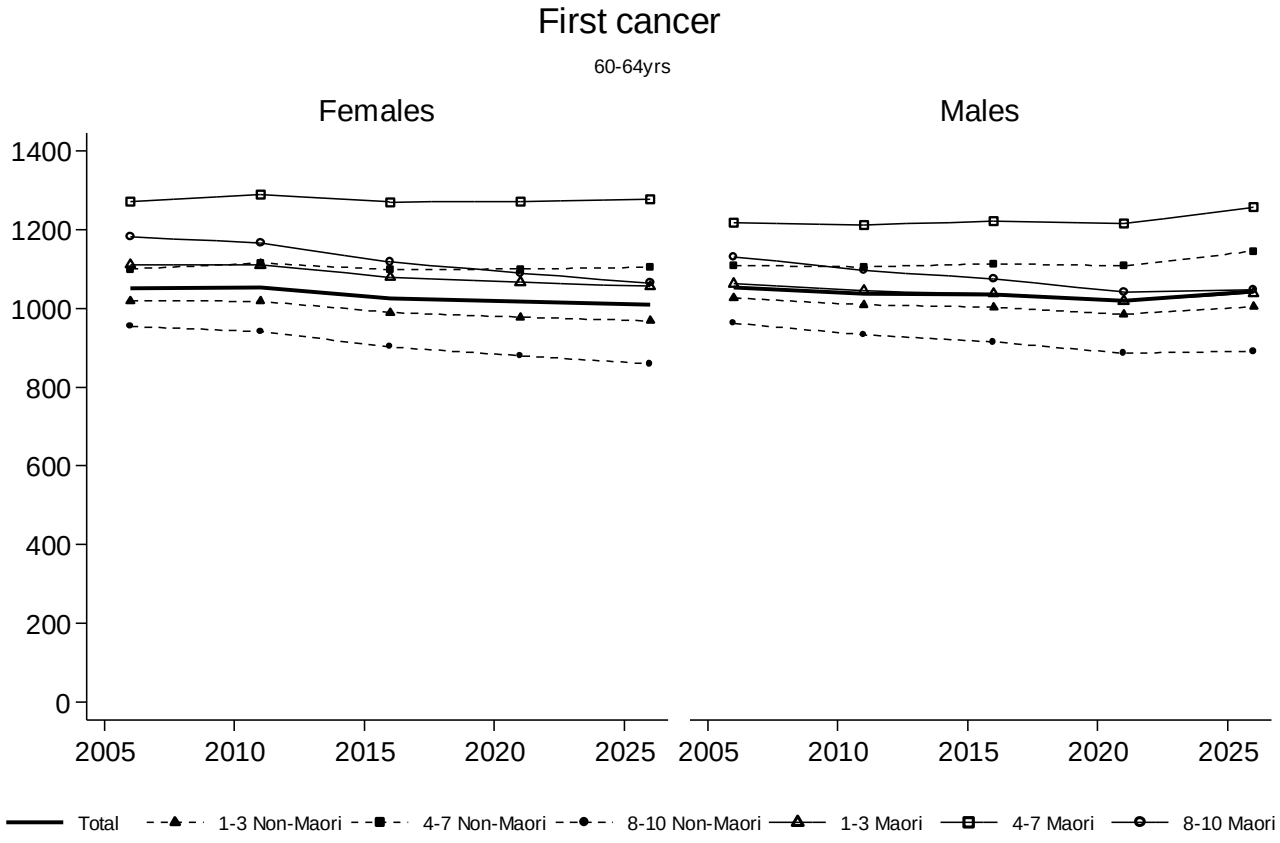
Variable	Cancer site									
	First cancer	Childhood	Lip	Oesophageal	Stomach	Colorectal	Liver	Gallbladder	Pancreatic	Laryngeal
Intercept	-4.172092295	-8.386939078	-8.574671410	-8.537978947	-8.223349011	-6.020931936	-8.918437861	-10.075556480	-8.291387986	-9.503328165
AgeYr	0.066153574		0.040448765	0.108184557	0.083806441	0.091336970	0.078692827	0.082612624	0.085480407	0.088788607
AgeYr2	-0.001099389		-0.001534830	-0.002219482	-0.001551116	-0.002348648	-0.002409527	-0.000934384	-0.001888090	-0.002885103
SexFem	-0.150348422	-0.270860240	-0.695227445	-1.107205402	-0.876947496	-0.252064638	-1.167239618	0.111618234	-0.164907209	-1.619127287
Year	0.020015585	0.011906154	-0.022262082	0.002758388	-0.015198799	0.004003759	0.024300328	-0.015458187	-0.004272320	-0.042129906
EthMaori	0.034108536	-0.074287749	0.022597843	0.469950687	0.833063064	0.092581810	1.041753942	0.197115995	0.444043445	0.396029627
NZDep8-10	-0.064008281	-0.224150310	0.696806040	0.401330775	0.256957463	-0.112122511	0.956115278	0.484097427	0.010110703	0.811614619
NZDep4-7	0.077499392	-0.116005627	0.518662314	0.217816279	0.114646275	0.028729194	0.342090457	0.177056456	-0.018211952	0.589345750
EthMaori*NZDep8-10	0.127407875					-0.190504145				
EthMaori*NZDep4-7	0.058499638					-0.161290349				
AgeYr*SexFem	-0.022302365		0.004681989	0.017433028	-0.002088946	-0.006013091	0.008816142	0.003763794	0.007827608	-0.014531629
AgeYr2*SexFem			0.000825885	0.000341304	0.000444136	0.000366868	0.000500954	-0.000517934		0.001194973
AgeYr*Year	0.000227254		-0.000389380	0.000701216	-0.000369296	0.000783835	0.000328958			0.001082593
AgeYr2*Year	-0.000007015		-0.000022180			-0.000011852	-0.000048757			
AgeYr*EthMaori			-0.013404675	0.002057847	-0.022579121	-0.009520061	-0.031515763		-0.005923933	-0.014016514
AgeYr2*EthMaori				-0.000809634	0.000377500		-0.001252700			
AgeYr*NZDep8-10	0.001395752		-0.008734876	-0.004301256	-0.007486365	-0.000050317	-0.025525427	0.002377513	-0.002238453	-0.013580501
AgeYr*NZDep4-7	-0.000149457		0.000862620	-0.016164822	-0.003372289	-0.003273357	-0.012395777	0.009589489	0.004661820	-0.007533985
AgeYr2*NZDep8-10	-0.000189073		-0.000439630	-0.000446072				-0.000664580		
AgeYr2*NZDep4-7	-0.000136856		-0.000310633	0.000145979				-0.000825688		
SexFem*Year	-0.003817402	-0.017382852	0.015068077	-0.008074384		-0.003100367			0.014874290	0.013062466
SexFem*EthMaori	0.052550981			-0.439958721	0.343938901	-0.213659666	-0.374049213			0.403496025
SexFem*NZDep8-10			-0.154984789				0.116361845	0.151956266		
SexFem*NZDep4-7			-0.197788938				0.419561343	0.247417620		
Year*EthMaori			0.026631673		0.008995301	0.020519698	-0.019546145			0.030051412
Year*NZDep8-10	-0.002722478		0.009234046	0.013166788			0.025256212	0.034032802		0.017507063
Year*NZDep4-7	0.002711114		0.013228316	0.001302278			0.014383729	0.019297840		0.019028522

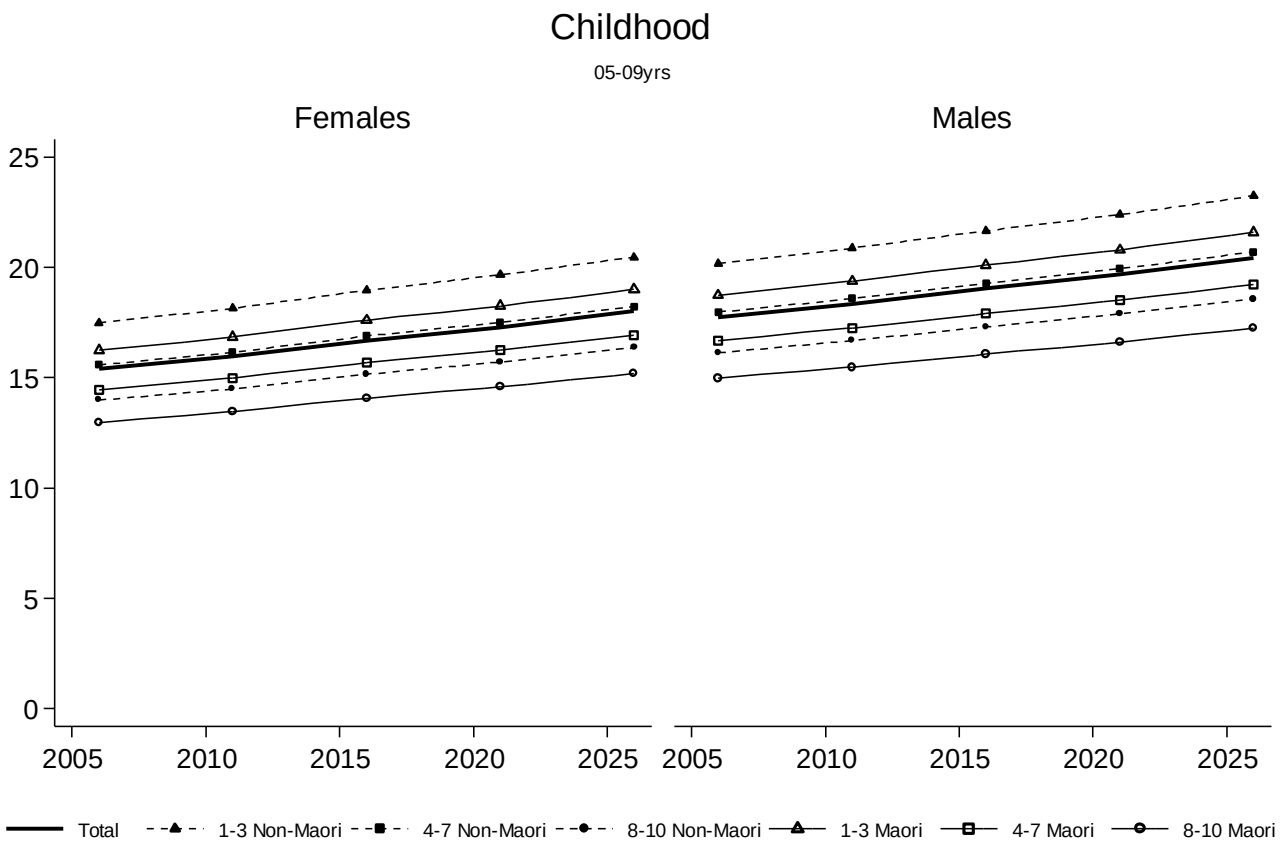
Variable	Cancer site									
	Lung	Bone	Melanoma	Breast	Cervix	Uterus	Ovary	Prostate	Testis	Kidney
Intercept	-7.052309325	-11.356674510	-6.104003452	-5.451520742	-9.176149504	-7.724580812	-7.824843996	-4.715425955	-10.121149310	-7.672655475
AgeYr	0.113983465	0.020267632	0.047668260	0.030590666	-0.003140183	0.051747337	0.037392966	0.118142316	-0.099651696	0.059598968
AgeYr2	-0.002698412	0.000182773	-0.000718961	-0.001489750	-0.000032678	-0.002389105	-0.001281013	-0.003937142	-0.001528888	-0.001904489
SexFem	-0.104419218	-0.390676547	-0.362078809							-0.685954543
Year	-0.025557899	-0.030797746	0.046823358	0.016664852	-0.027151600	-0.002701066	0.001696150	0.090516054	0.011647958	0.027296613
EthMaori	0.861976685	0.182556983	-1.270479136	0.377064565	0.663854226	0.773515206	-0.030365364	0.020373301	-0.868372435	-0.668470938
NZDep8-10	0.724558723	-0.224498339	-0.416249066	-0.202215998	0.366192289	0.300606310	0.231731219	-0.291486334	-0.266547763	-0.008566078
NZDep4-7	0.512405557	-0.074580341	-0.057654207	-0.053773451	0.235909102	0.241184683	0.093238185	-0.101115291	0.030369143	0.099735682
EthMaori*NZDep8-10			-0.482398051		-0.033211206	-0.342771645			0.546932622	0.642094198
EthMaori*NZDep4-7			-0.349630671		0.180661295	-0.330554465			0.164866375	0.559426602
AgeYr*SexFem	-0.027257137		-0.019922258							-0.009664300
AgeYr2*SexFem	0.000195820		0.000093559							0.000232156
AgeYr*Year	0.000646587	-0.000557538	0.001151946		0.000115523	0.000228671	0.000351786	-0.002439856	-0.001600737	
AgeYr2*Year			-0.000006334		0.000017656				-0.000044488	
AgeYr*EthMaori	-0.008949696	-0.018535822	-0.000087967	-0.010486034	-0.017471433	-0.013095343	-0.024744780	0.008432775	-0.037769336	-0.023847528
AgeYr2*EthMaori	-0.000590070		0.000420366	-0.000328038	-0.001014532	-0.000527468	-0.000467648	-0.000539128		
AgeYr*NZDep8-10	-0.009970897		0.010238472		-0.005663097	-0.008495000		-0.012395851		
AgeYr*NZDep4-7	-0.005827902		0.003146965		-0.001247943	-0.000090519		0.007140281		
AgeYr2*NZDep8-10	-0.000266400		-0.000152268		-0.000693225	0.000363172		0.000774762		
AgeYr2*NZDep4-7	-0.000282916		-0.000037436		-0.000201117	-0.000176155		-0.000103354		
SexFem*Year	0.038185522		-0.012985306							
SexFem*EthMaori	0.439683584	-0.443958613								
SexFem*NZDep8-10	-0.101685963		0.136467987							
SexFem*NZDep4-7	-0.102613612		0.058834817							
Year*EthMaori	0.008872320			0.009542930	-0.012204601					
Year*NZDep8-10	0.008014511		-0.000480650		-0.011286261	0.015723336	0.017034186			
Year*NZDep4-7	0.007680920		0.005310606		0.003260803	0.011667627	0.004083809			

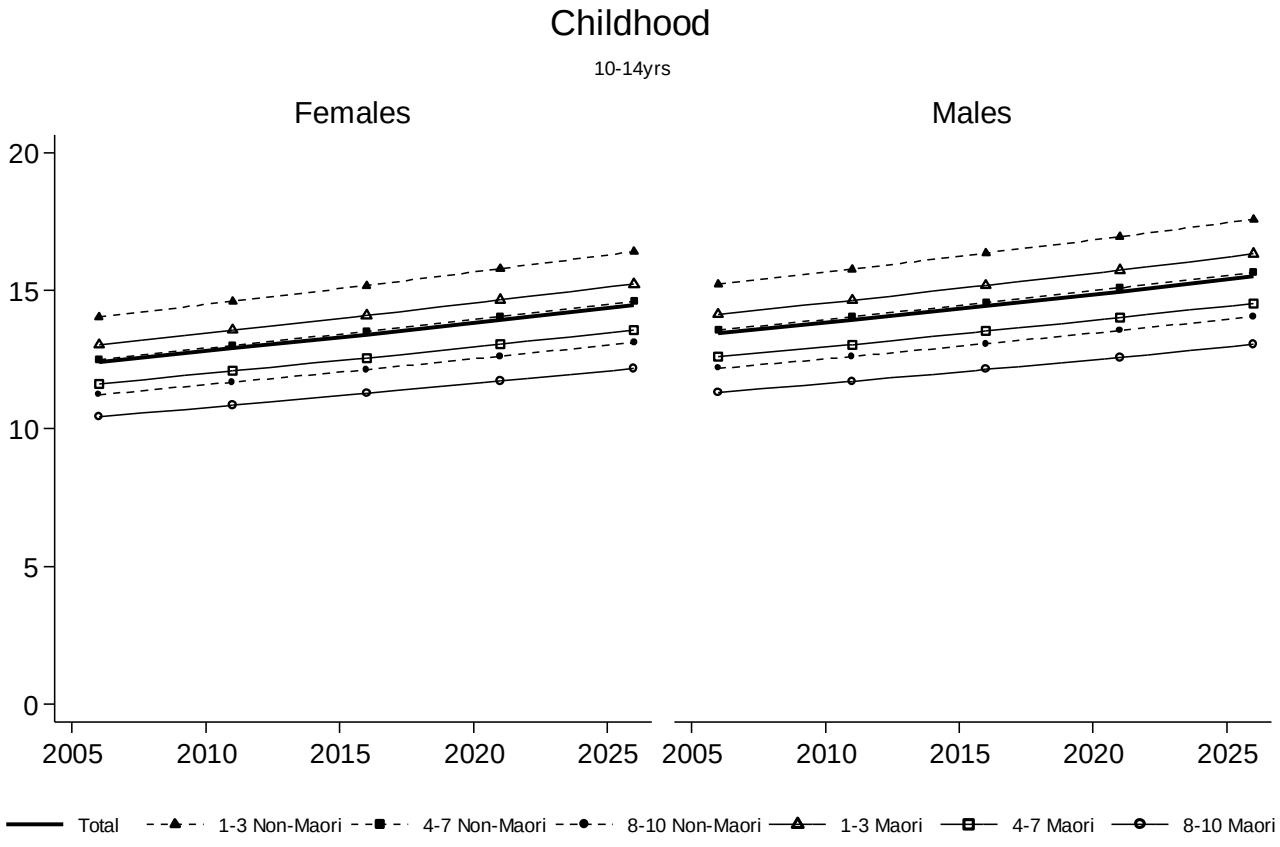
Variable	Cancer site							
	Bladder	Brain	Thyroid	Hodgkin's	NHL	Myeloma	Leukaemia	Other
Intercept	-7.279249443	-8.425047668	-9.869022229	-10.575644570	-7.316813367	-8.494835315	-7.365548152	-7.368520831
AgeYr	0.104699870	0.036208237	0.007269576	0.000366528	0.051333042	0.089777442	0.076297234	0.070373827
AgeYr2	-0.001927324	-0.000846003	-0.000767091	0.000321850	-0.000873429	-0.001546802	-0.001183122	-0.000779447
SexFem	-1.258137993	-0.484418894	0.770271431	-0.323312424	-0.210459728	-0.394868009	-0.505784899	-0.541182424
Year	0.013520295	0.005312385	0.019824062	-0.014559272	0.034046265	0.011038181	0.041123909	0.029472196
EthMaori	-0.310370655	0.505517884	0.542617371	0.012911627	-0.190320326	0.535868201	0.269573582	0.225385545
NZDep8-10	0.045389880	-0.156859190	0.175154966	-0.264845839	-0.172591295	0.107029093	-0.053041699	-0.148513309
NZDep4-7	0.040407073	0.016326060	0.165218456	0.145426168	-0.006653718	0.141517842	-0.017222182	-0.013926990
EthMaori*NZDep8-10	-0.500758440	-0.482609848					-0.307644695	
EthMaori*NZDep4-7	-0.365484260	-0.491607636					-0.053393724	
AgeYr*SexFem	-0.011252887	-0.001266962	-0.018498853	-0.010340870	0.002091224	0.000923514	-0.006902125	-0.009776528
AgeYr2*SexFem	0.000405782	0.000187977			-0.000314226	-0.000387211		0.000390725
AgeYr*Year	0.000395344	0.000753520	-0.000822583	-0.001062481	0.000142248		0.000137632	0.000594936
AgeYr2*Year		0.000015294	-0.000025172		-0.000012986		-0.000034940	
AgeYr*EthMaori	-0.008470461		0.011472592		0.003852827	-0.008678167	-0.013549264	-0.020583765
AgeYr2*EthMaori	0.000678353				0.000657130			-0.000591936
AgeYr*NZDep8-10	-0.002246791	0.001937751			0.001232133	-0.005548588	-0.008096106	
AgeYr*NZDep4-7	-0.006755449	-0.004230975			0.003128903	-0.006420657	-0.004313102	
AgeYr2*NZDep8-10	-0.000159674				-0.000312758			
AgeYr2*NZDep4-7	0.000149369				-0.000365487			
SexFem*Year					0.005489618			-0.013298134
SexFem*EthMaori	0.210211452			-0.443673537				
SexFem*NZDep8-10				-0.057608641	0.143810014	0.120450455	0.118165498	0.110479035
SexFem*NZDep4-7				-0.492553695	0.068530953	-0.063595408	0.038949731	0.052389029
Year*EthMaori		0.030498704						
Year*NZDep8-10			0.008869646			0.016714429		
Year*NZDep4-7			0.017245315			0.007839520		

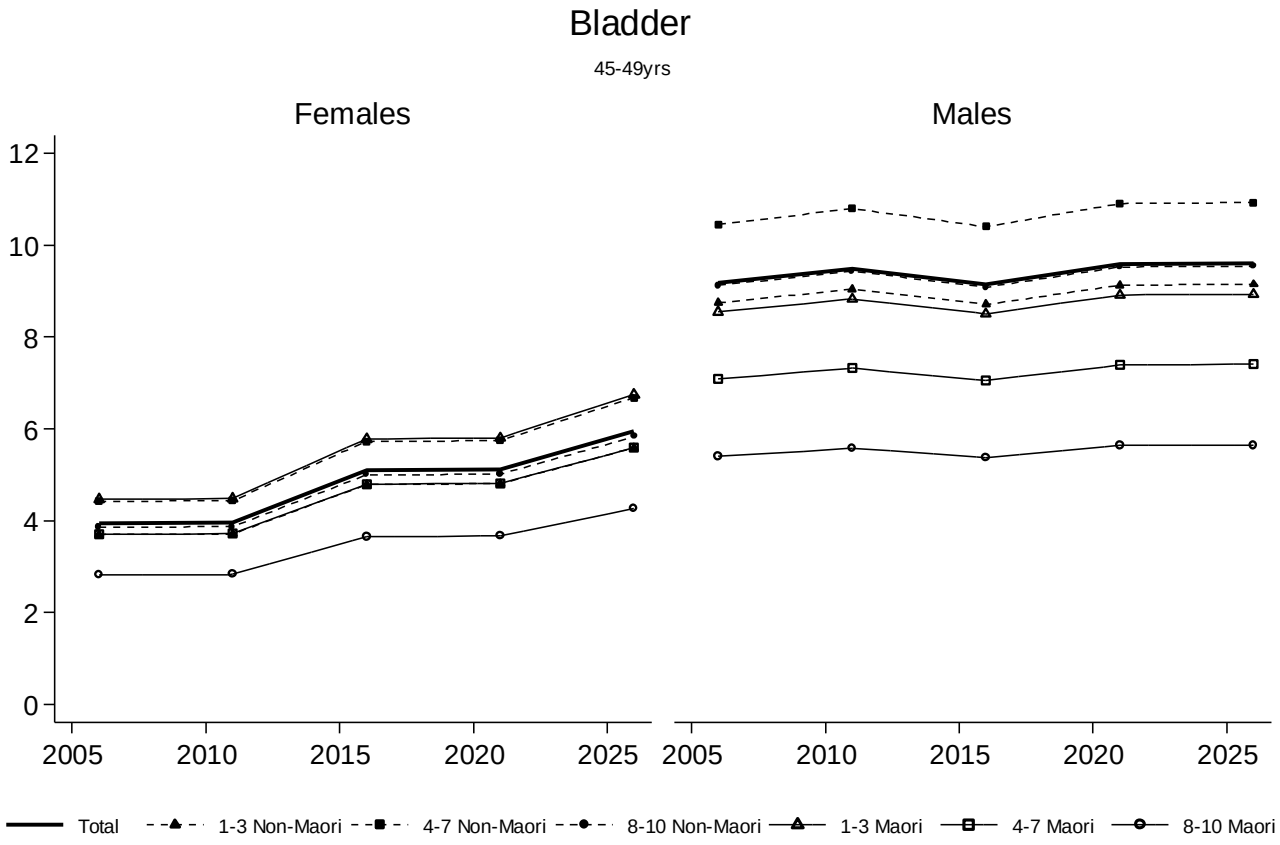
Appendix 2: Final incidence rates by sex, age, ethnicity and deprivation for each cancer site over 2006-2026

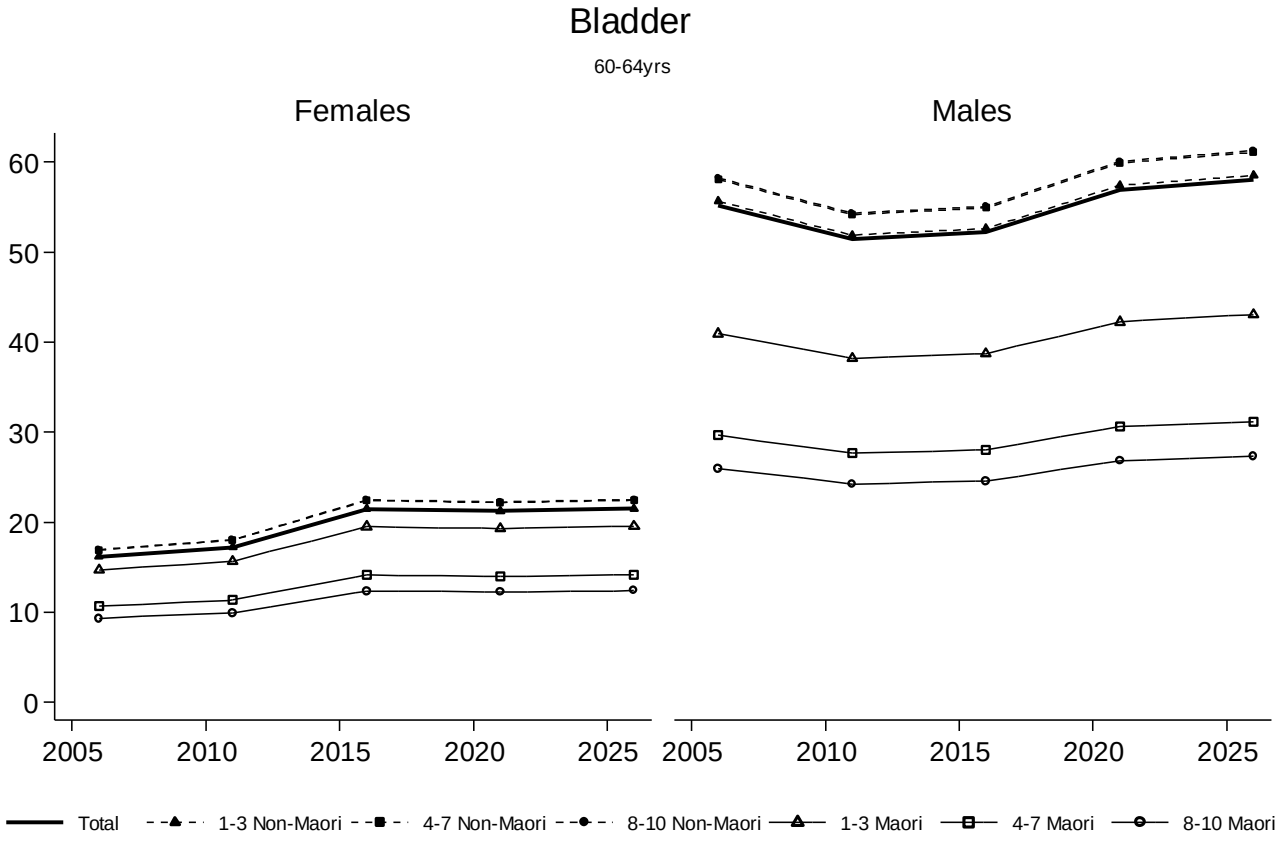

First cancer
45-49yrs
Females
Males
600
500
400
300
200
100
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

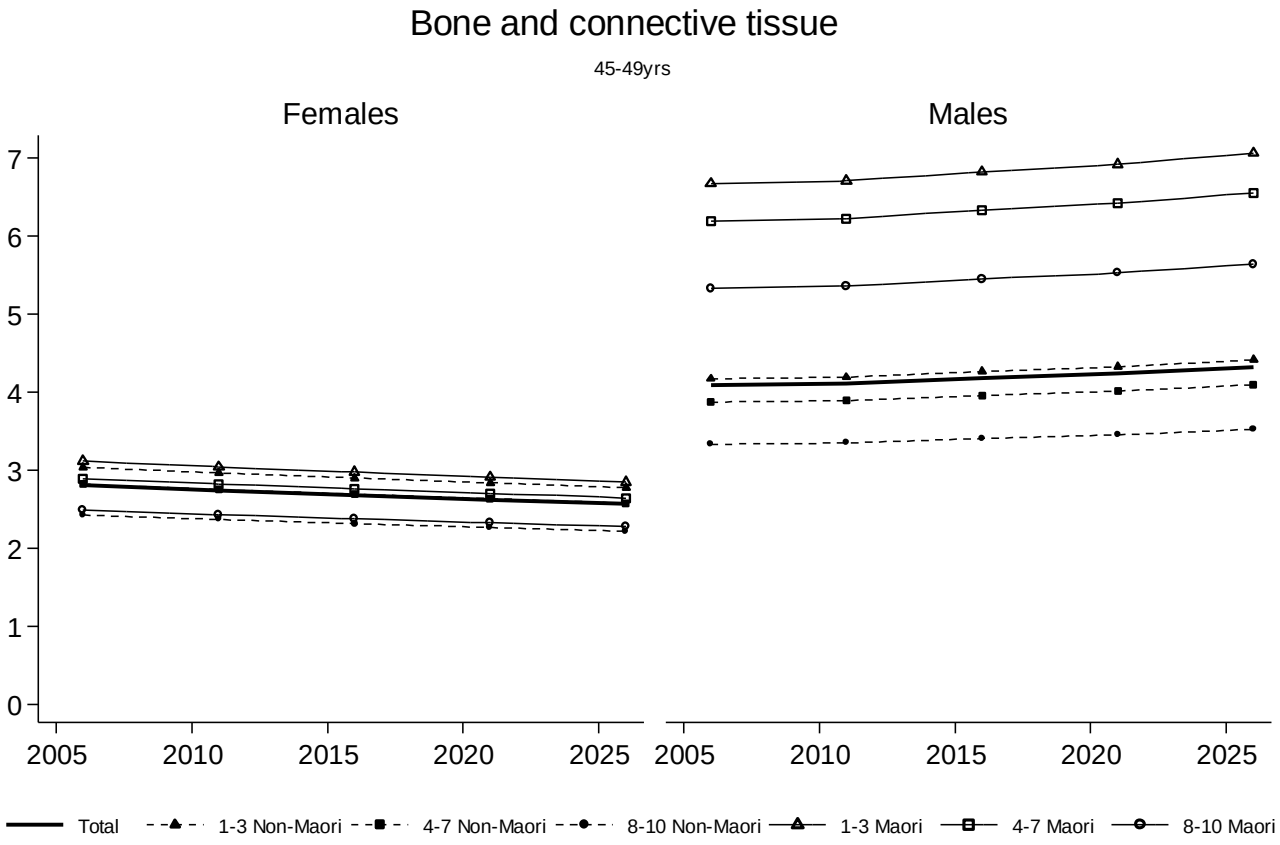

First cancer
60-64yrs
Females
Males
1400
1200
1000
800
600
400
200
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

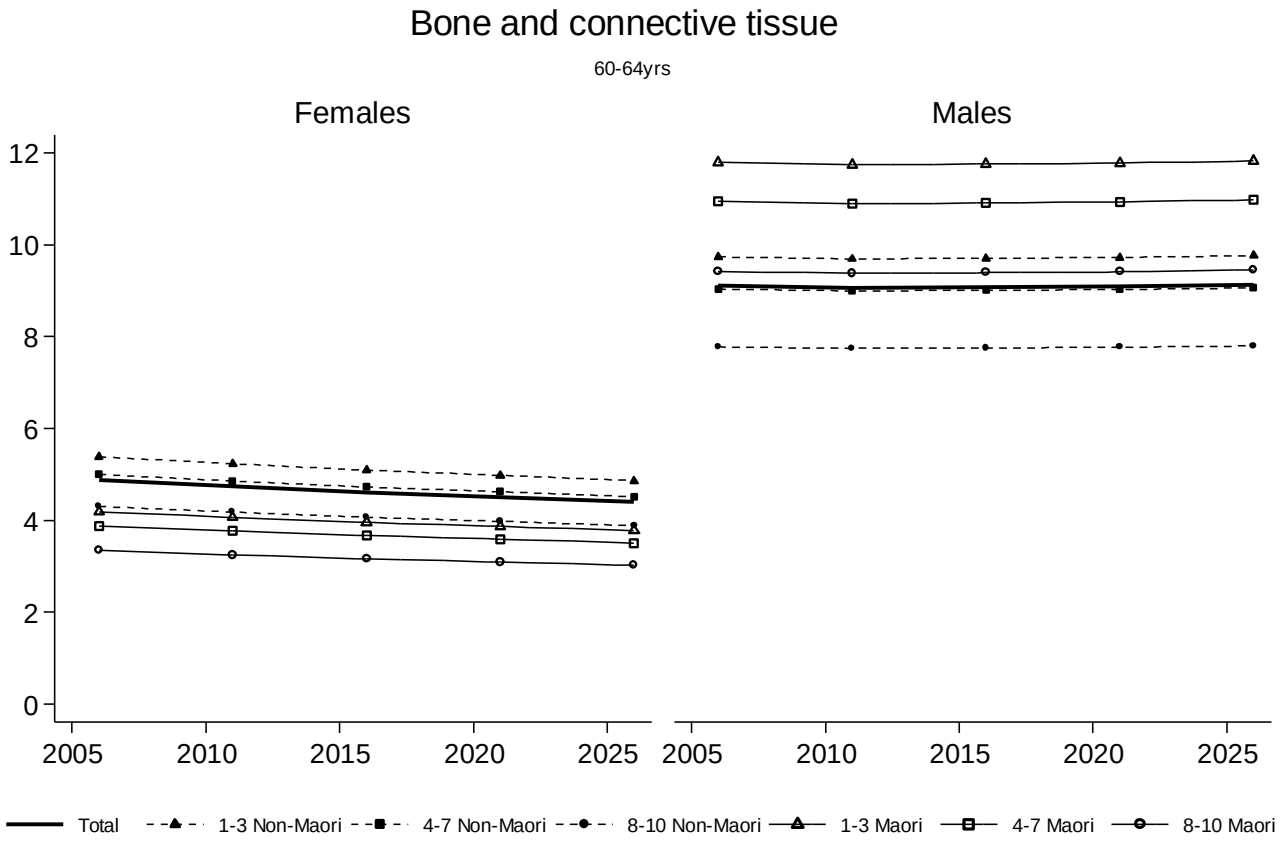

Childhood
05-09yrs
Females
Males
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

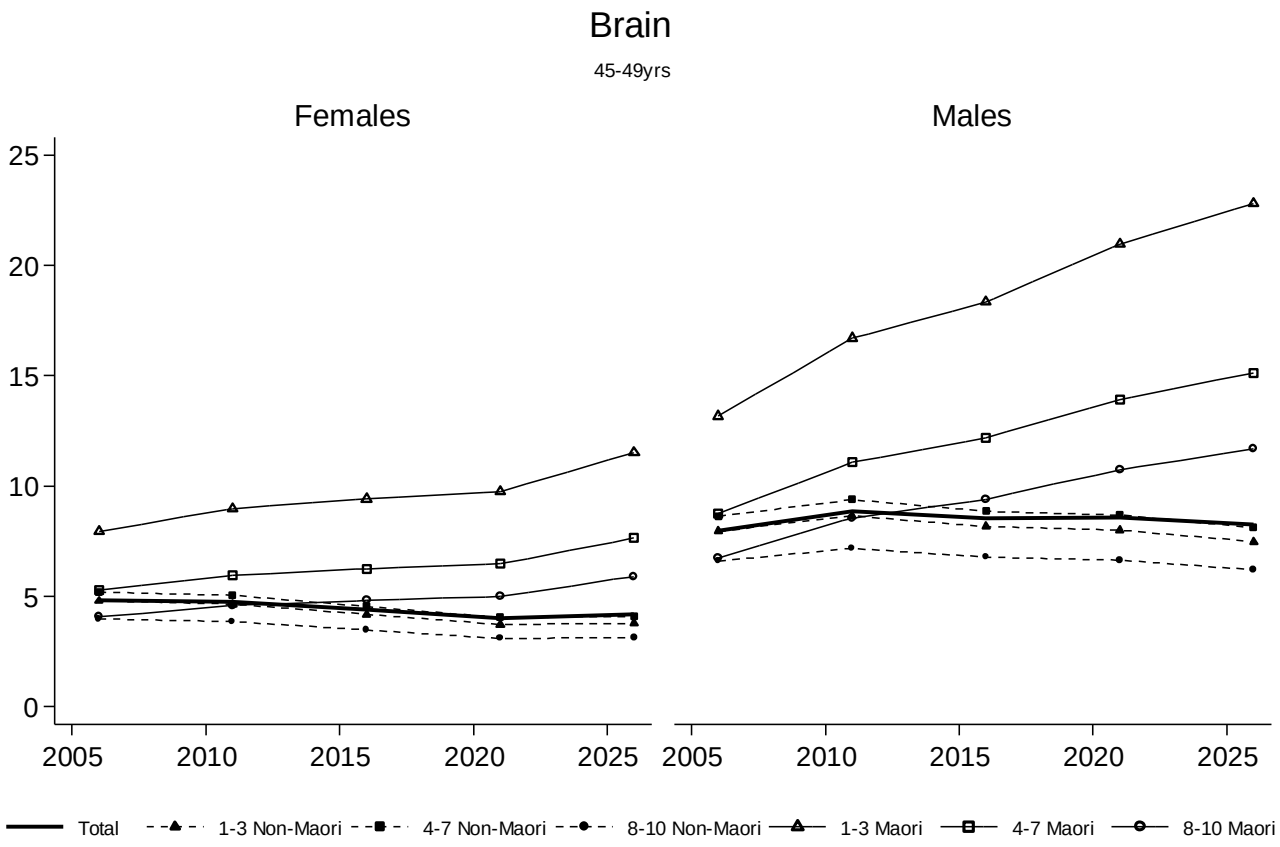

Childhood
10-14yrs
Females
Males
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

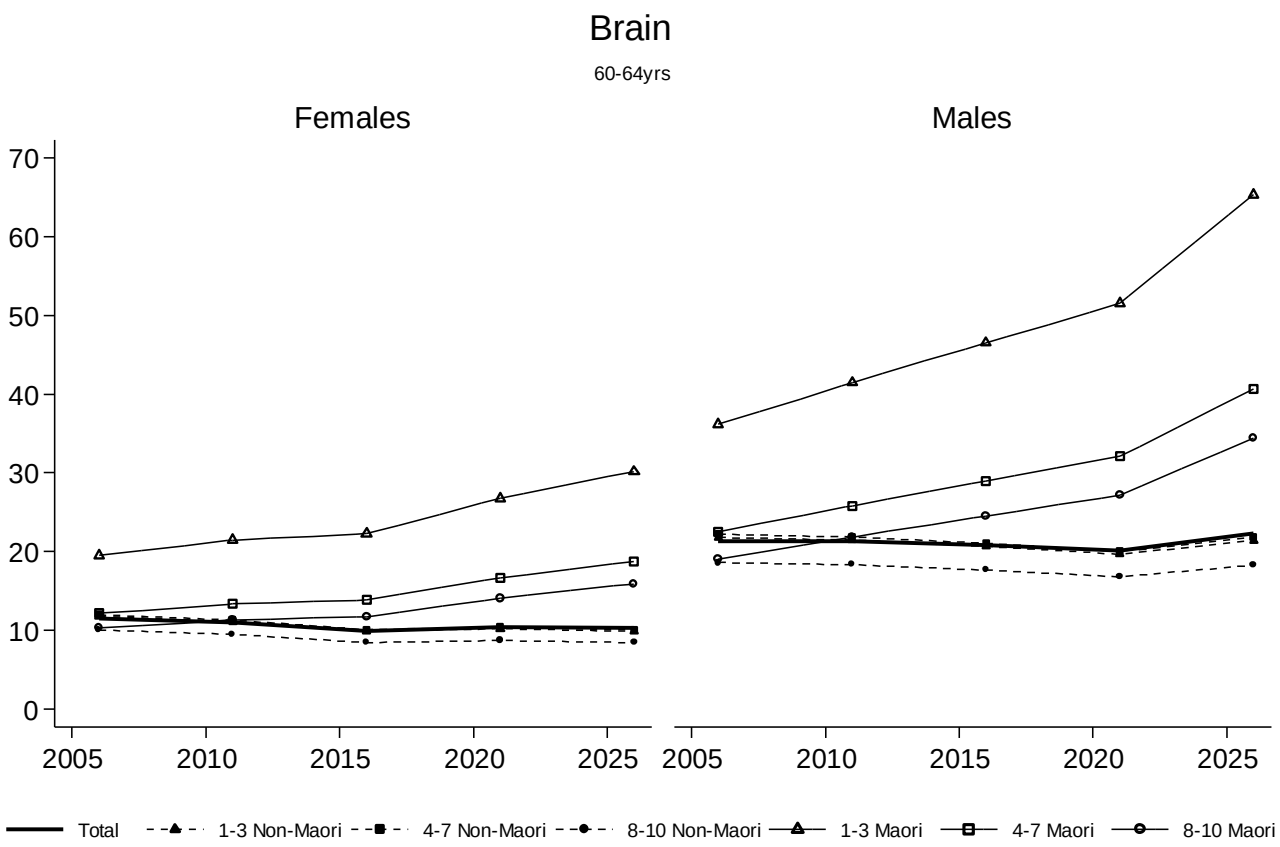

Bladder
45-49yrs
Females
Males
12
10
8
6
4
2
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

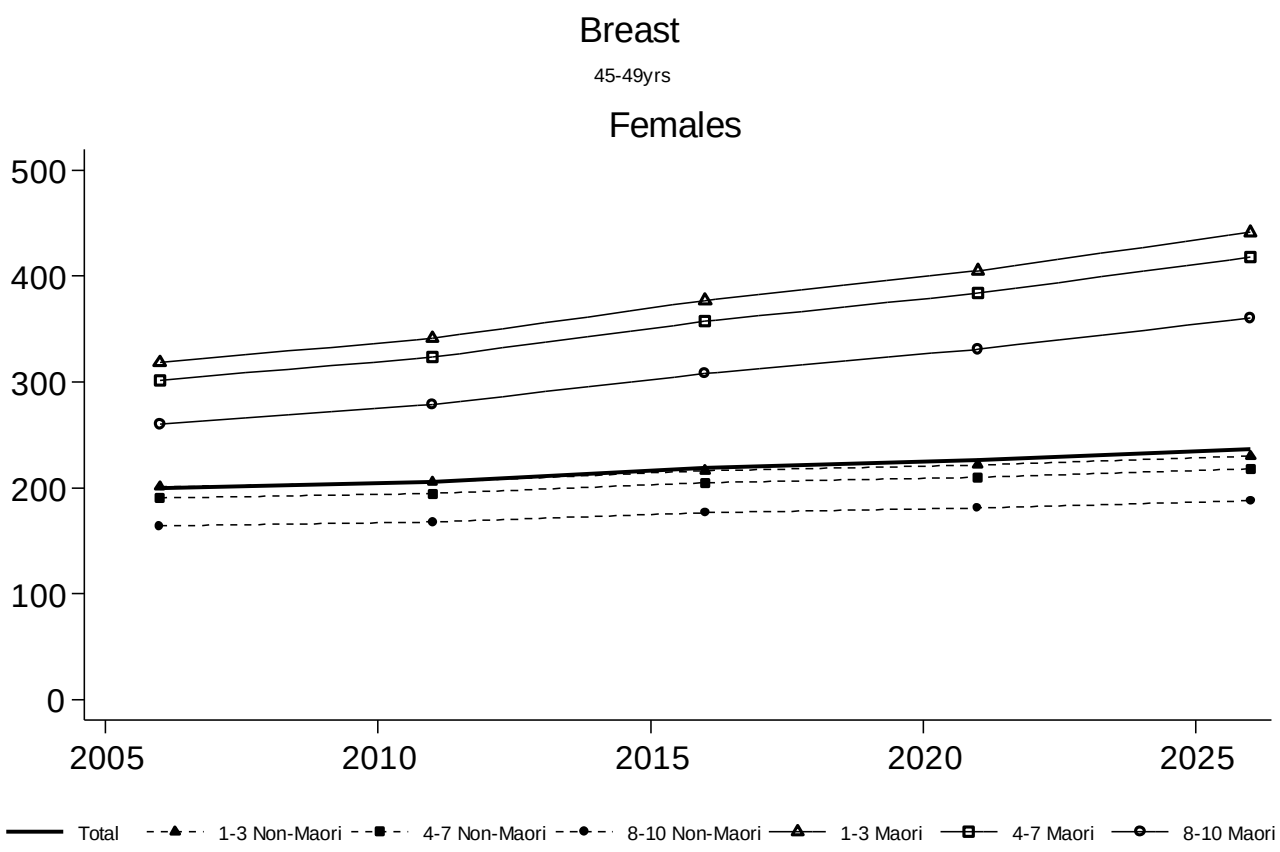

Bladder
60-64yrs
Females
Males
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

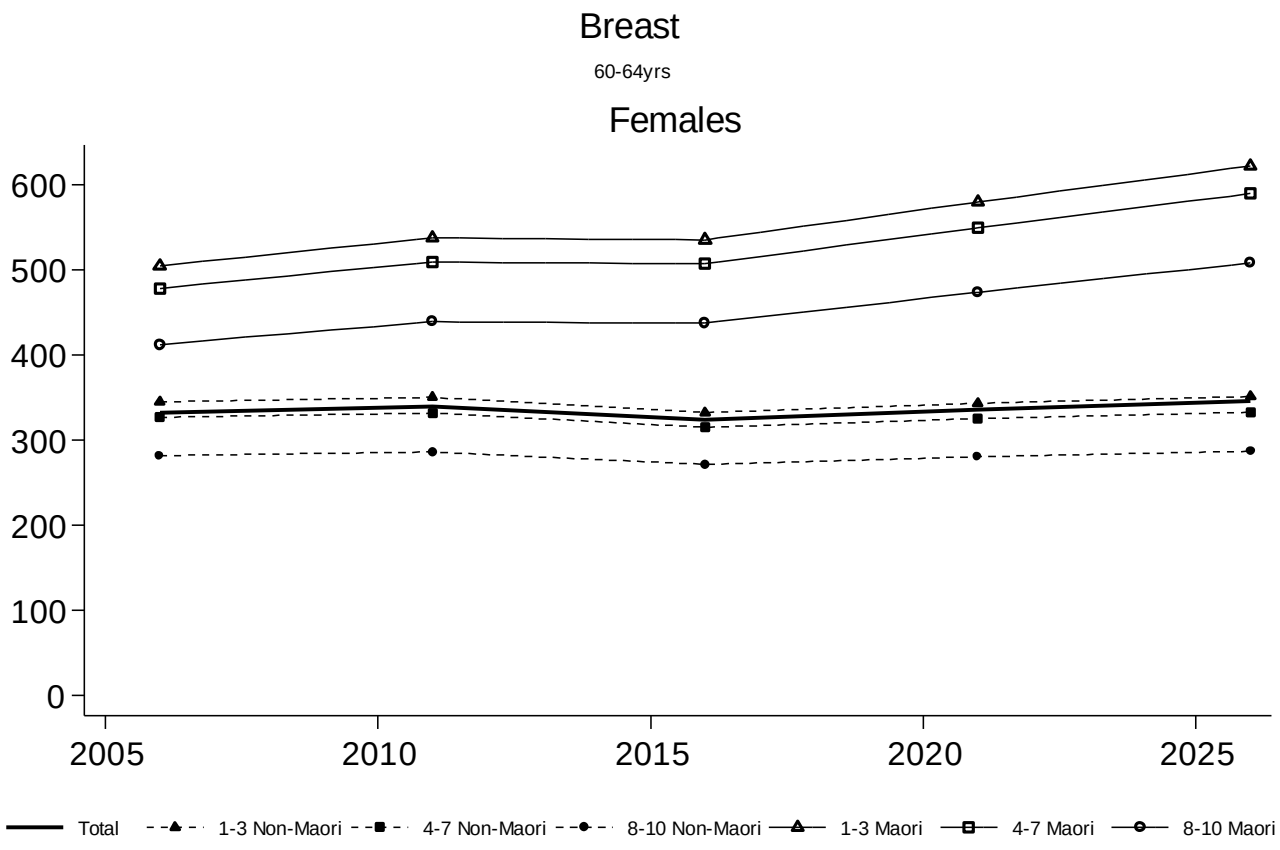

Bone and connective tissue
45-49yrs
Females
Males
0
1
2
3
4
5
6
7
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

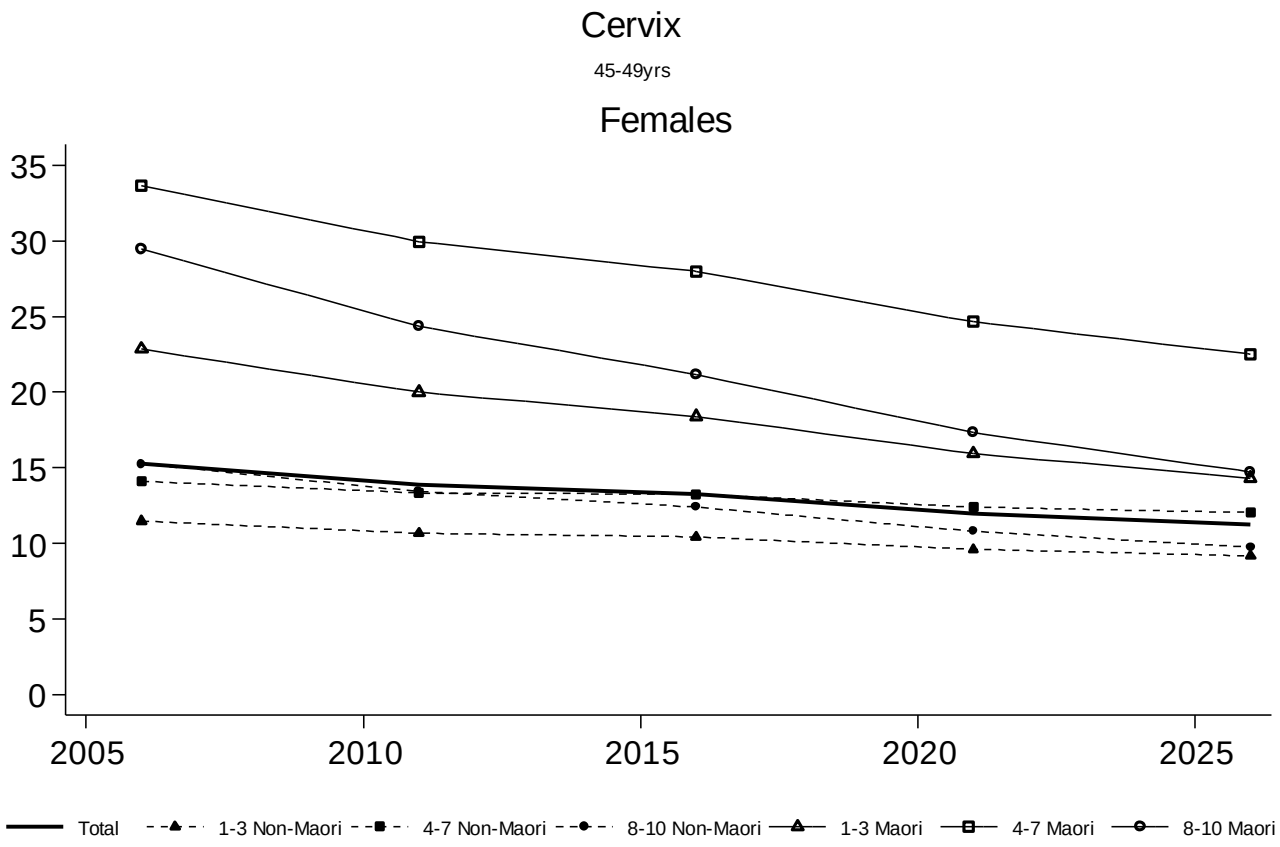

Bone and connective tissue
60-64yrs
Females
Males
0
2
4
6
8
10
12
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

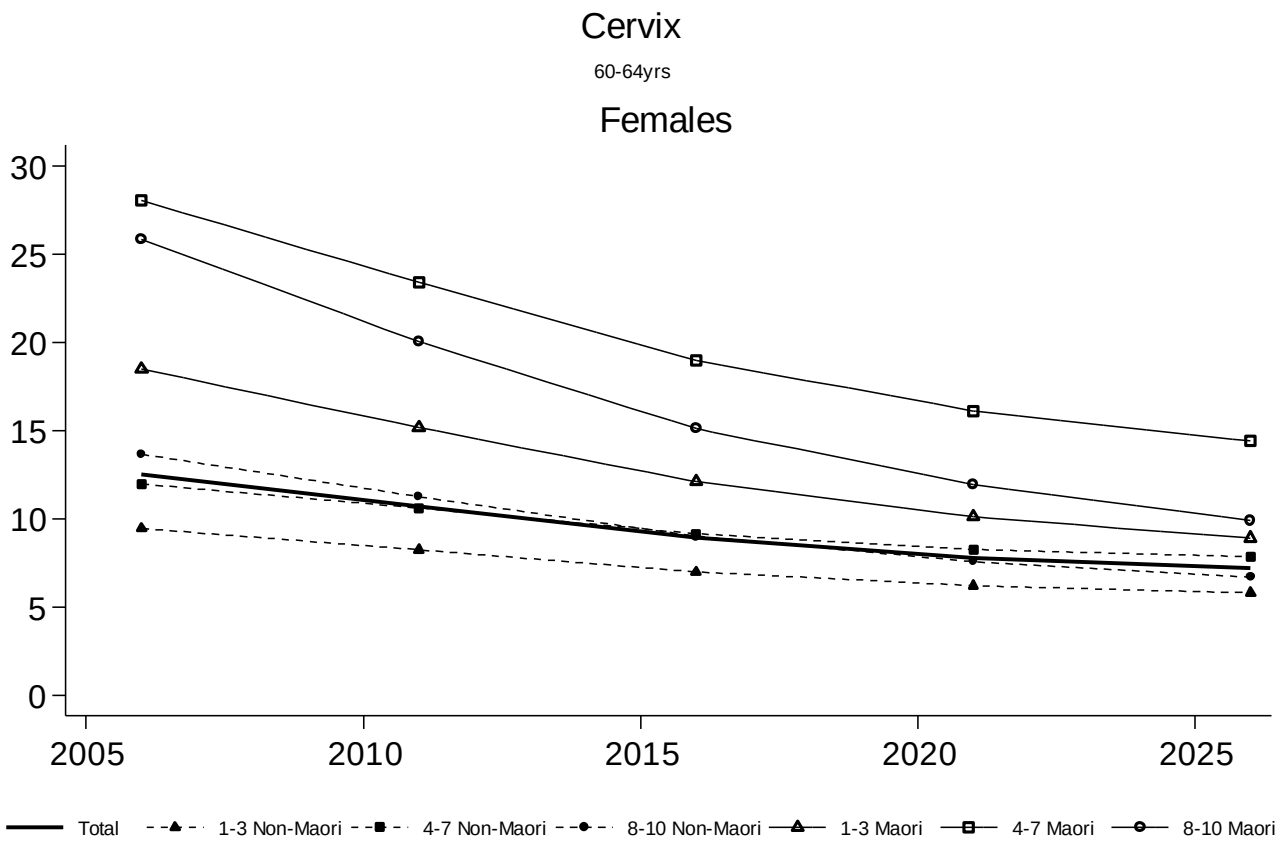

Brain
45-49yrs
Females
Males
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

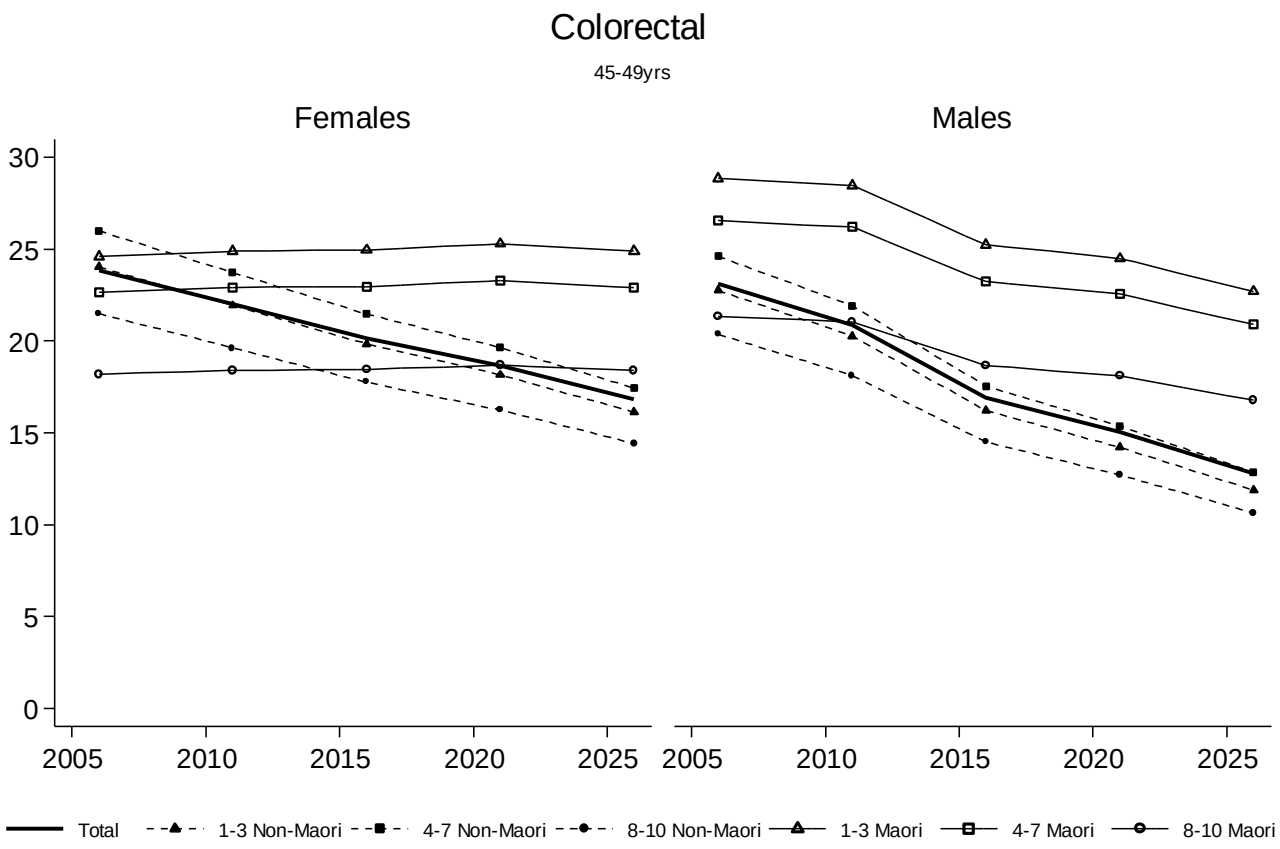

Brain
60-64yrs
Females
Males
70
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

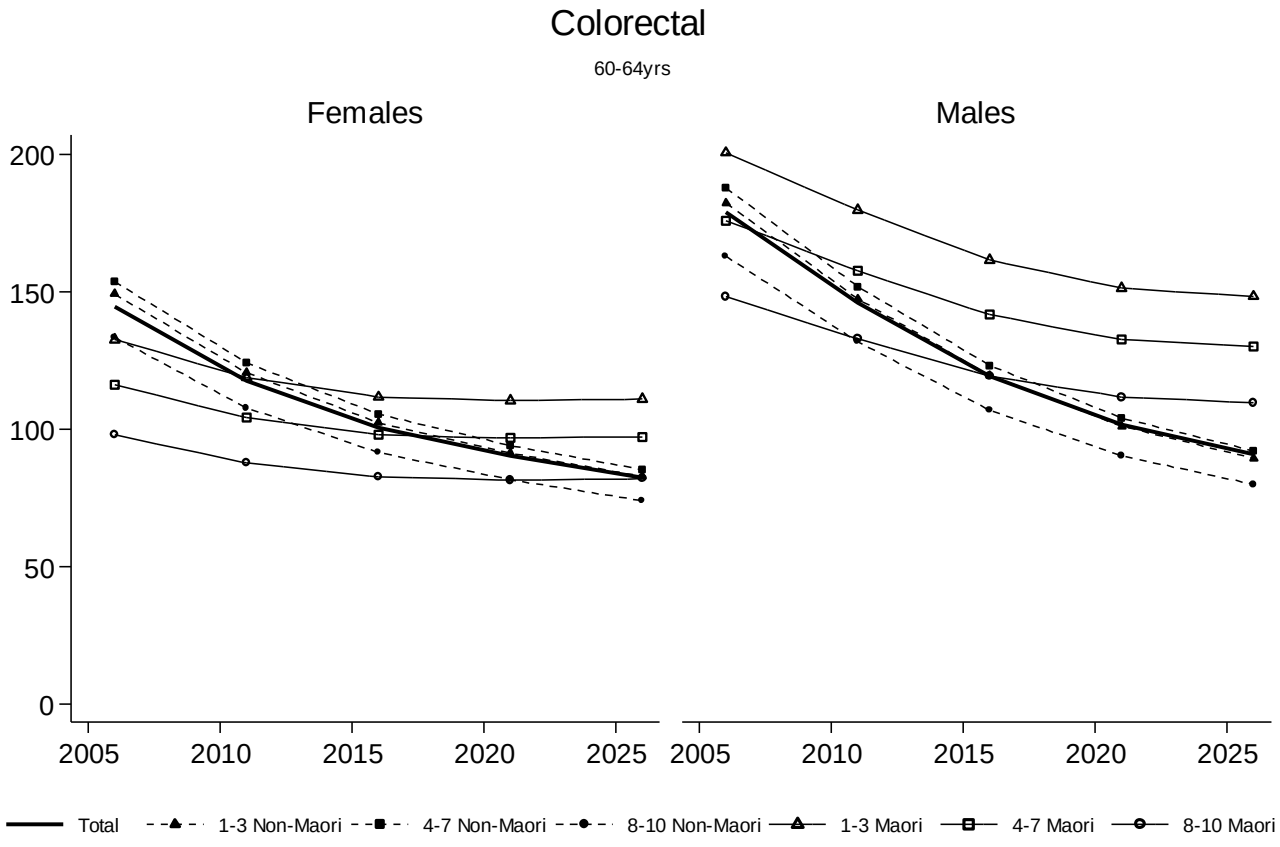

Breast
45-49yrs
Females
500
400
300
200
100
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

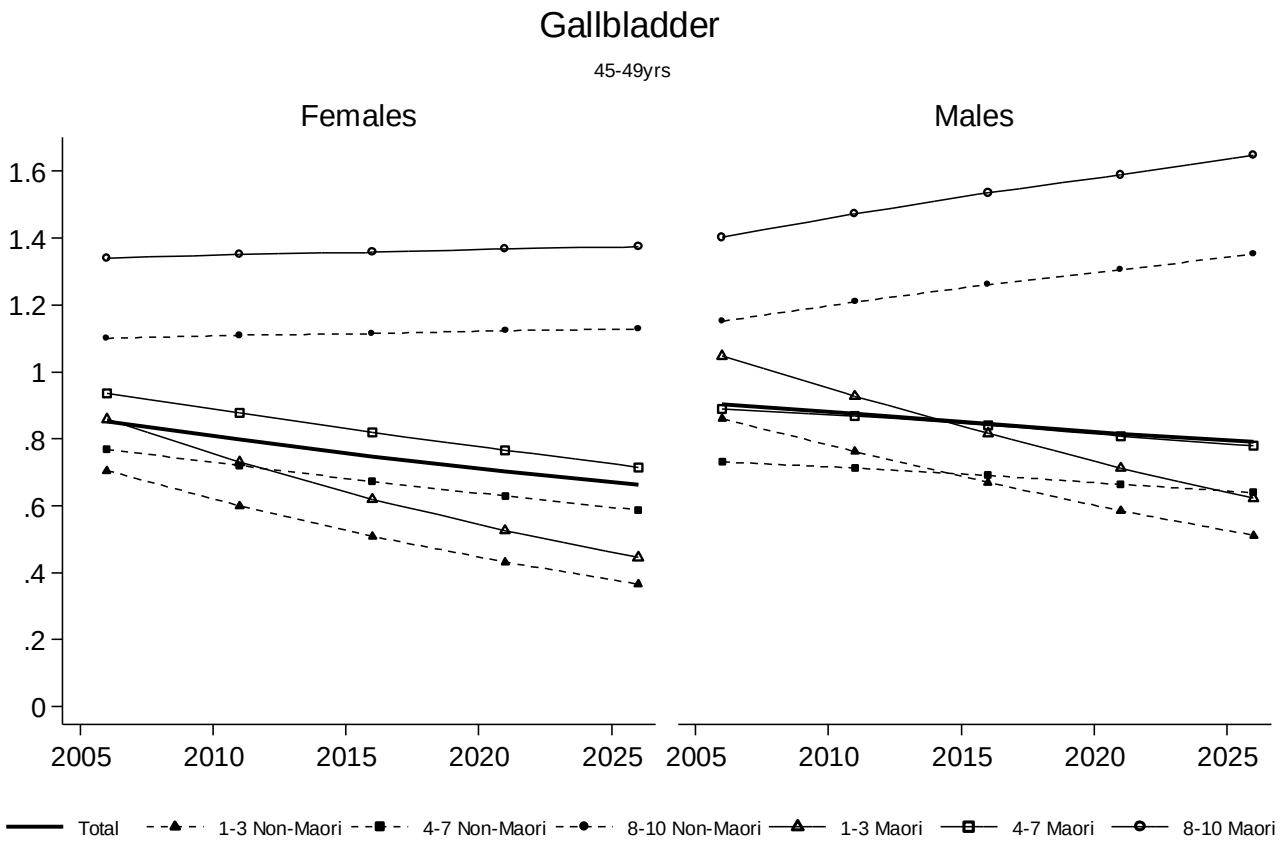

Breast
60-64yrs
Females
600
500
400
300
200
100
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

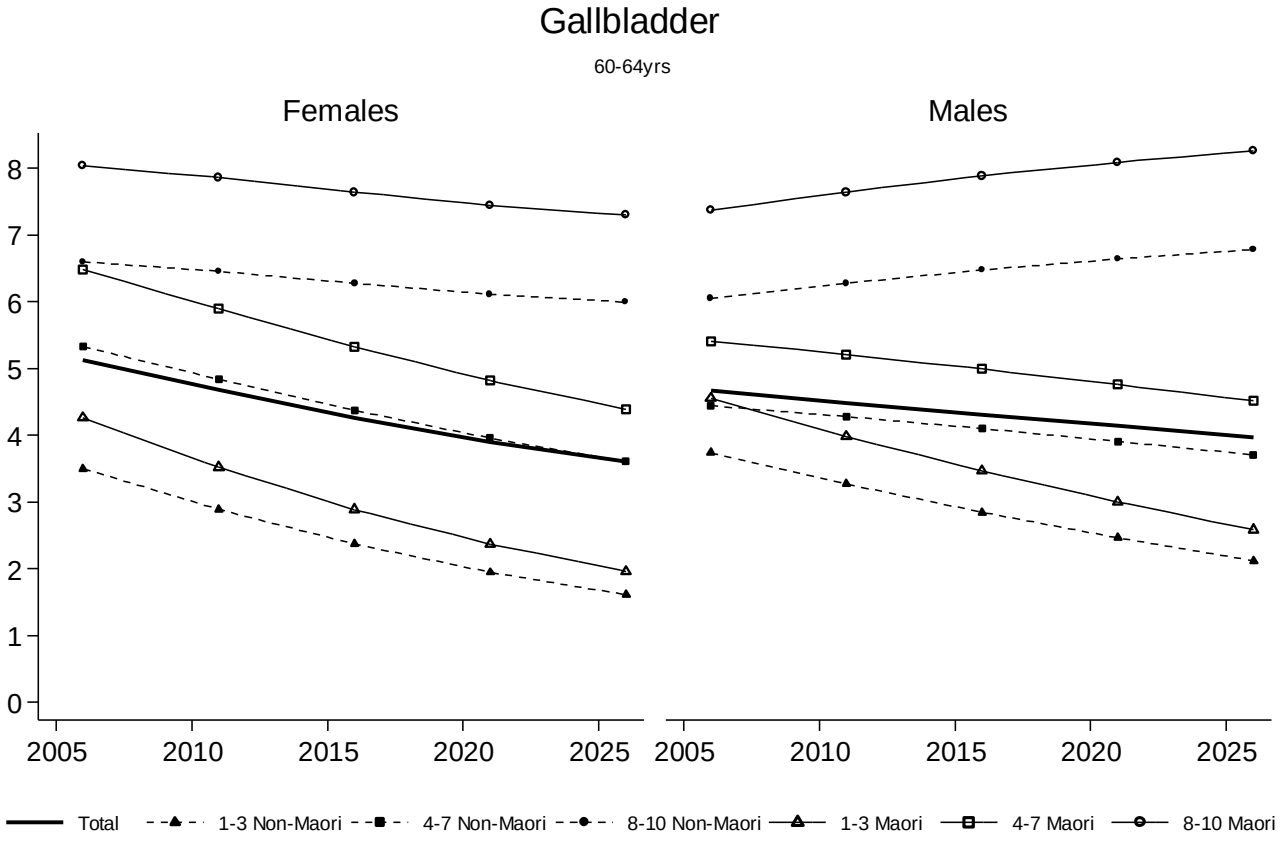

Cervix
45-49yrs
Females
35
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

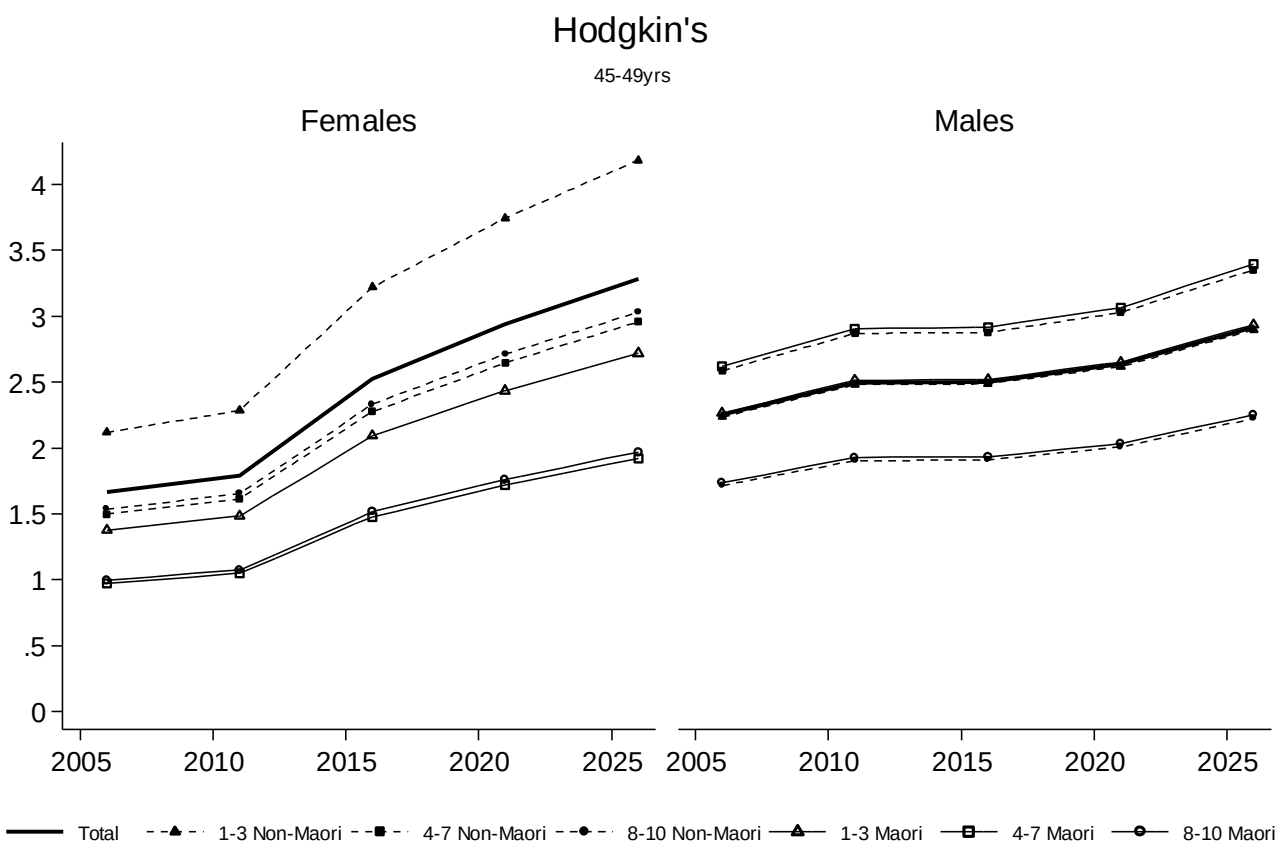

Cervix
60-64yrs
Females
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

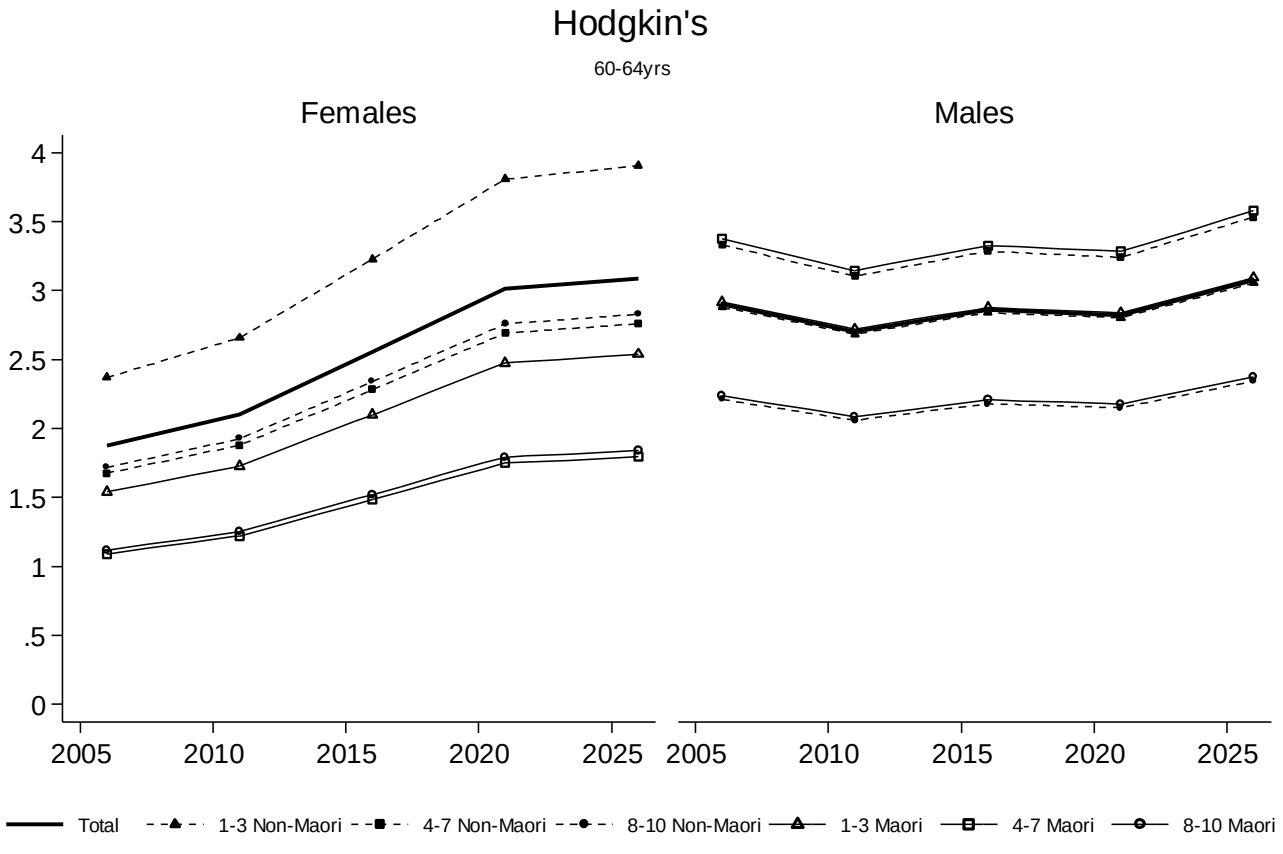

Colorectal
45-49yrs
Females
Males
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

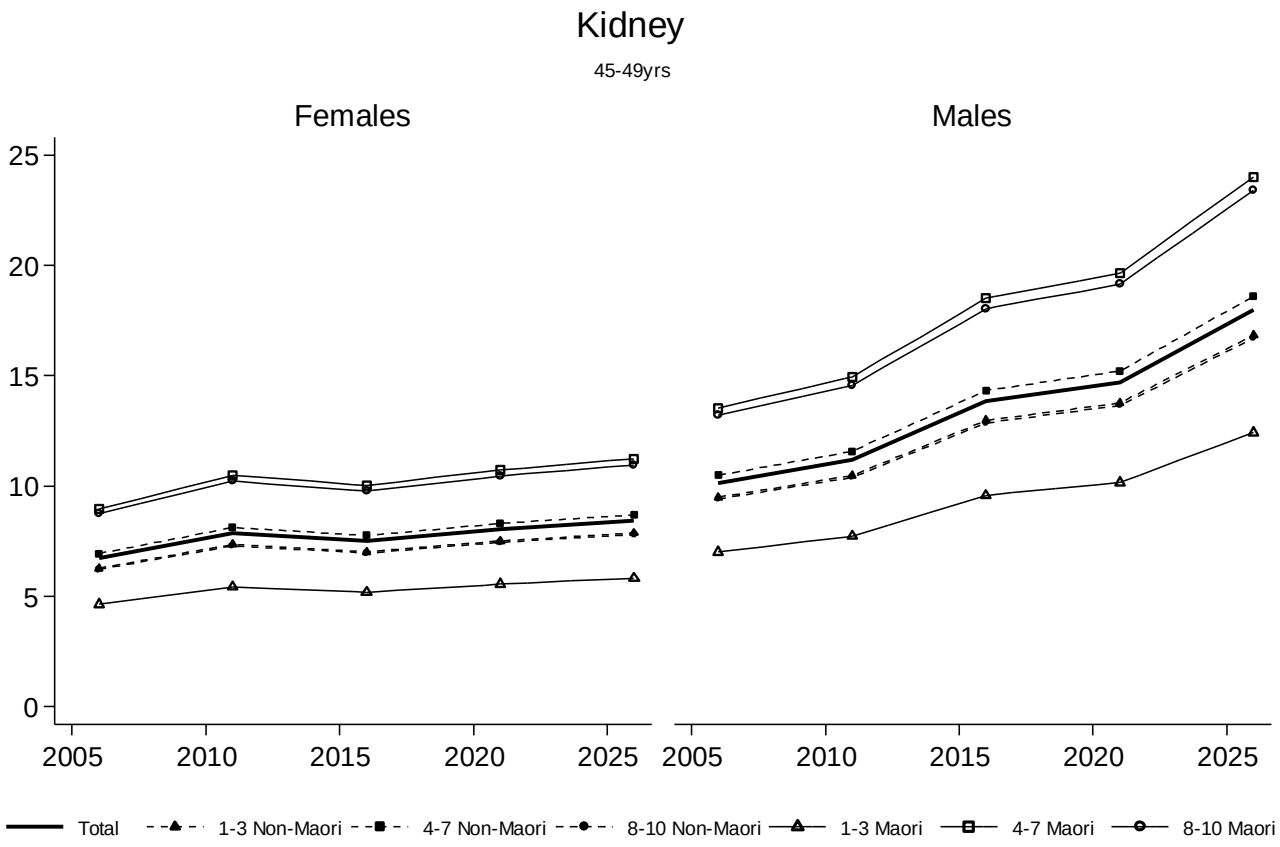

Colorectal
60-64yrs
Females
Males
200
150
100
50
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

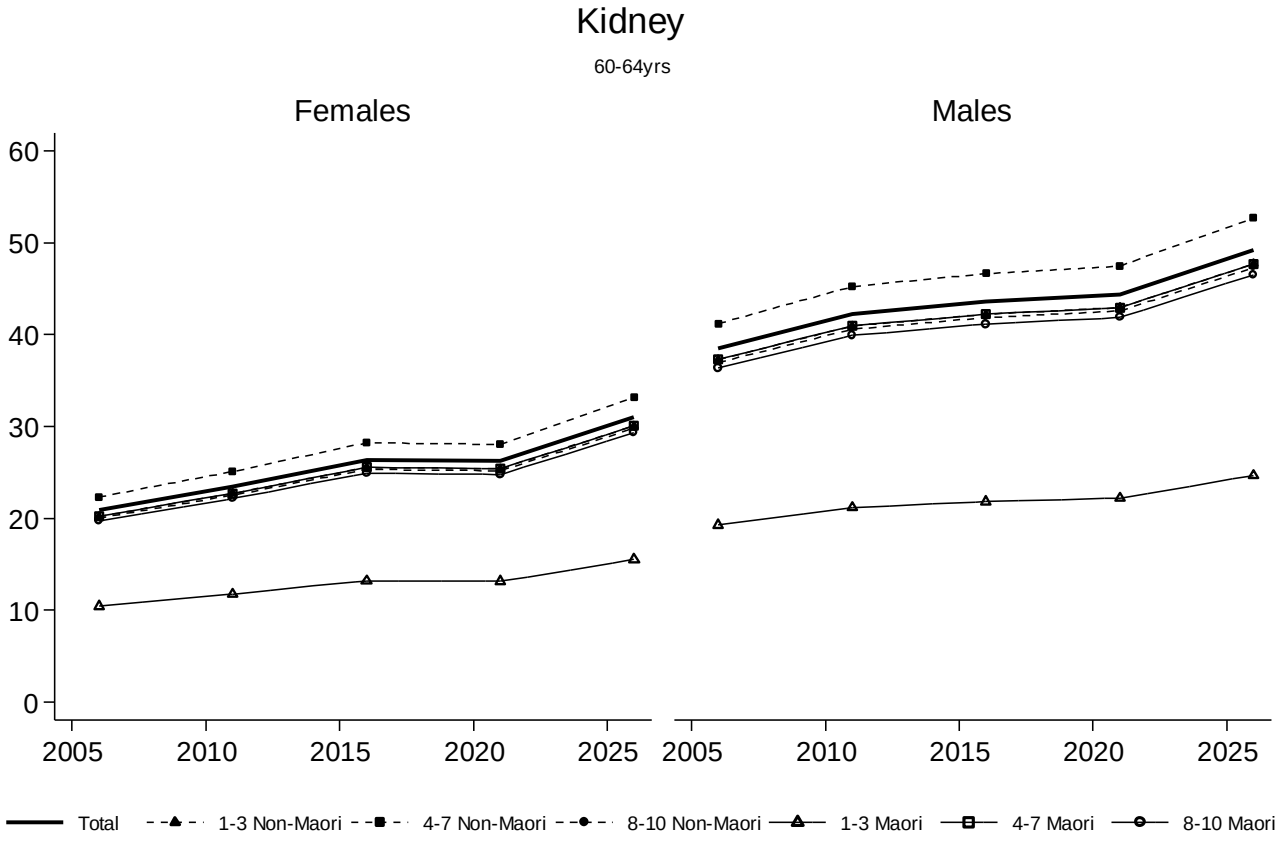

Gallbladder
45-49yrs
Females
Males
1.6
1.4
1.2
1
.8
.6
.4
.2
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

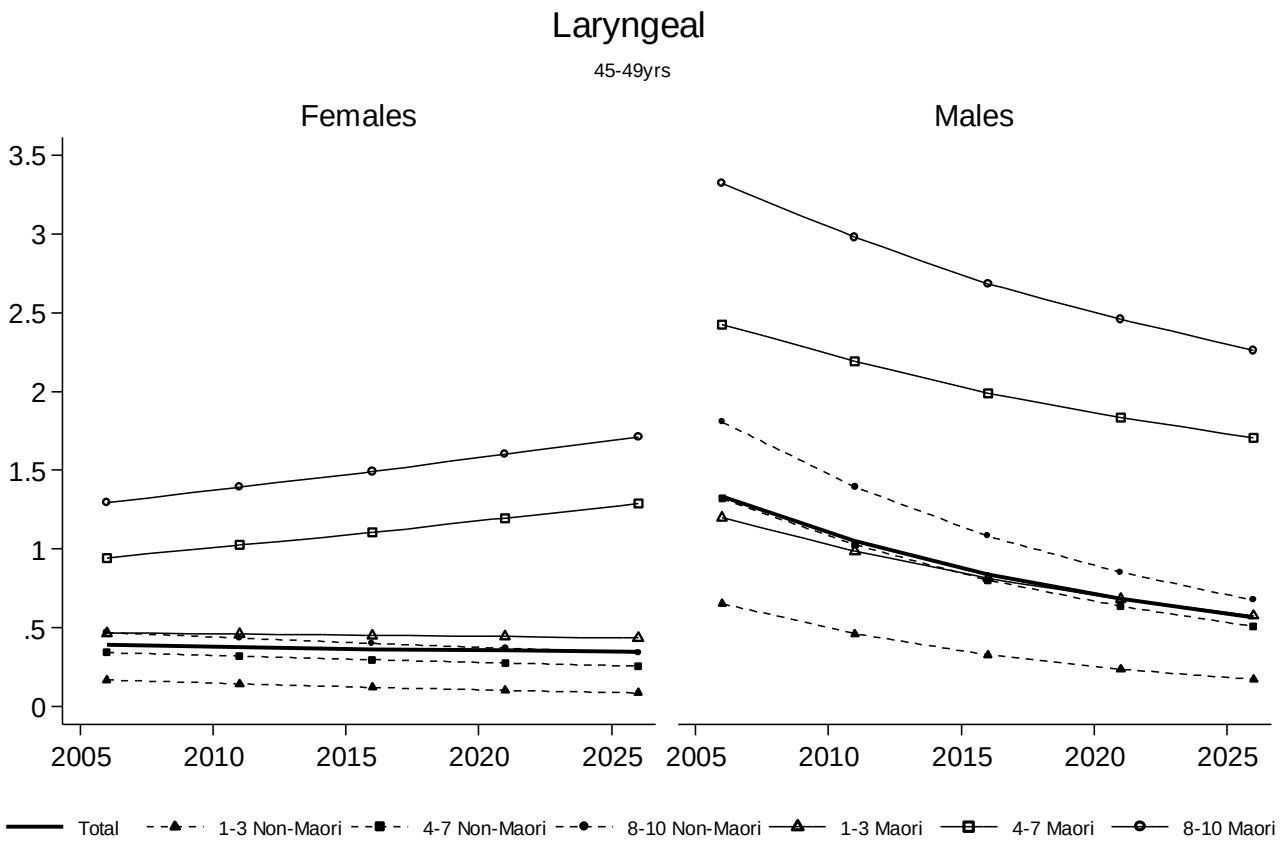

Gallbladder
60-64yrs
Females
Males
8
7
6
5
4
3
2
1
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

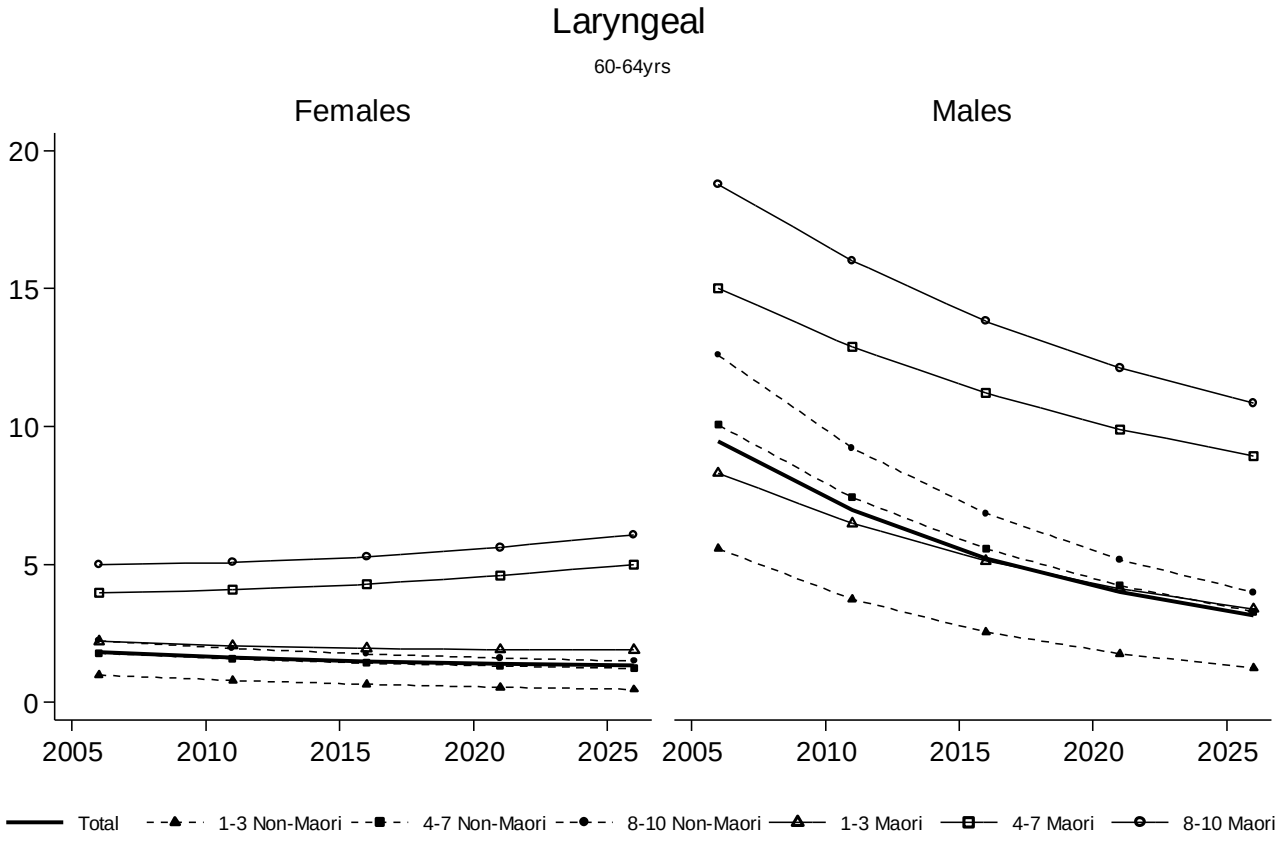

Hodgkin's
45-49yrs
Females
Males
0
.5
1
1.5
2
2.5
3
3.5
4
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

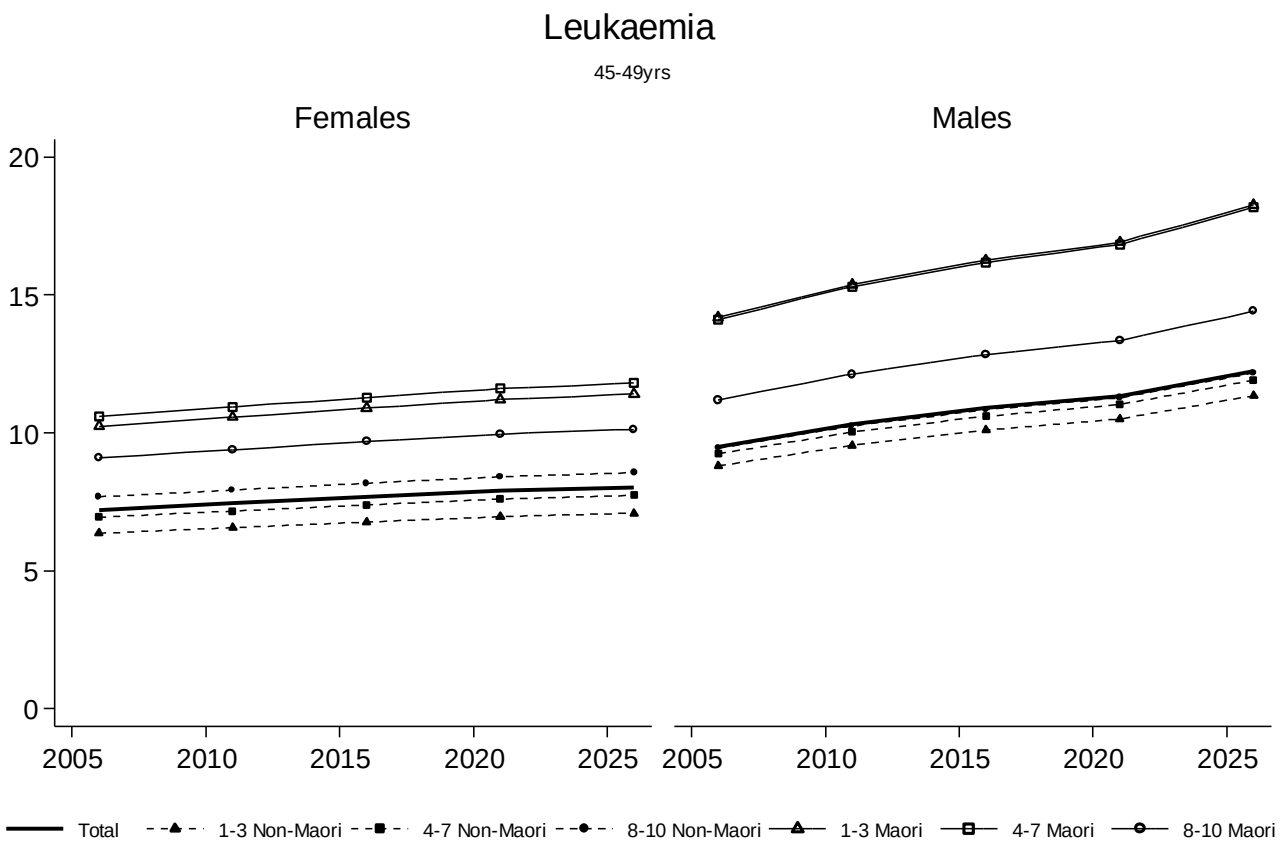

Hodgkin's
60-64yrs
Females
Males
0
.5
1
1.5
2
2.5
3
3.5
4
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

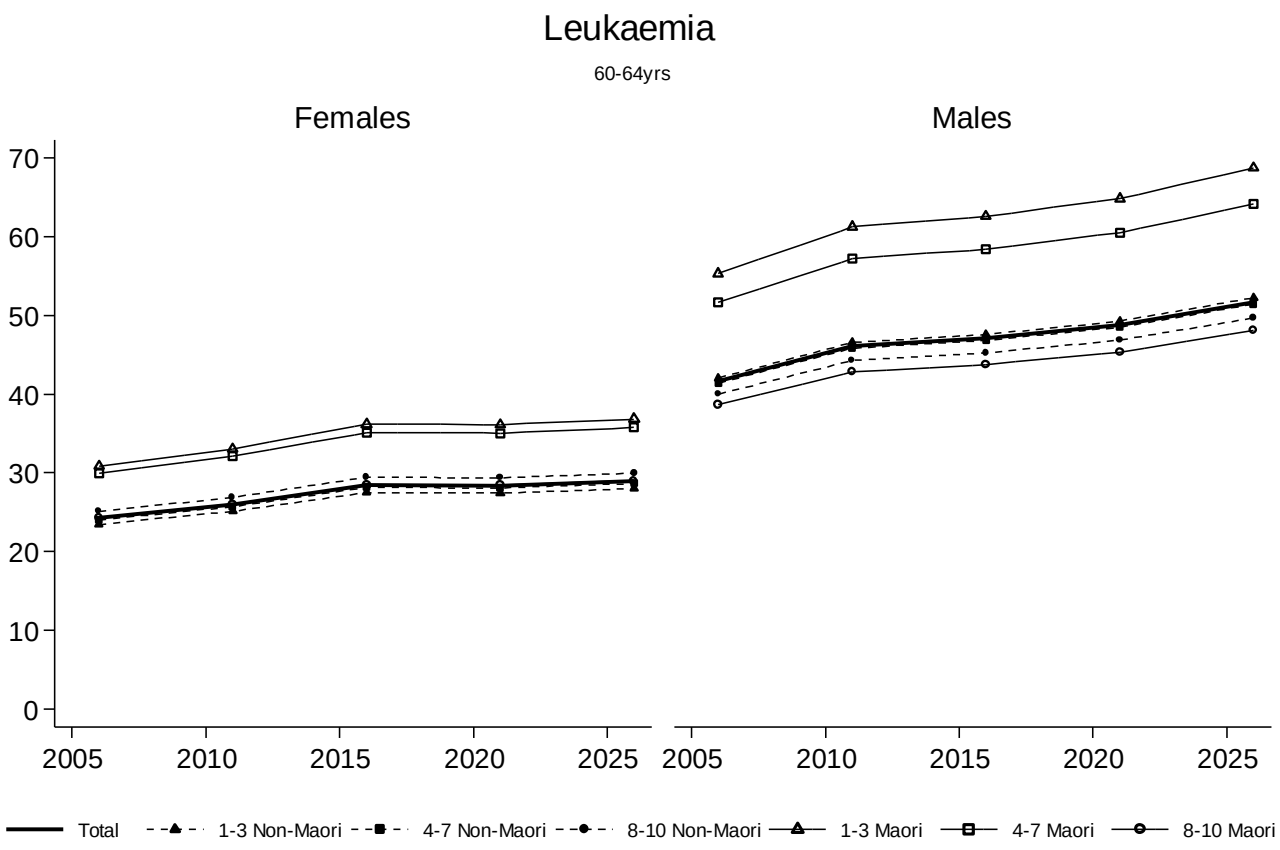

Kidney
45-49yrs
Females
Males
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

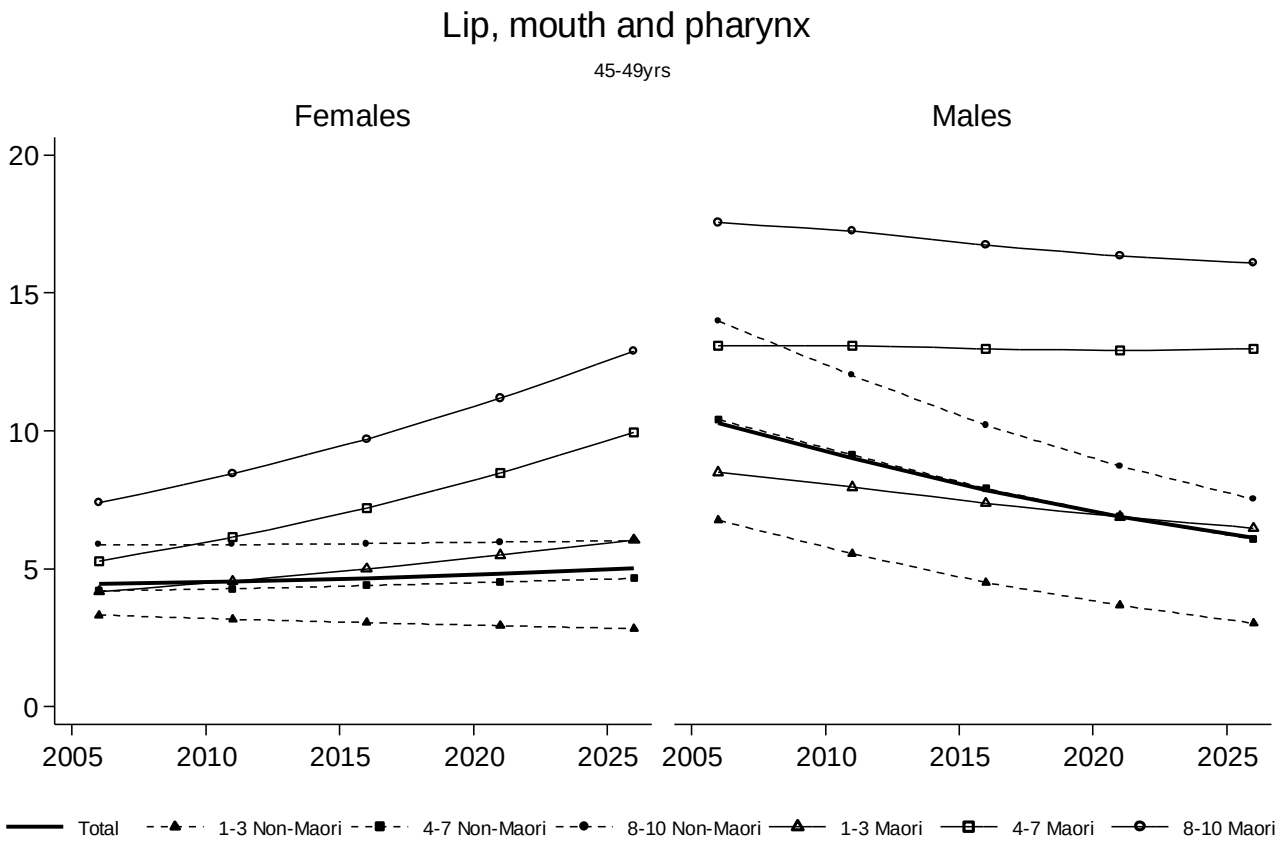

Kidney
60-64yrs
Females
Males
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

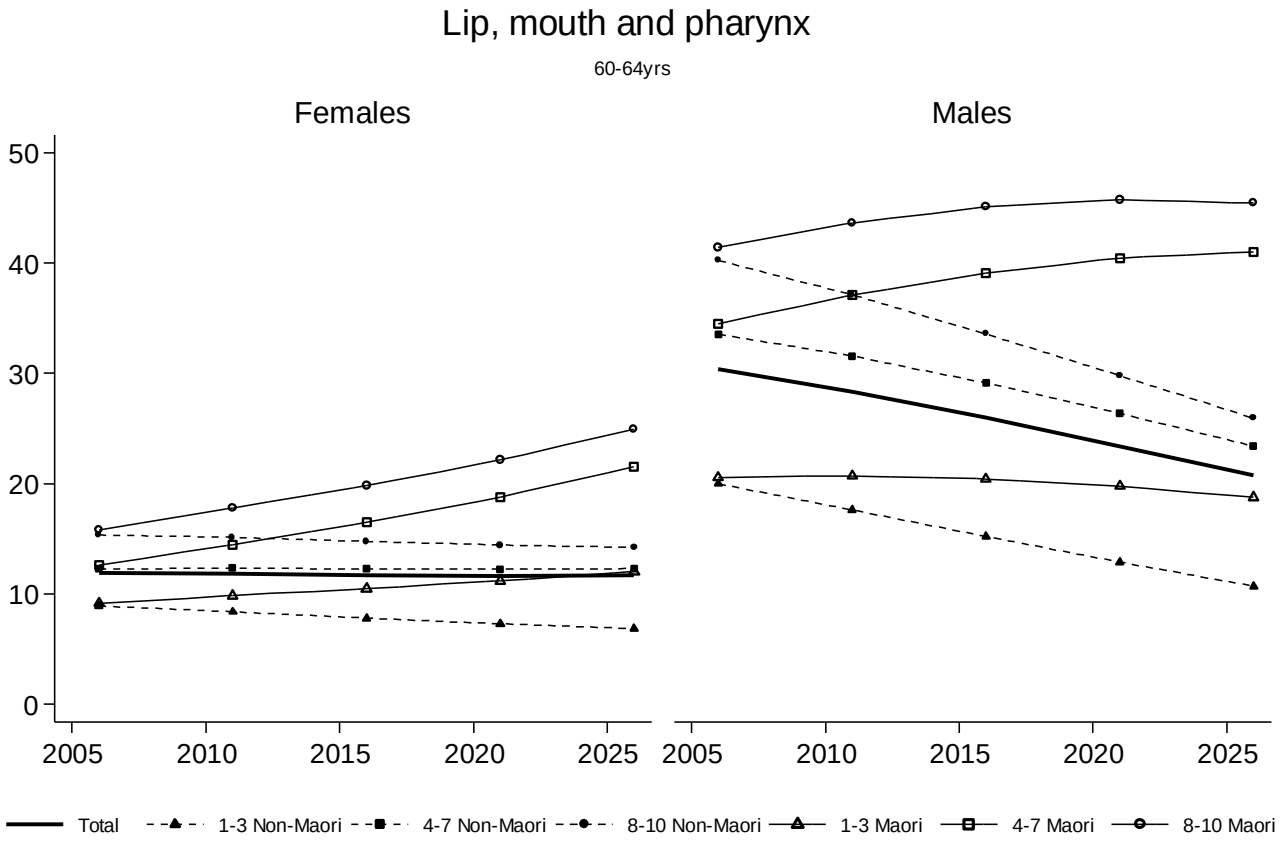

Laryngeal
45-49yrs
Females
Males
3.5
3
2.5
2
1.5
1
.5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

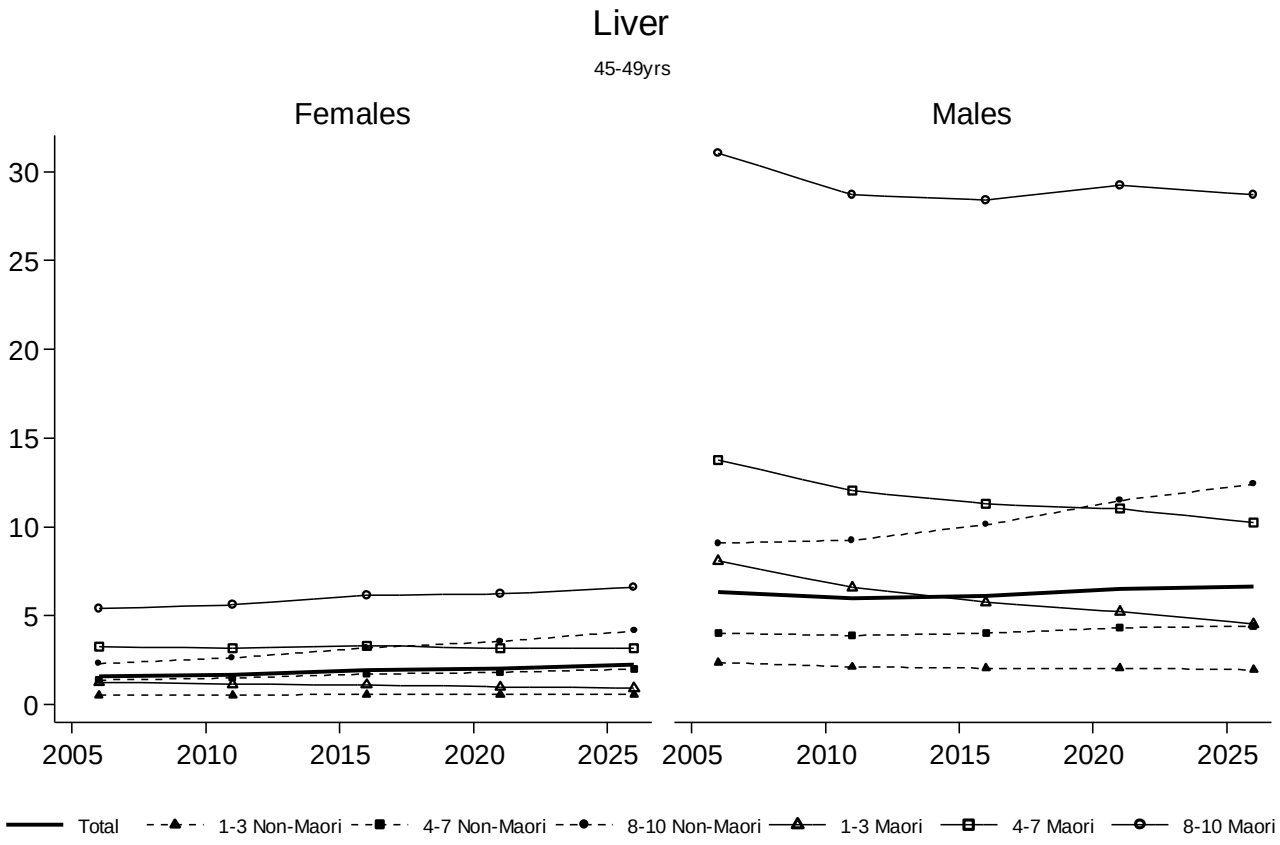

Laryngeal
60-64yrs
Females
Males
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

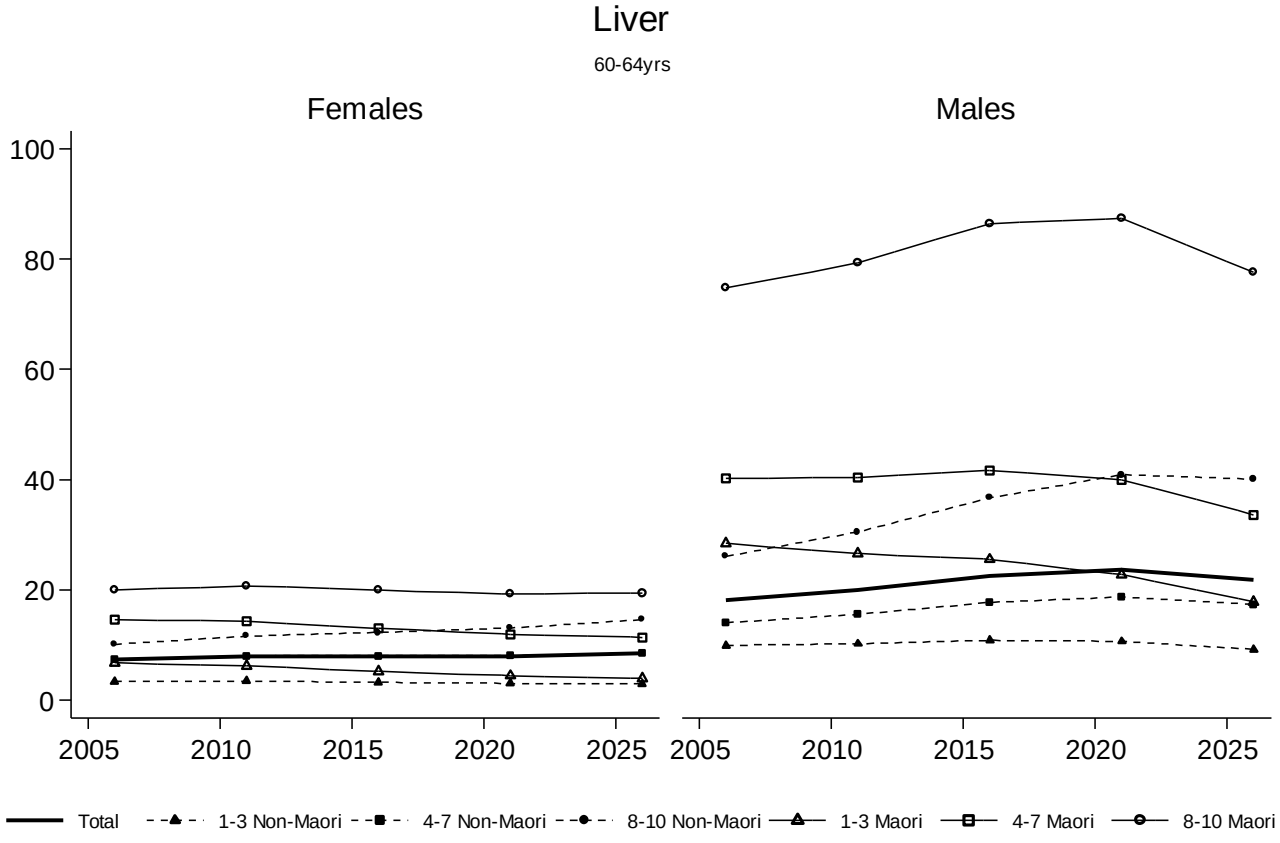

Leukaemia
45-49yrs
Females
Males
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

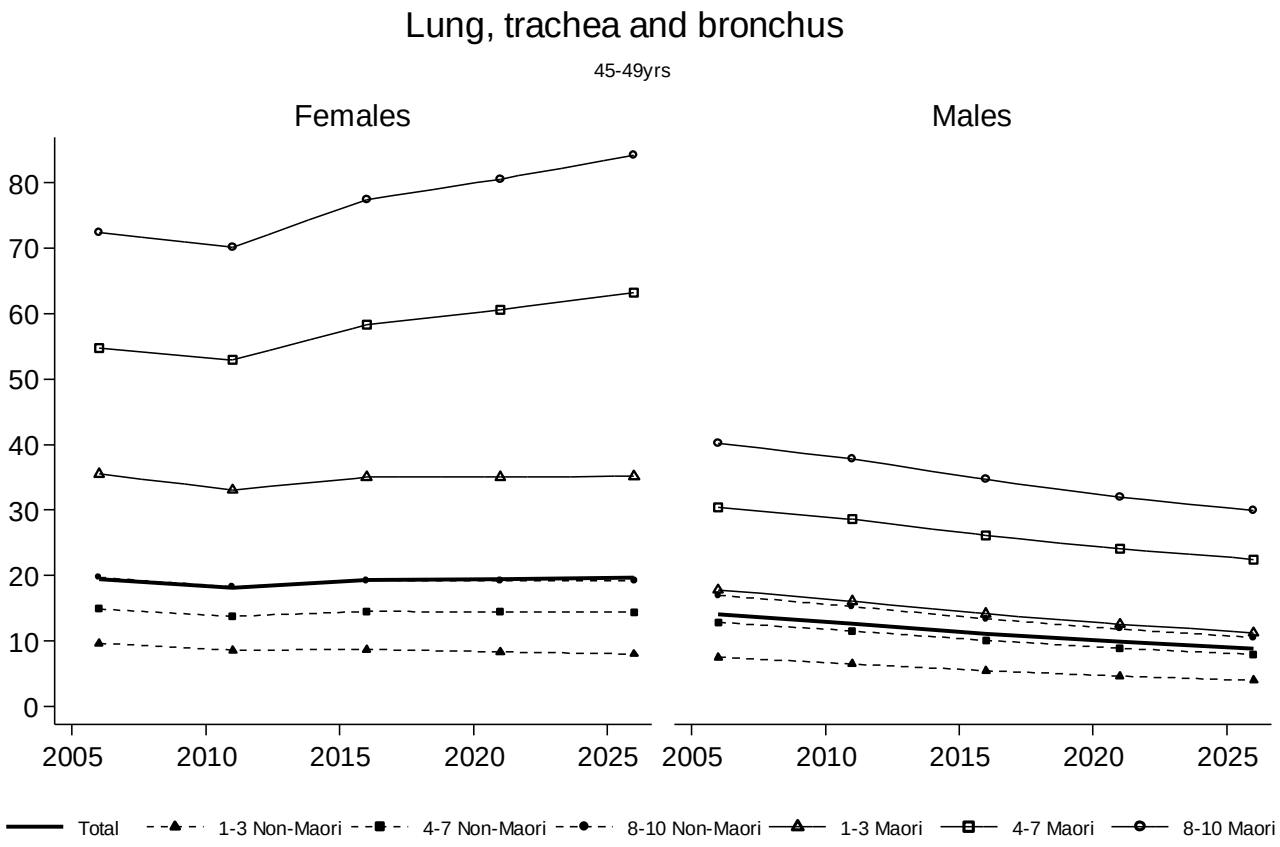

Leukaemia
60-64yrs
Females
Males
70
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

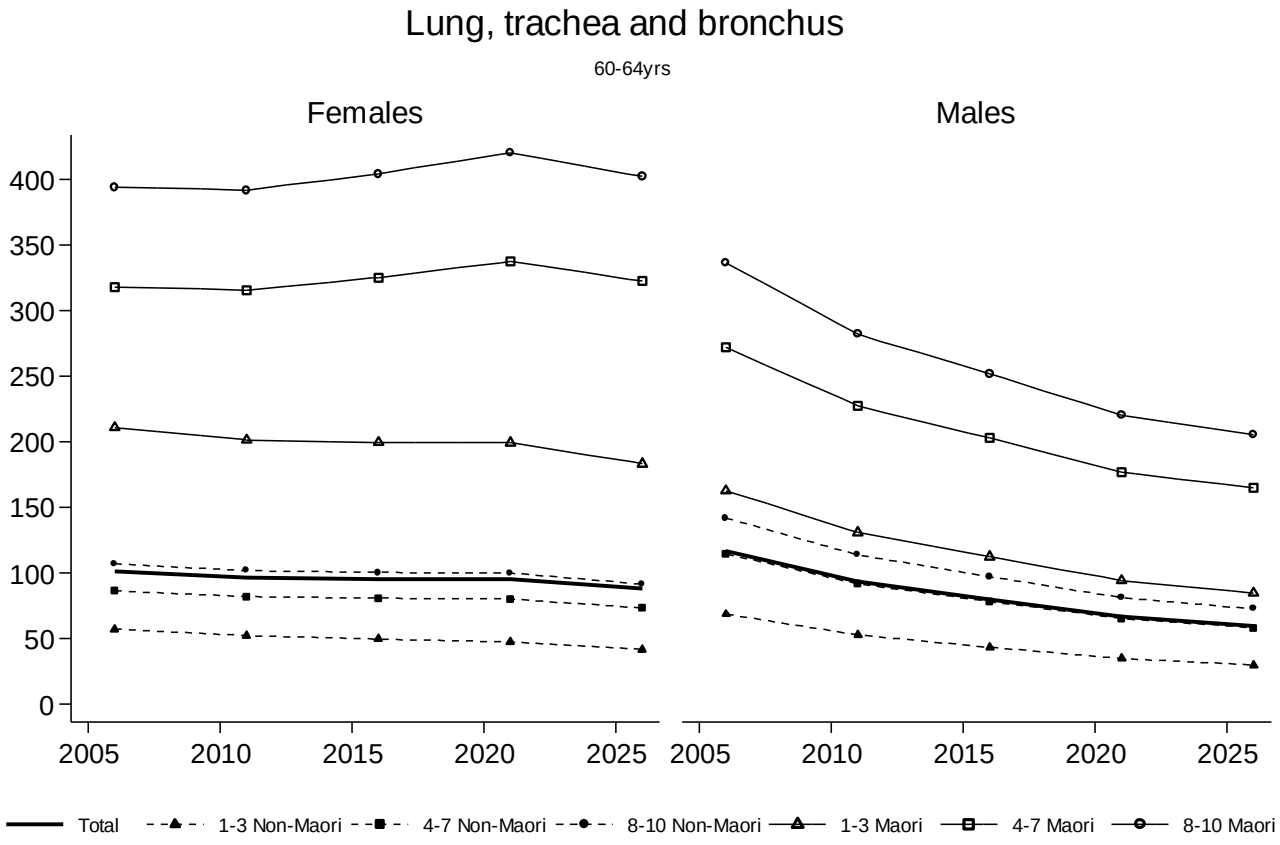

Lip, mouth and pharynx
45-49yrs
Females
Males
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

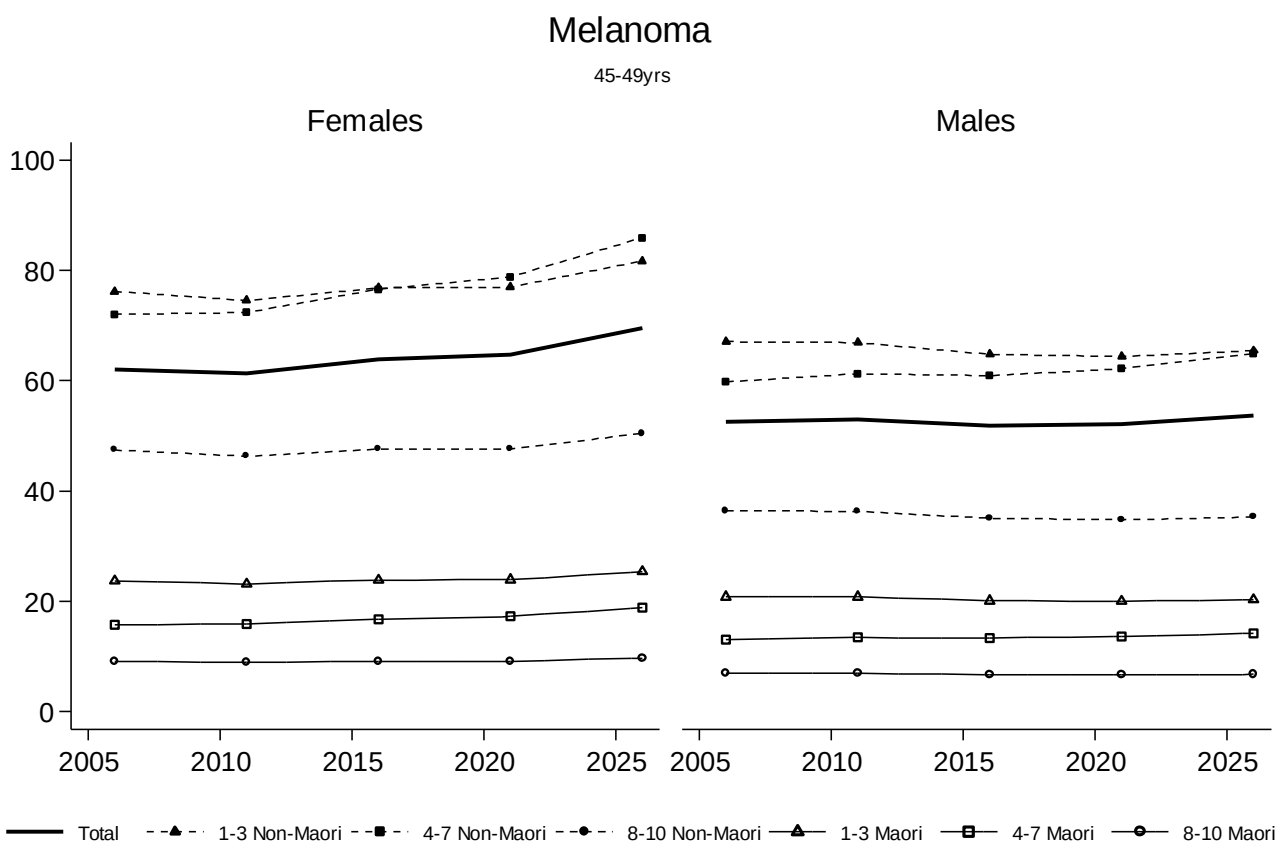

Lip, mouth and pharynx
60-64yrs
Females
Males
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

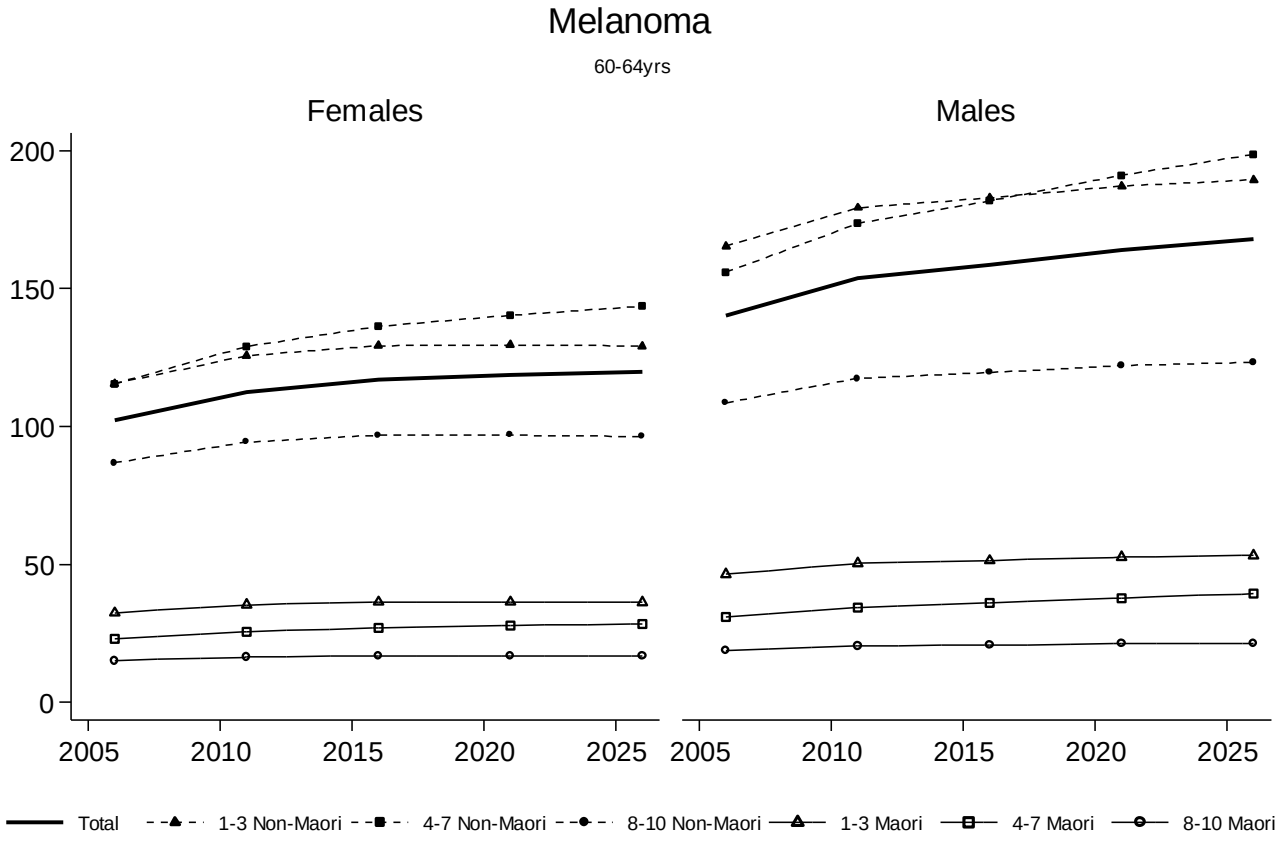

Liver
45-49yrs
Females
Males
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

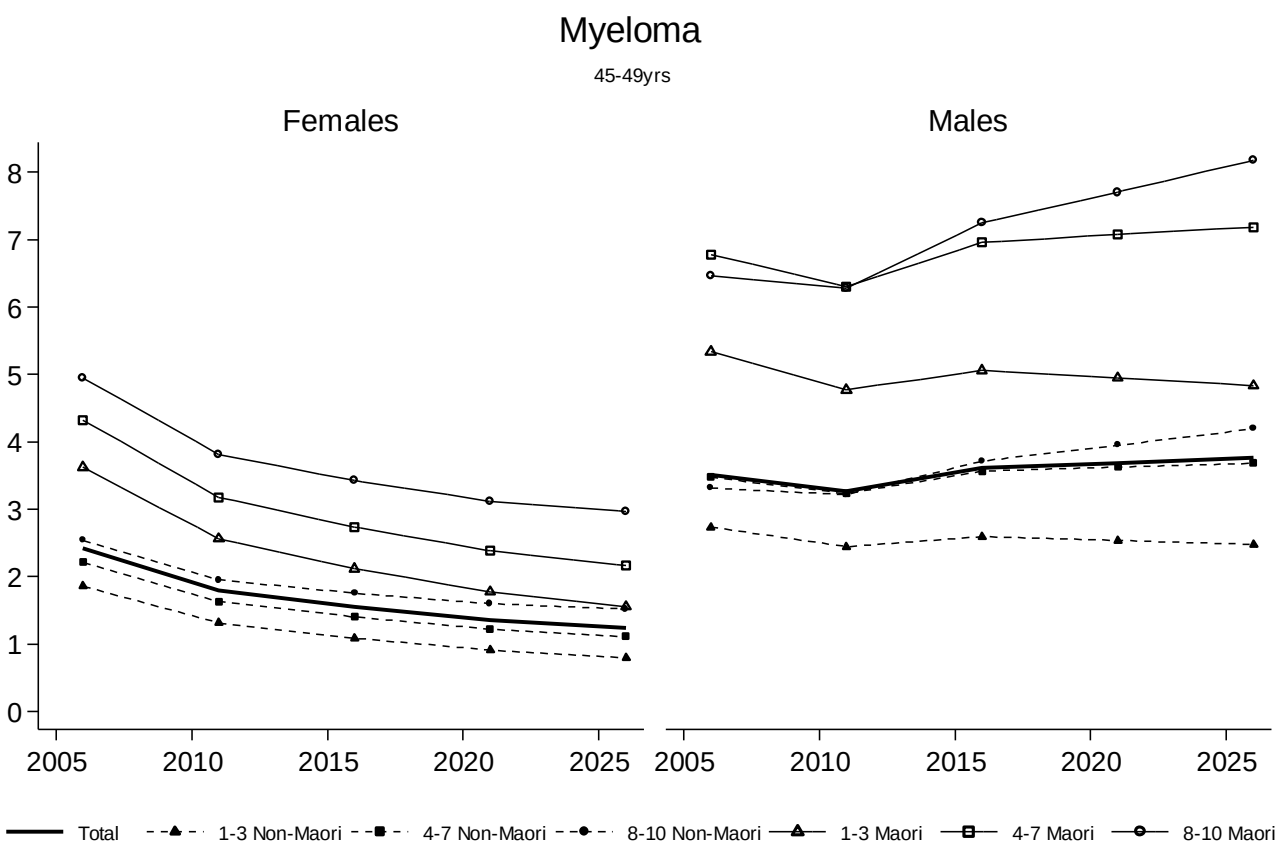

Liver
60-64yrs
Females
Males
100
80
60
40
20
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

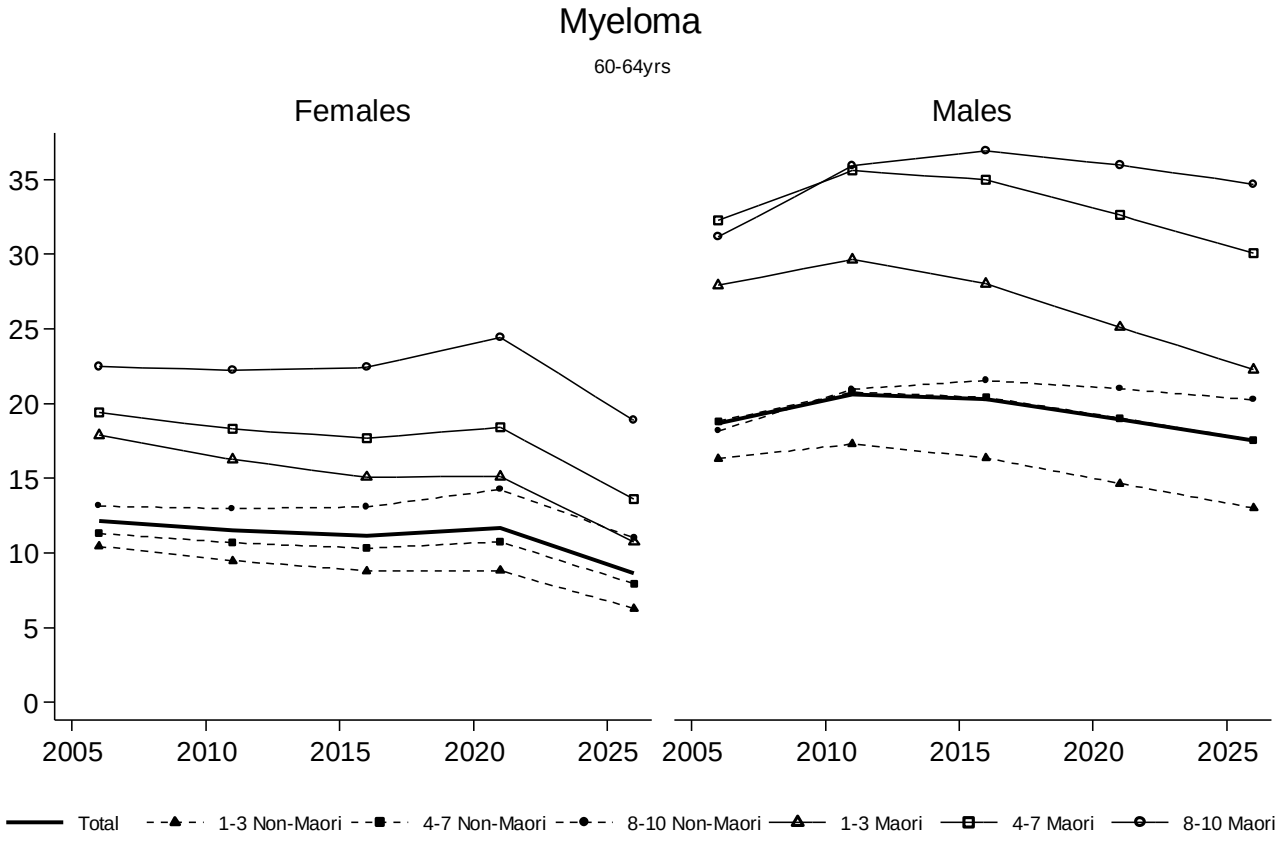

Lung, trachea and bronchus
45-49yrs
Females
Males
0
10
20
30
40
50
60
70
80
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

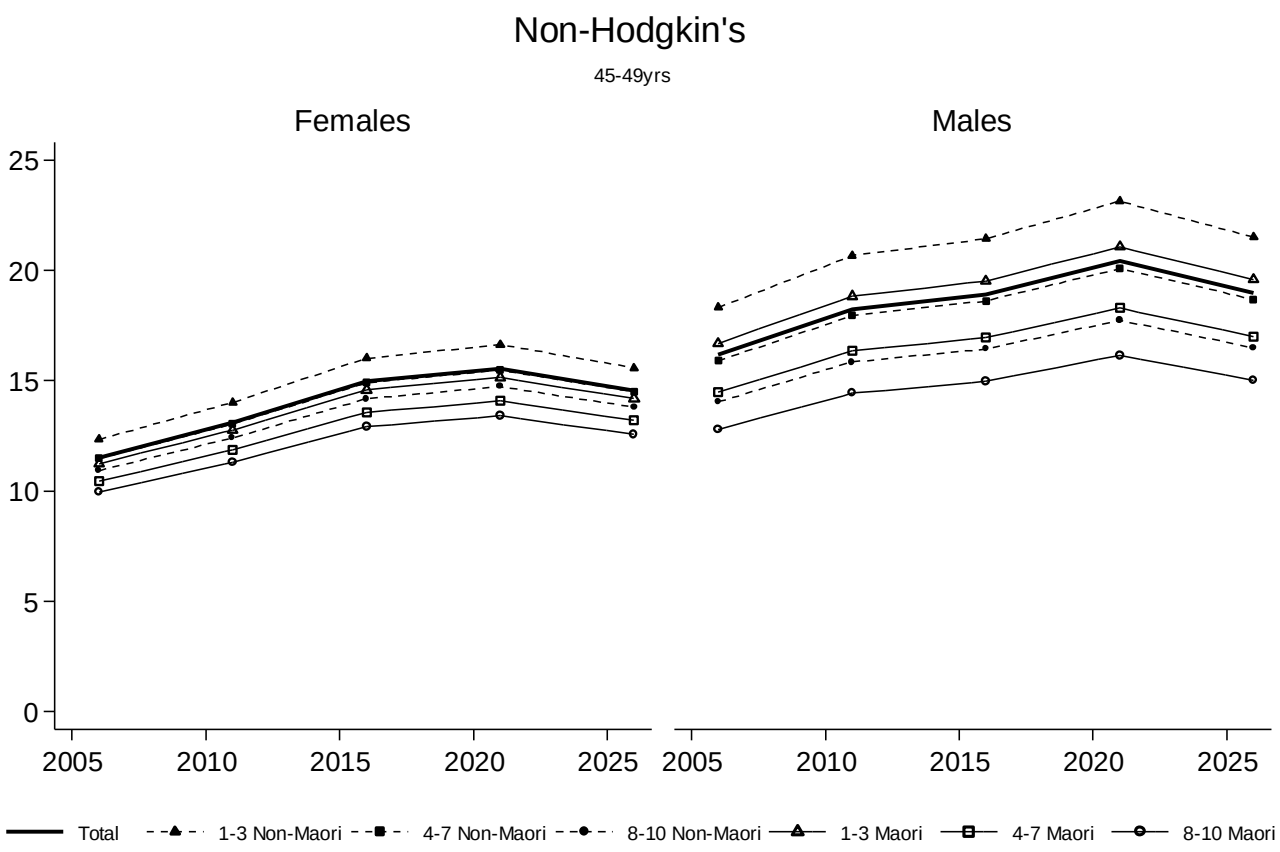

Lung, trachea and bronchus
60-64yrs
Females
Males
0
50
100
150
200
250
300
350
400
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

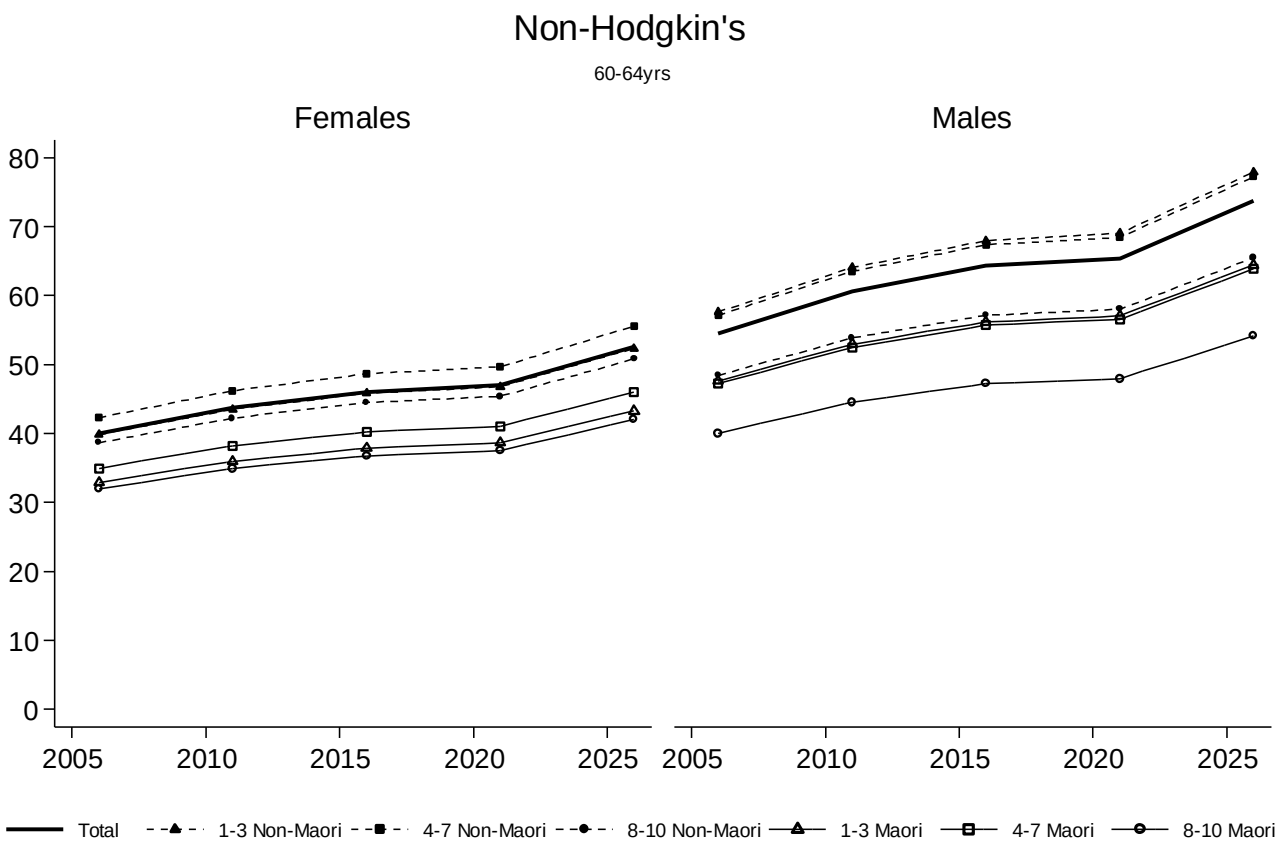

Melanoma
45-49yrs
Females
Males
100
80
60
40
20
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

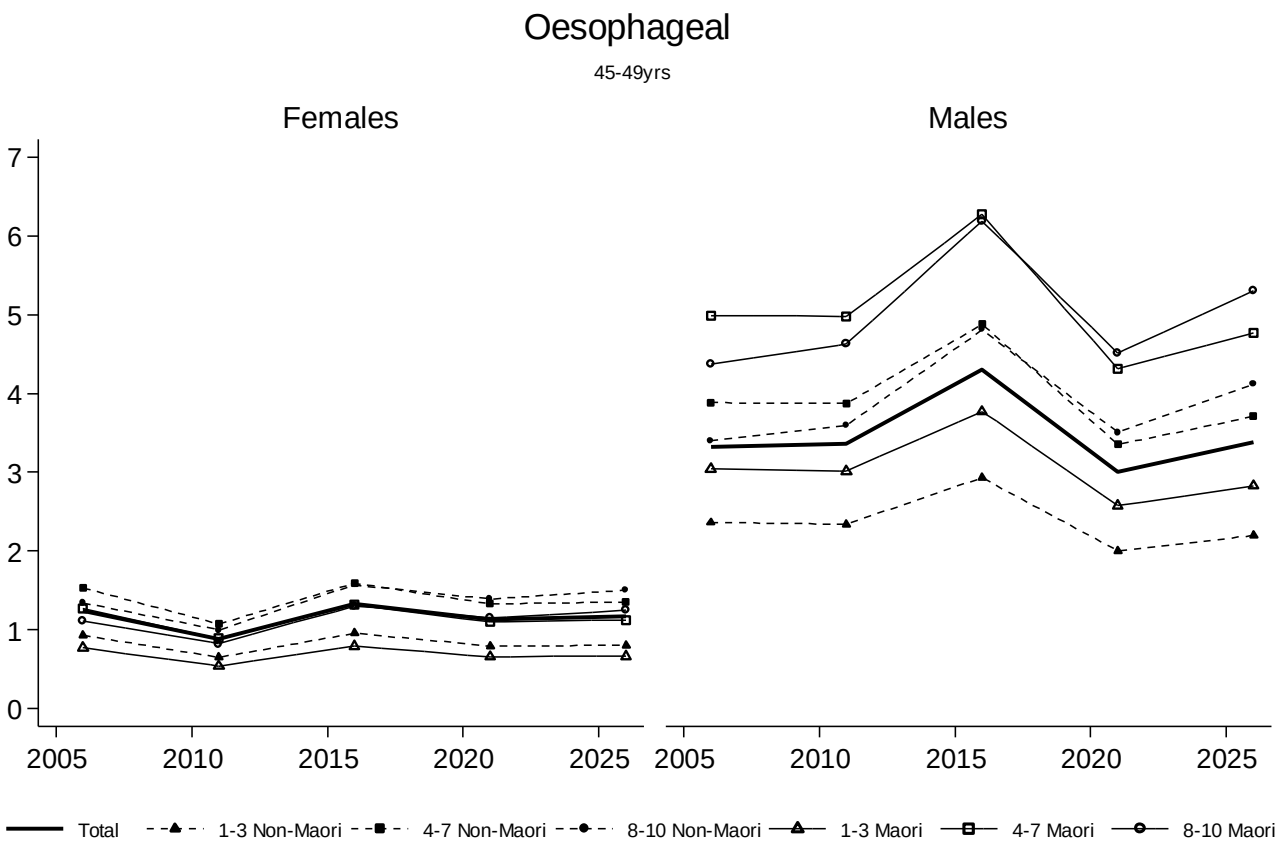

Melanoma
60-64yrs
Females
Males
200
150
100
50
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

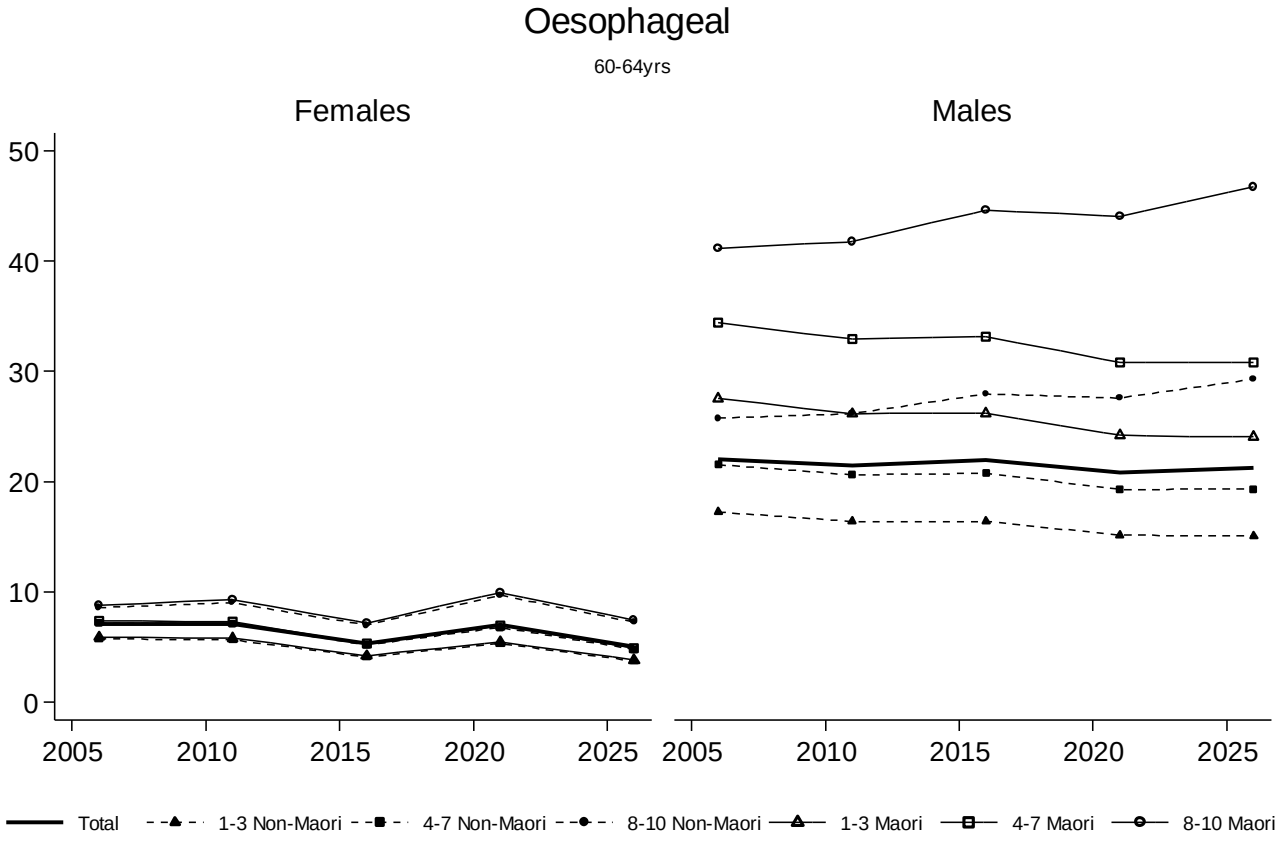

Myeloma
45-49yrs
Females
Males
0
1
2
3
4
5
6
7
8
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

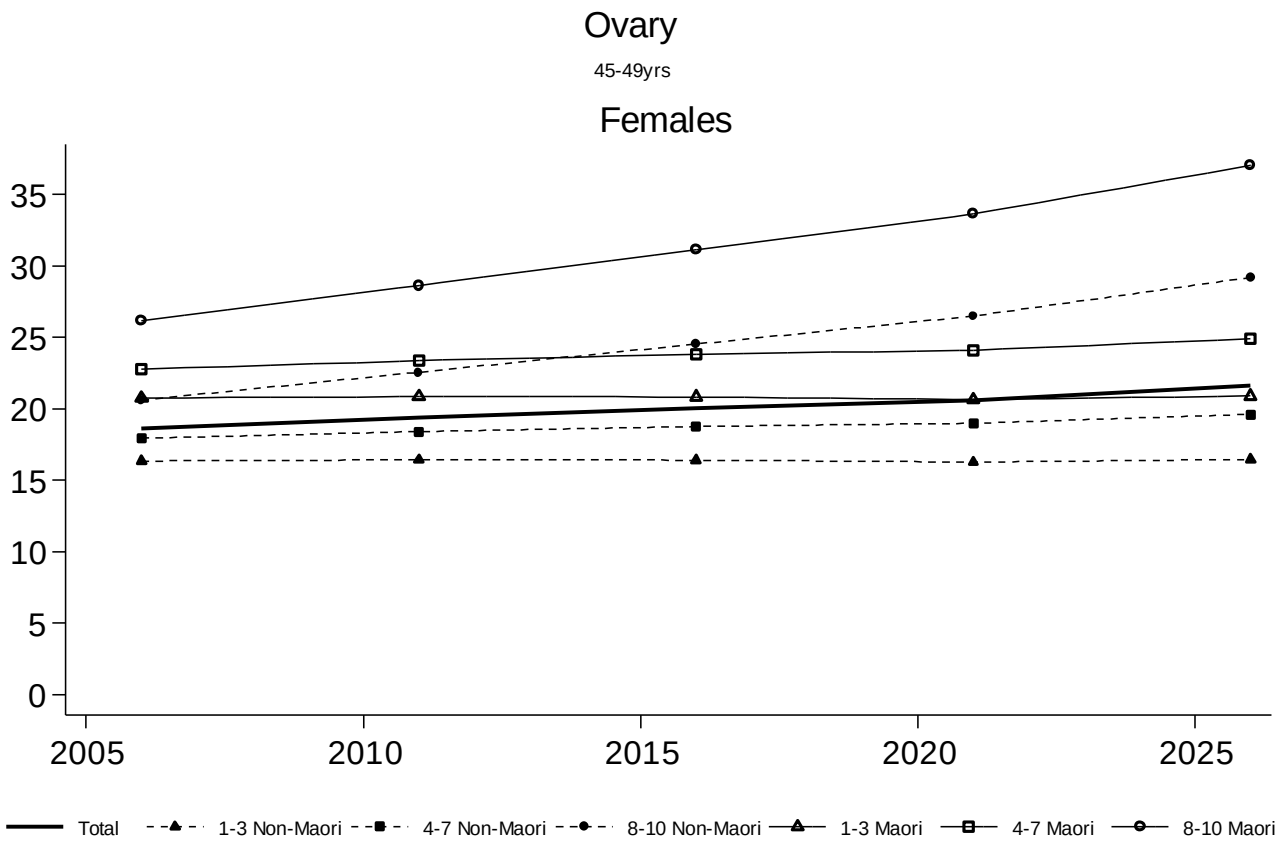

Myeloma
60-64yrs
Females
Males
0
5
10
15
20
25
30
35
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

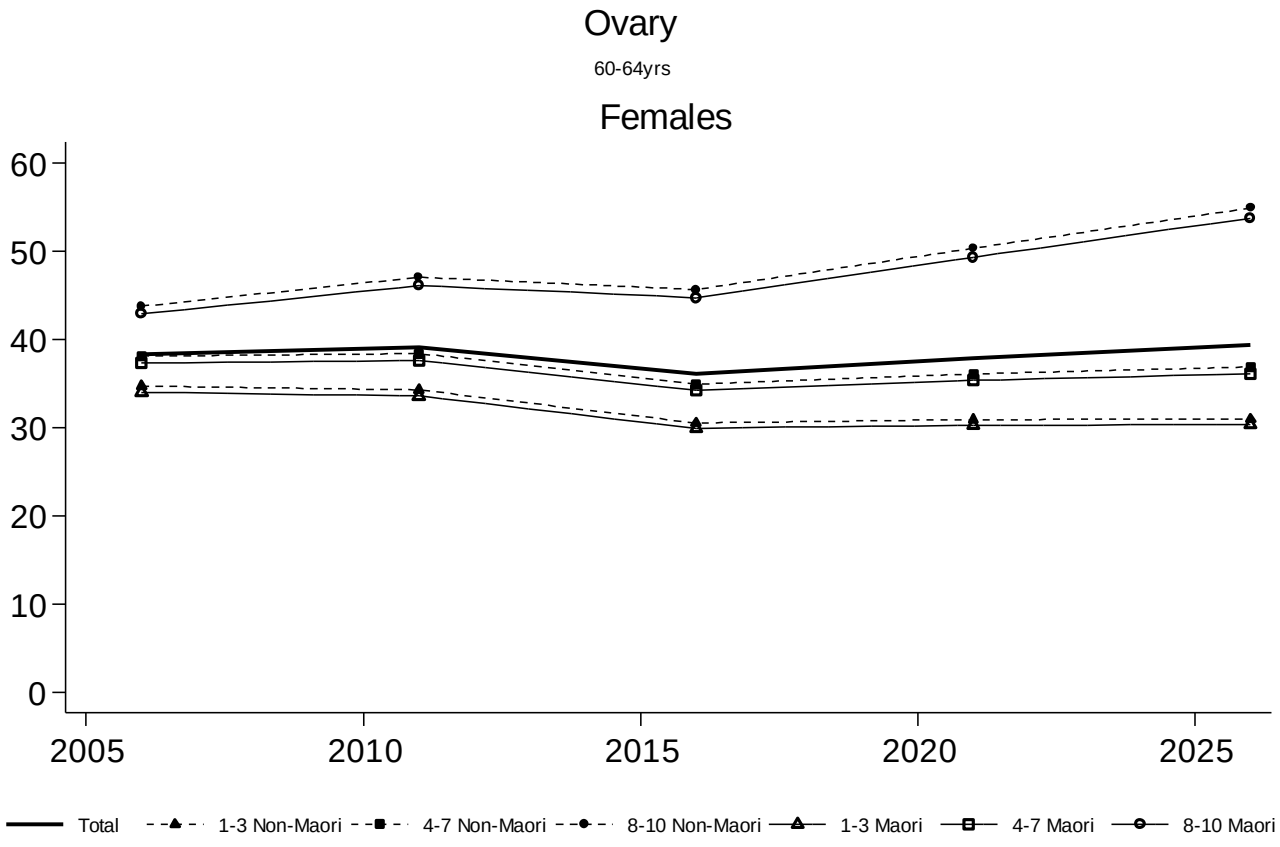

Non-Hodgkin's
45-49yrs
Females
Males
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

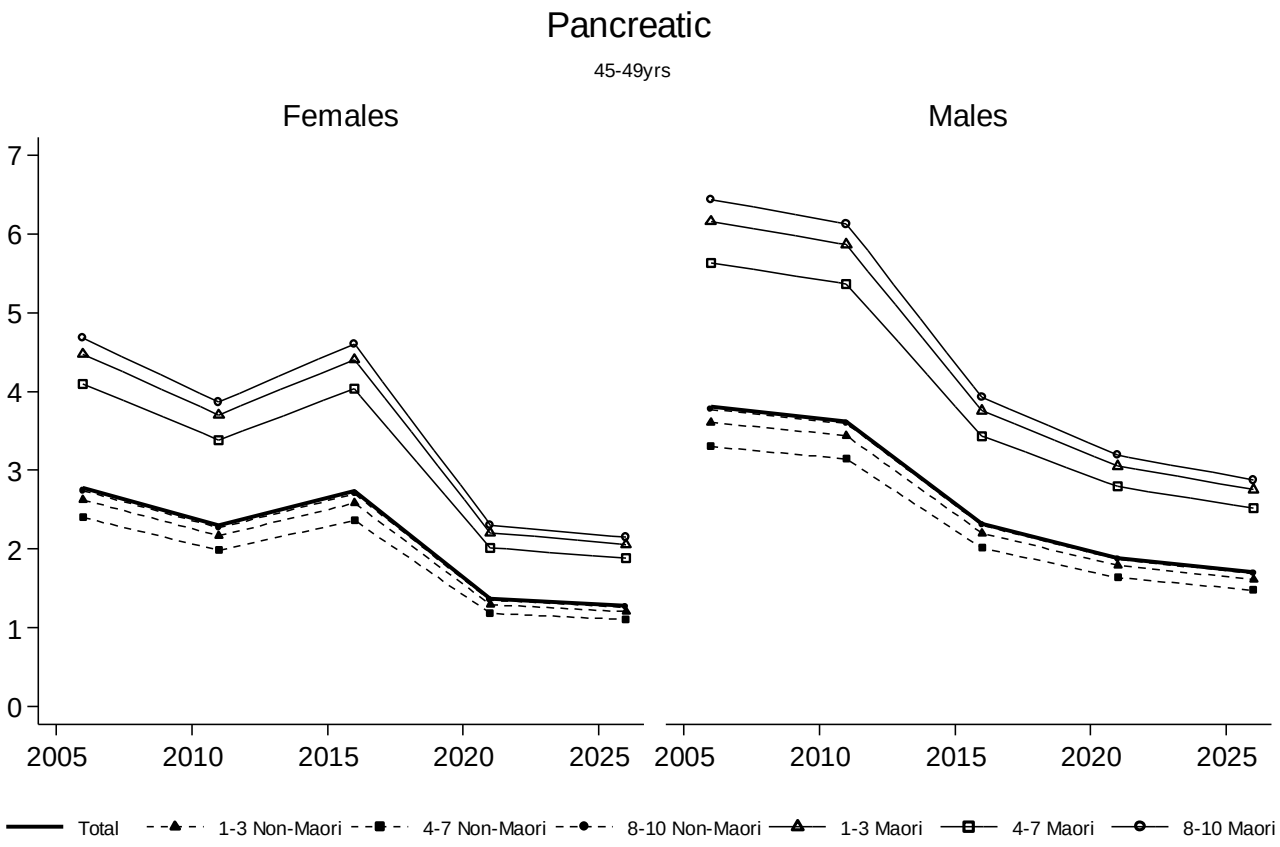

Non-Hodgkin's
60-64yrs
Females
Males
80
70
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

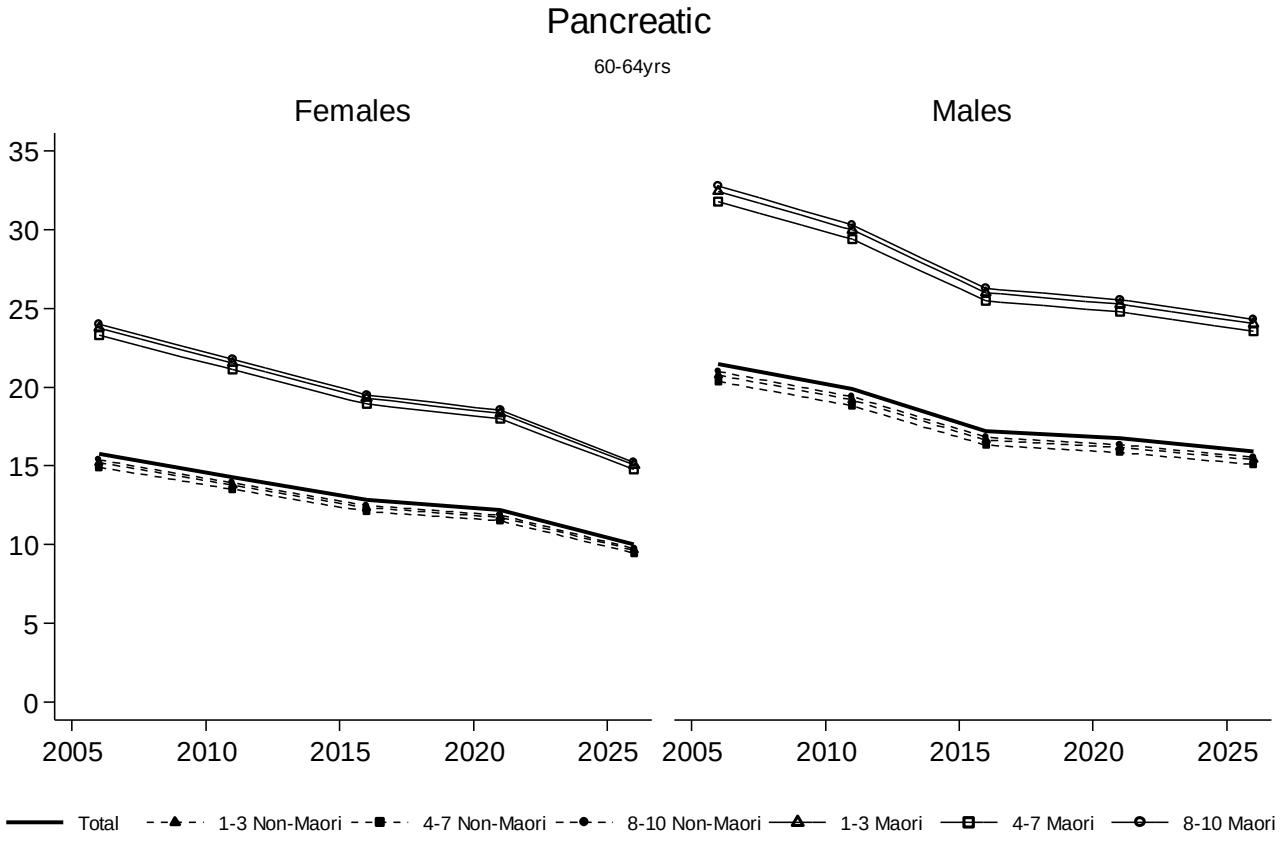

Oesophageal
45-49yrs
Females
Males
0
1
2
3
4
5
6
7
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

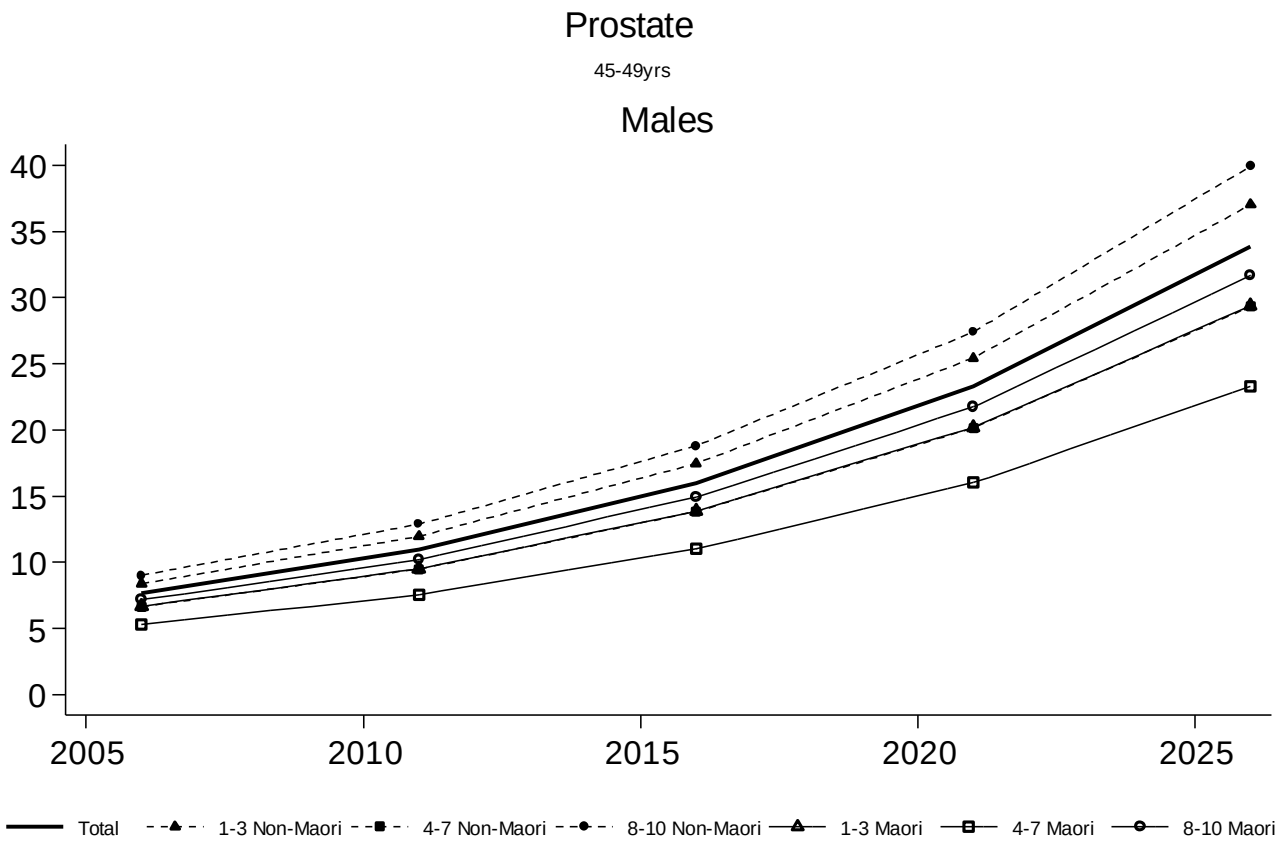

Oesophageal
60-64yrs
Females
Males
0
10
20
30
40
50
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

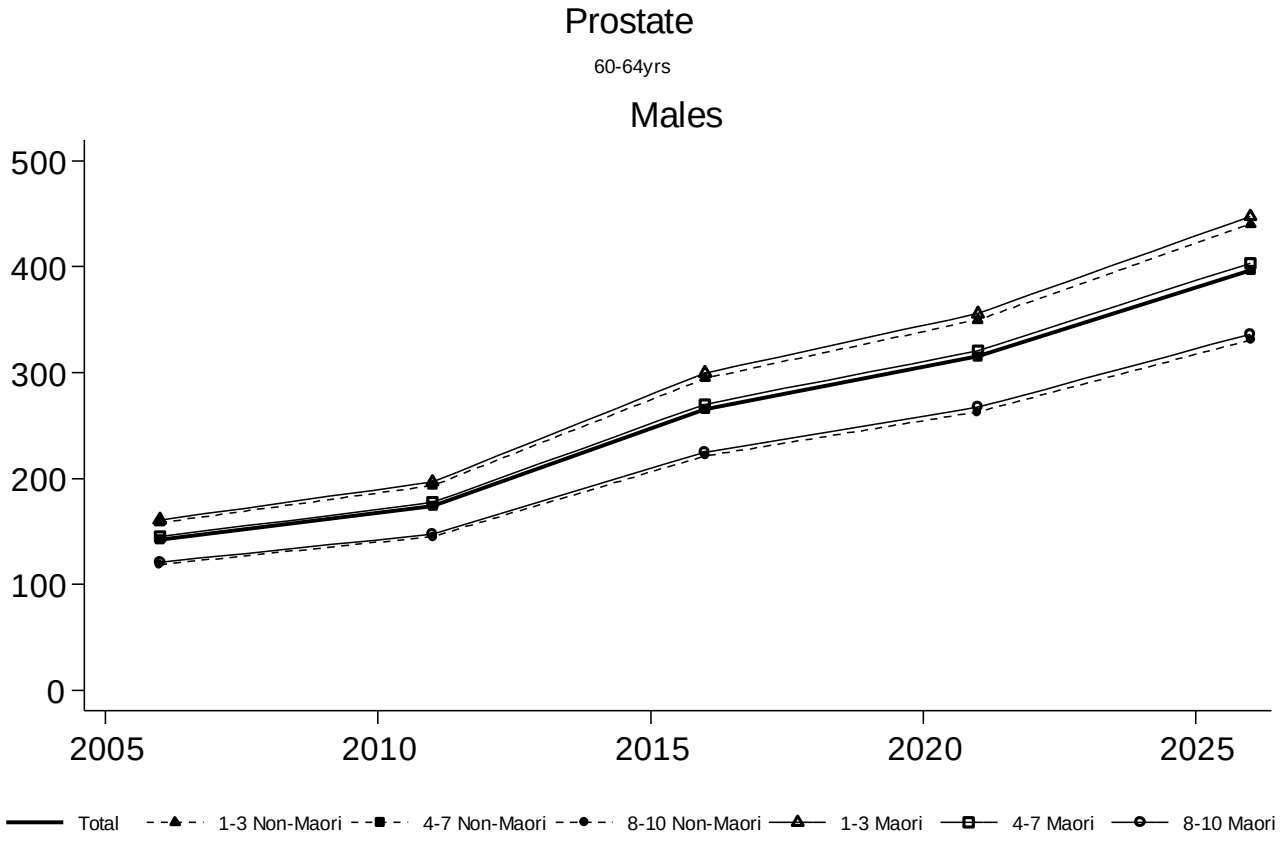

Ovary
45-49yrs
Females
35
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

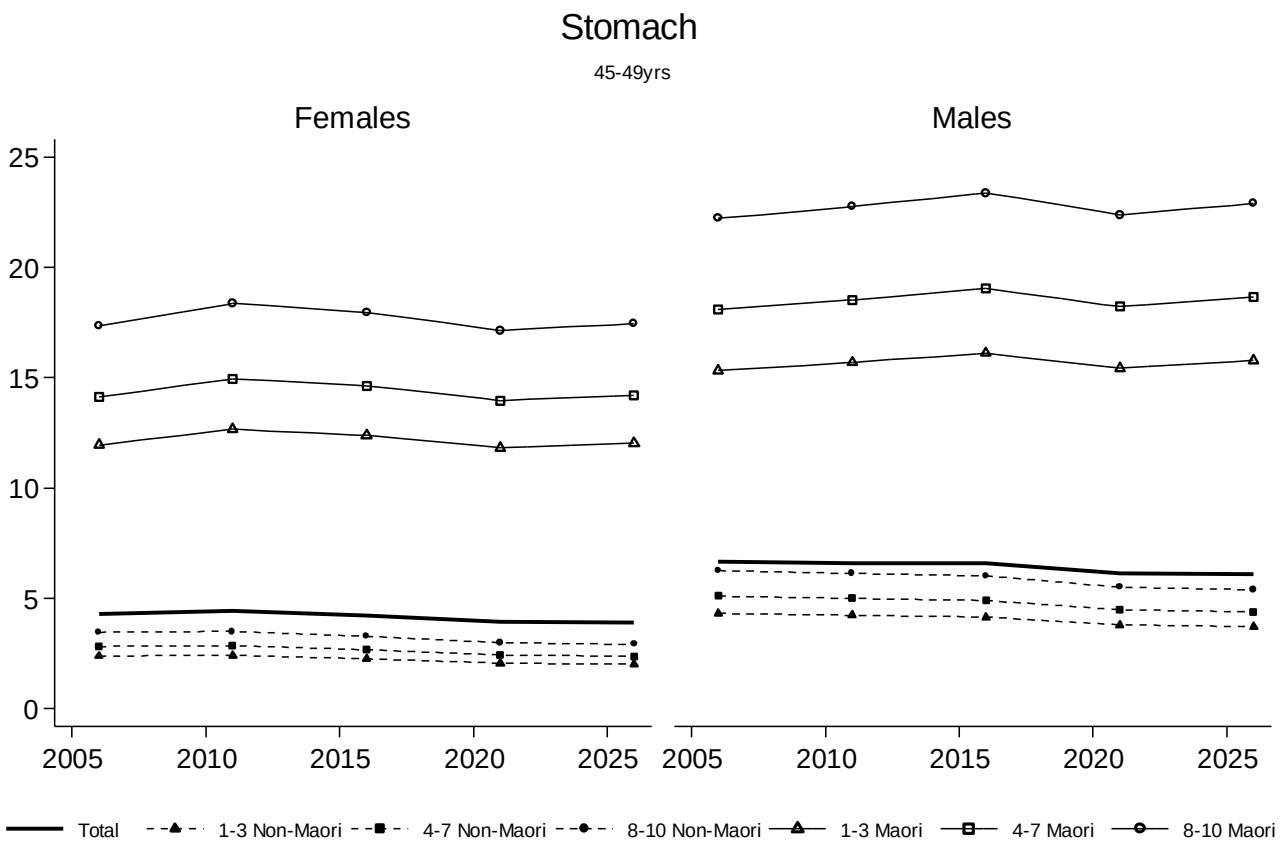

Ovary
60-64yrs
Females
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

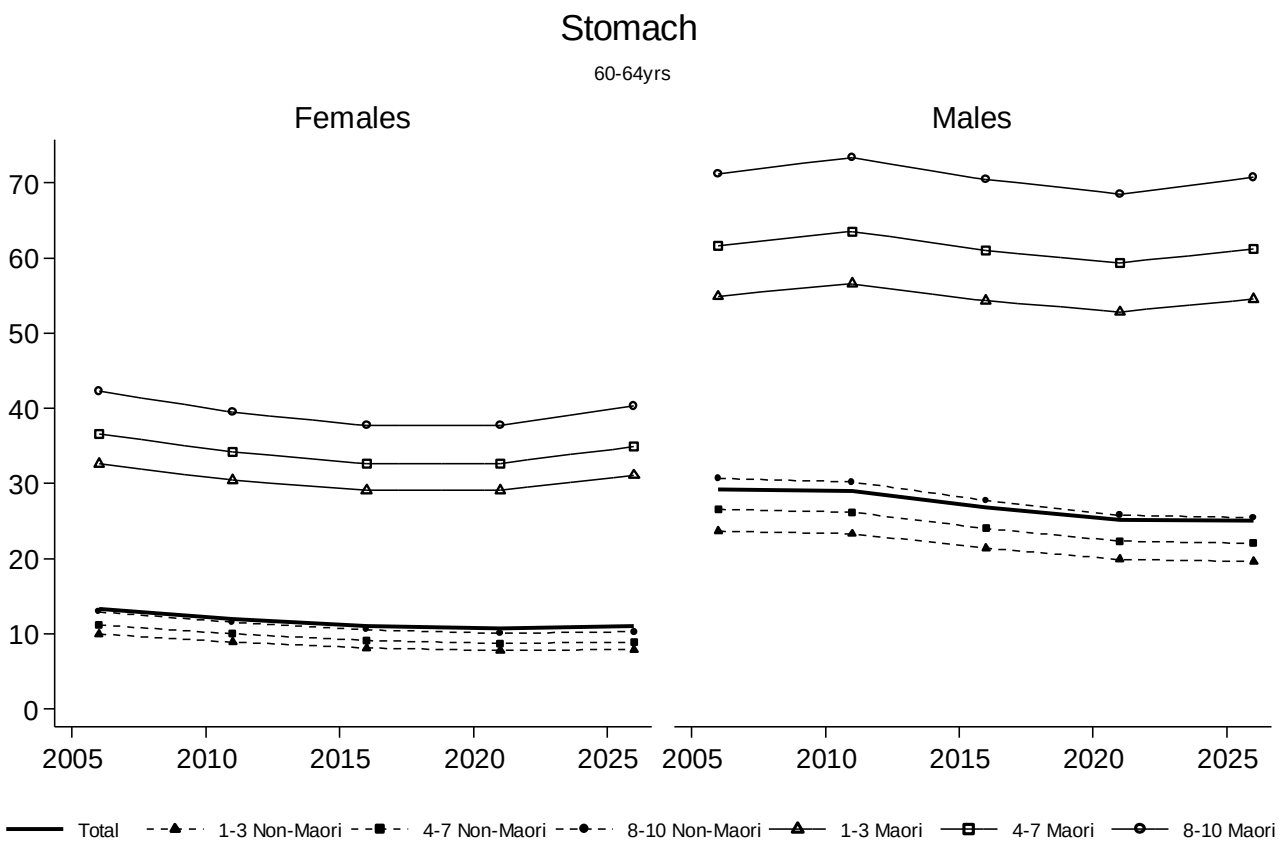

Pancreatic
45-49yrs
Females
Males
0
1
2
3
4
5
6
7
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

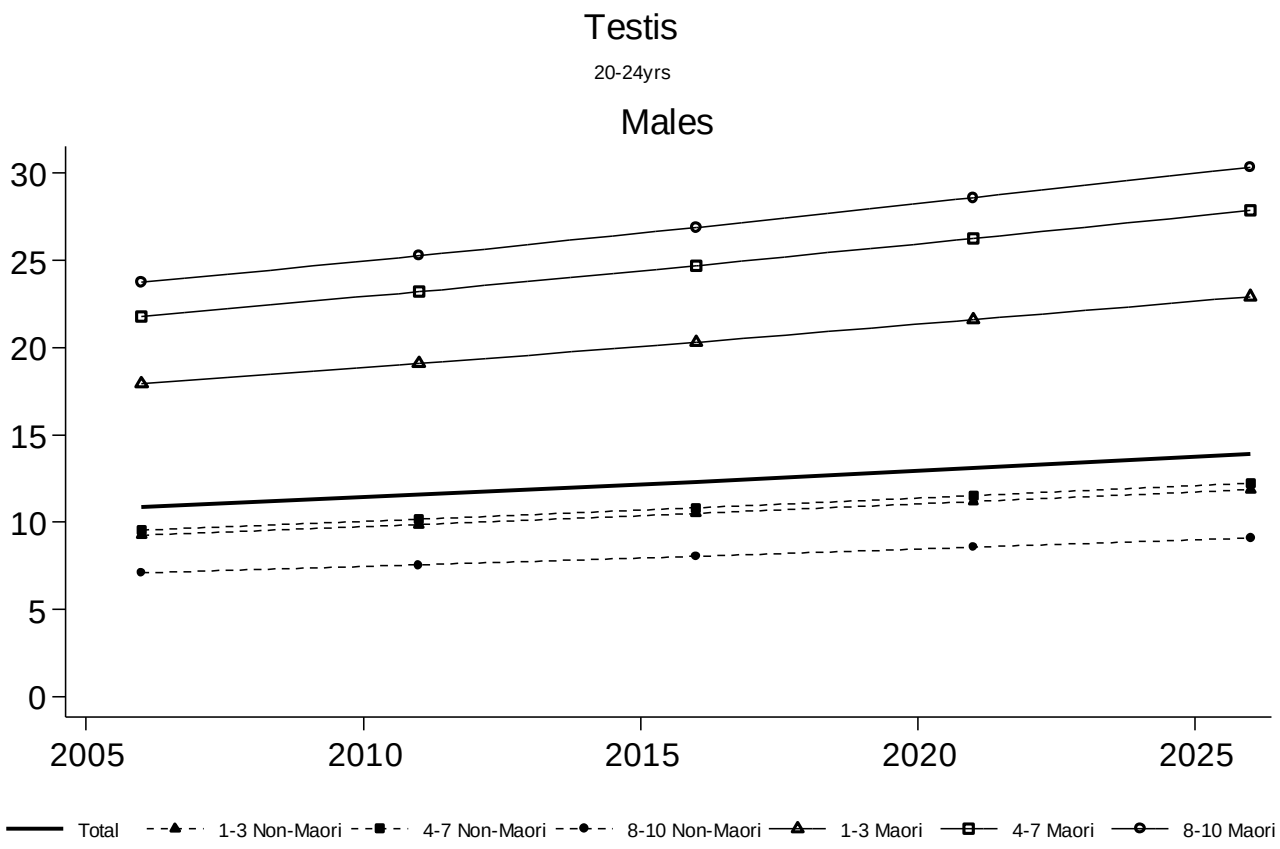

Pancreatic
60-64yrs
Females
Males
0
5
10
15
20
25
30
35
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

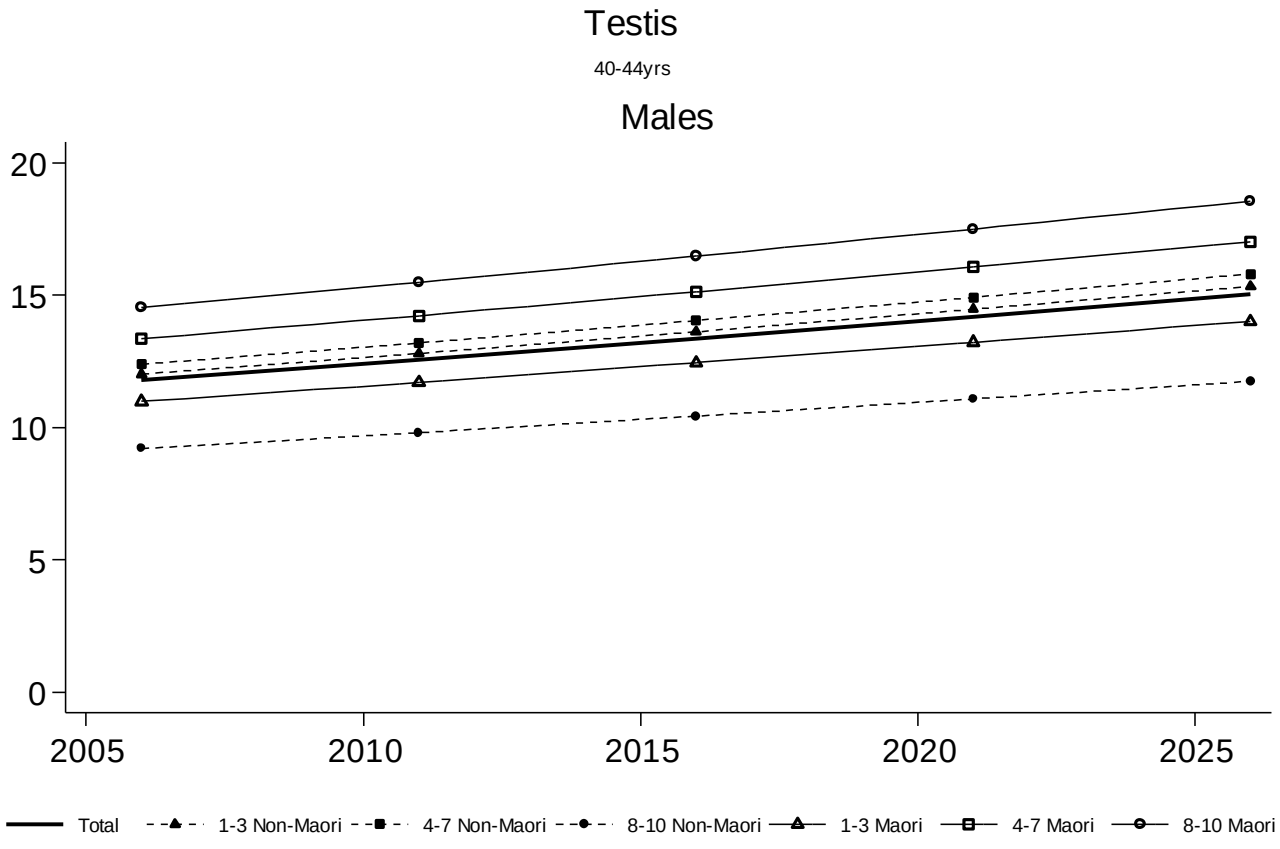

Prostate
45-49yrs
Males
40
35
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

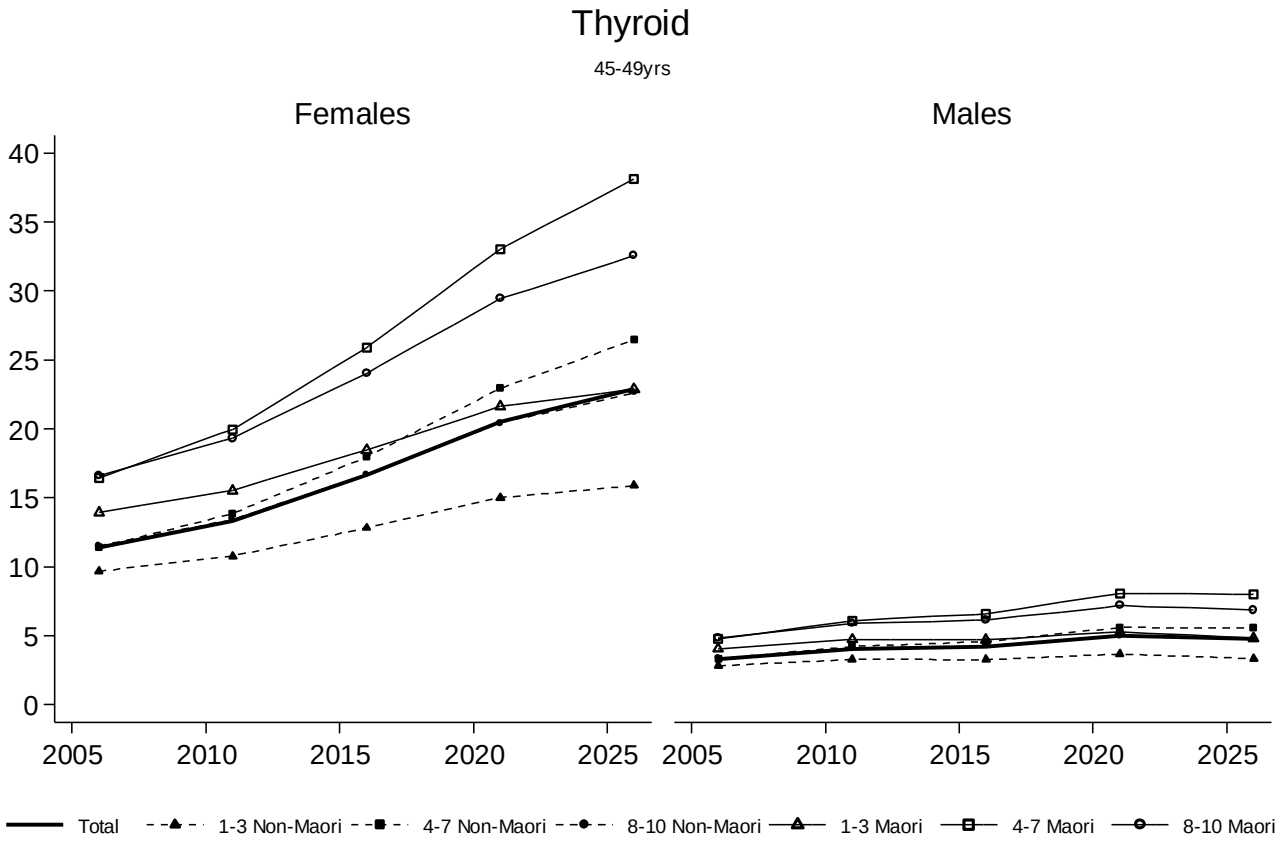

Prostate
60-64yrs
Males
500
400
300
200
100
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

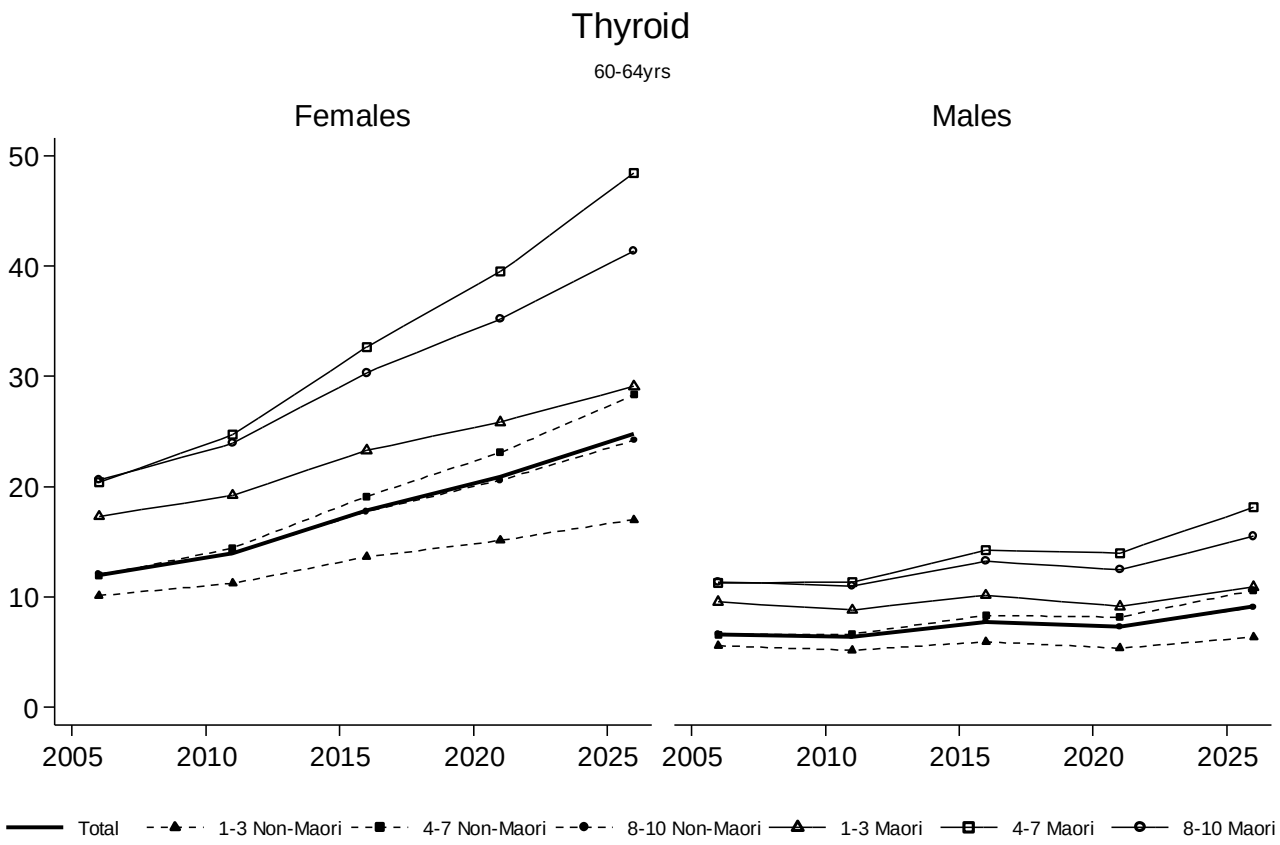

Stomach
45-49yrs
Females
Males
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

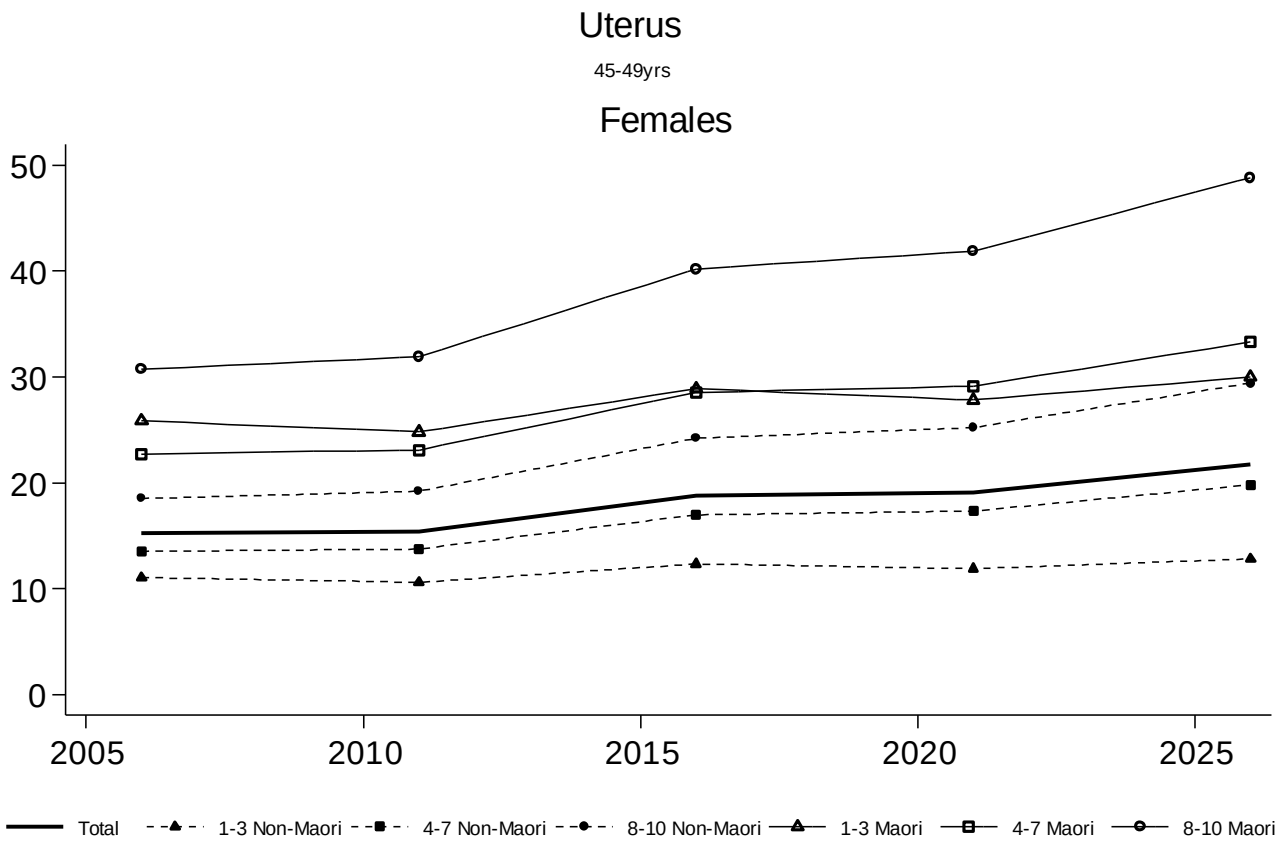

Stomach
60-64yrs
Females
Males
70
60
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

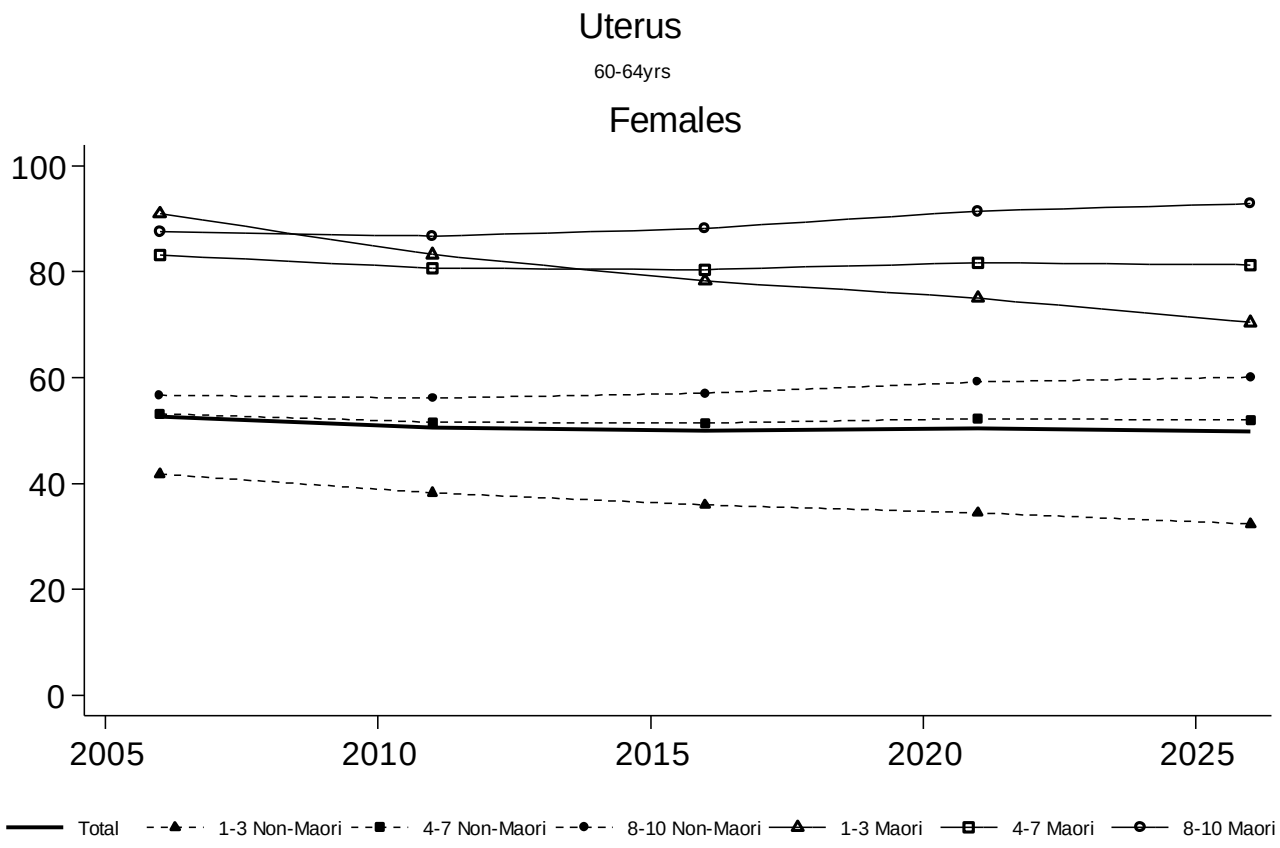

Testis
20-24yrs
Males
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

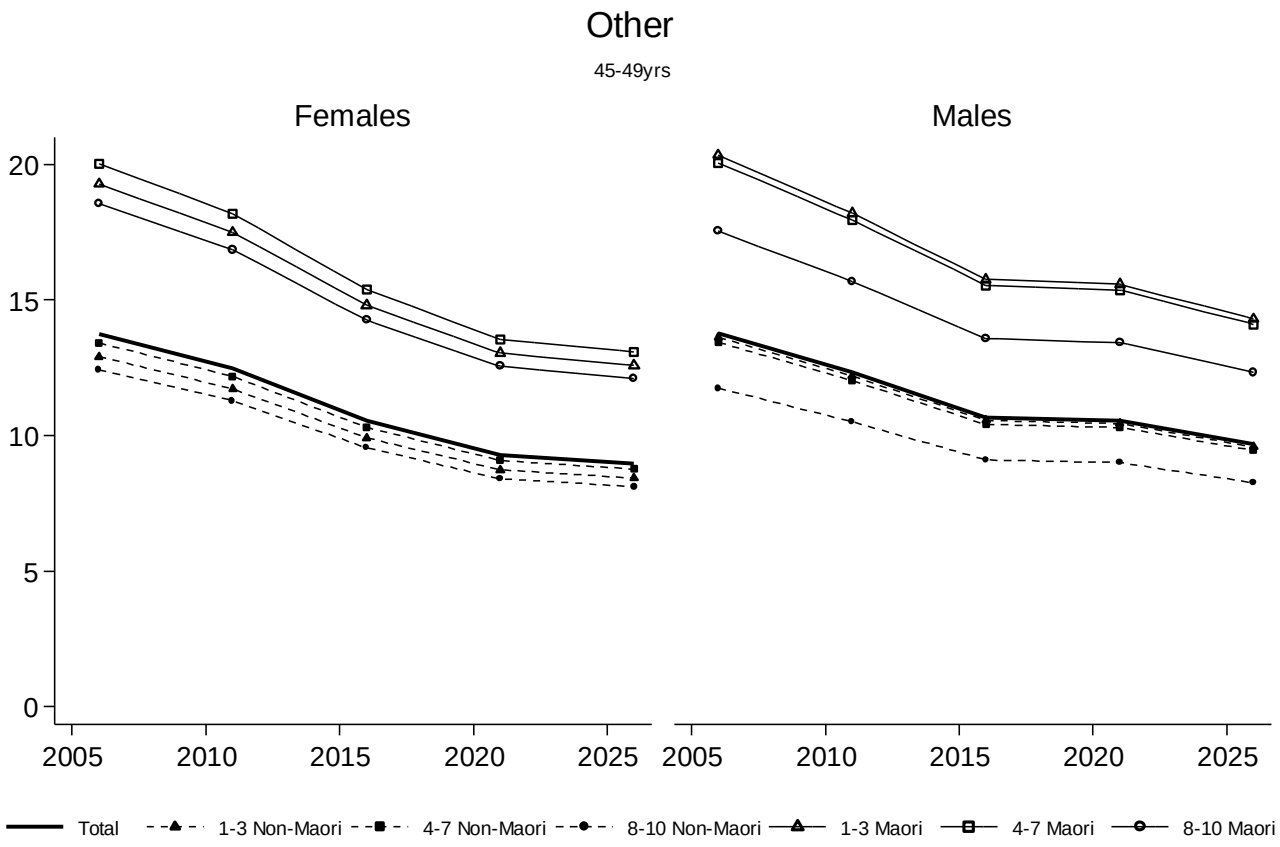

Testis
40-44yrs
Males
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori

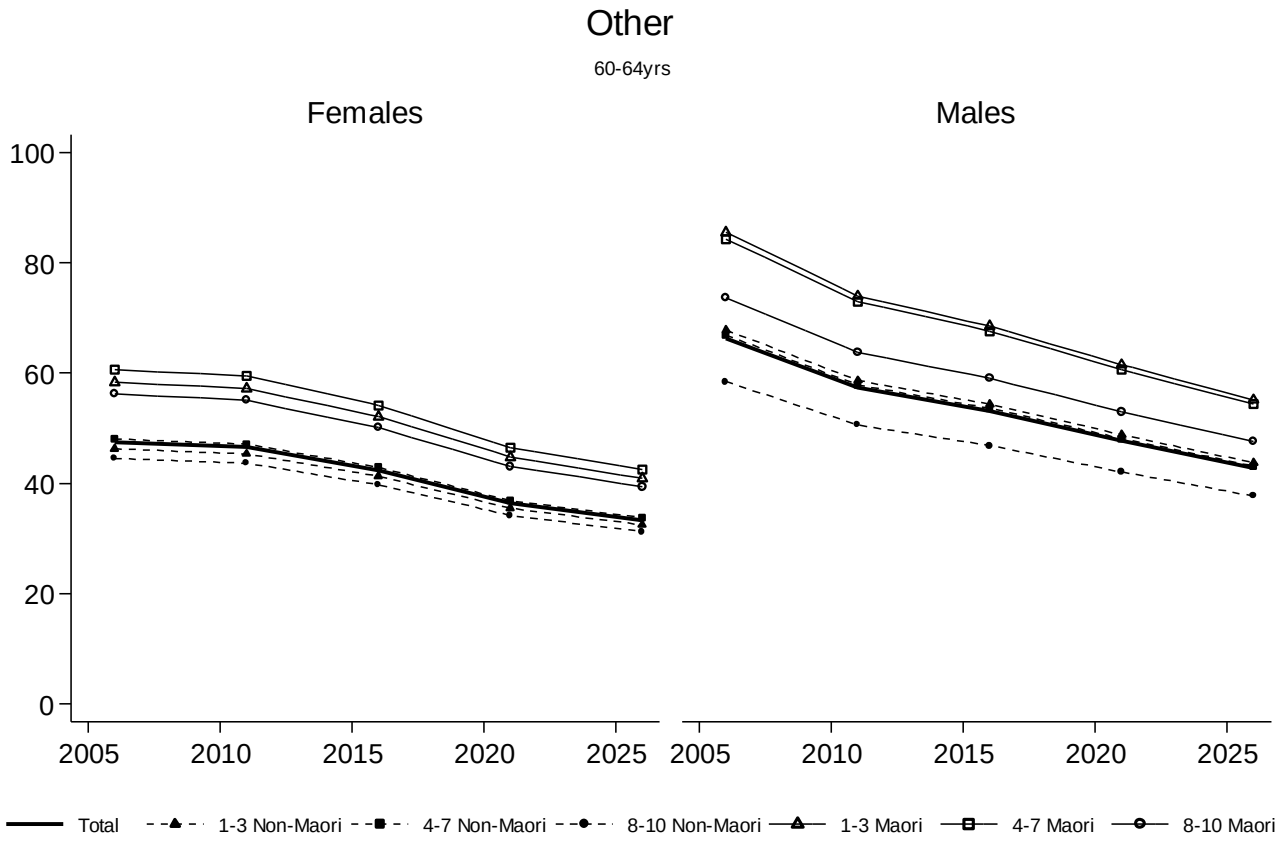

Thyroid
45-49yrs
Females
Males
40
35
30
25
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori


Thyroid
60-64yrs
Females
Males
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori


Uterus
45-49yrs
Females
50
40
30
20
10
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori


Uterus
60-64yrs
Females
100
80
60
40
20
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori


Other
45-49yrs
Females
Males
20
15
10
5
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori


Other
60-64yrs
Females
Males
100
80
60
40
20
0
2005
2010
2015
2020
2025
Total
1-3 Non-Maori
4-7 Non-Maori
8-10 Non-Maori
1-3 Maori
4-7 Maori
8-10 Maori