

Motu Note #55

Some notes on measuring pay gaps¹

David C Maré (Motu Research) & Lyn Brieseman (Strategic Pay Ltd)

October 2025

Haiku

*How big are pay gaps
for women and ethnic groups?
Measurement matters.*

Abstract

The formula for measuring the gender pay gap is widely used and generates internationally comparable measures. It measures how much lower women's pay is than men's, as a proportion of men's pay. The size of the gender gap is not directly comparable with the size of inter-ethnic gaps because inter-ethnic gaps are generally measured as a proportion of a different group's pay (not that of men). These notes discuss choices and issues that arise when defining pay gaps among more than two groups. It discusses both the formula used for calculating pay gaps and the choice of pay measure. When examining pay gaps by ethnicity, there are several plausible ways of choosing a comparator (pay compared with what?) and a scale (as a proportion of what?).

Introduction

The internationally accepted definition of the gender pay gap is the difference in pay between men and women, as a proportion of men's pay, with a positive number meaning that women's pay is lower than men's. A common approach to measuring pay gaps between ethnic groups is to calculate the difference between pay for an ethnic group and pay for the highest paid ethnic group (in New Zealand, generally Europeans). However, because male pay and European pay differ, the sizes of gender and inter-ethnic gaps cannot be directly compared.

In these notes, we discuss both the choice of pay measure and the formula used for calculating pay gaps. For calculating pay gaps, we consider options for choosing both a comparator and a scale (both explained below). We also note that there is a diversity of possible pay measures that can be used when calculating pay gaps (hourly earnings, full-time hourly earnings, average earnings, etc).

¹ This note was prepared with support from the MBIE Endeavour Fund funded programme WERO (Working to End Racial Oppression) [UOWX2002].

Calculating Pay Gaps

The gender pay gap formula

The standard formula for the gender wage gap is shown in equation (1). This is the formula used by statistical agencies and international organisations (Australian Bureau of Statistics, 2023; OECD, n.d.; Statistics New Zealand, 2020, 2021).

Standard Gender Pay Gap formula:

$$Gap = \frac{(w_M - w_F)}{w_M} \quad (1)$$

The formula is a very simple one but introducing some additional terminology will make the subsequent discussion clearer. The focus of the gender gap is on women's pay (w_F), which is being compared with men's pay (w_M). The difference is measured in terms of men's pay, which serves as the scale for the measure. Equation (1) can therefore be expressed as $G_{F,M|M}$, where:

$$G_{Focus,Comparator|Scale} = \frac{(Comparator - Focus)}{Scale} \quad (2)$$

Measurement using most recent data

The official measure of the gender gap in New Zealand is based on median hourly earnings from wages and salaries. Table 1 contains the data used for calculating gender and inter-ethnic pay gaps – from the 2025 HLFS (income). The official measure of the gender gap in 2025 is 5.2%. Applying equation (1), this is calculated as follows:

- Median hourly pay for women: $w_F = \$33.76$
- Median hourly pay for men: $w_M = \$35.62$
- Median hourly pay overall: $w_O = \$35.00$

$$G_{F,M|M} = \frac{(w_M - w_F)}{w_M} = \frac{(\$35.62 - \$33.76)}{\$35.62} = \frac{\$1.86}{\$35.62} = 5.2\%$$

In words, women earn 5.2 percent less than men, or equivalently, men would have to be paid 5.2% less to have the same median pay as women.

The key advantages of using the standard Gender Pay Gap formula are that it is widely accepted, well understood, and has a clear and easily communicated interpretation. Having a consistently-defined measure facilitates comparisons across time and across countries and across multiple dimensions (gender gap within ethnic groups, industry, etc).

The numerator in equation (1) ($w_M - w_F$) is the difference of men's median pay compared with women's median pay, which is a positive number when men's pay is higher. Changing the order of this comparison ($w_F - w_M$) would change the sign of the gap – making it negative, but not the magnitude. The more important feature of equation (1) is the choice of scale (the denominator). In equation (1), this is the male median (w_M), so the gap of 5.2% is 5.2% of the male median pay.

There are, however, alternative plausible measures of the gap between men's and women's pay. While none is necessarily any better than the standard pay gap measure, some alternatives have desirable properties when analysing pay gaps for more than two groups – as in the case of inter-ethnic pay gaps. We discuss alternative measures that differ from the standard measure in terms of the chosen scale, and the choice of pay measures.

Using women's median pay as the scale

The standard measure summarises how much lower women's pay is than men's pay, as a proportion of *men's* pay. An equally plausible summary would be how much higher is men's pay than women's pay, as a proportion of *women's* pay. Compared with the standard measure, the gap is larger when measured as a proportion of a lower (women's pay) amount rather than as a proportion of a higher (men's pay) amount.

$$G_{F,M|F} = \frac{(w_M - w_F)}{w_F} \quad (3)$$

Using the same pay amounts as used above, we have:

$$G_{F,M|F} = \frac{(\$35.62 - \$33.76)}{\$33.76} = \frac{\$1.86}{\$33.76} = 5.5\%$$

In words, men earn 5.5 percent more than women, or equivalently, women would have to be paid 5.5% more to have the same median pay as men. Using women's median pay as the scale shows a larger gap (5.5% of women's pay) than the standard measure (5.2% of men's pay) because the same dollar difference represents a higher proportion of the smaller pay of women.

Using the overall median pay as the scale

We now discuss a third possible choice of scale- the overall median pay for all workers (w_O). We refer to this as the 'overall-scale' gap:

$$G_{F,M|O} = \frac{(w_M - w_F)}{w_O} = \frac{(35.62 - \$33.76)}{\$35.00} = 5.3\% \quad (4)$$

The gap measure lies between $G_{F,M|M}$ and $G_{F,M|F}$ because the overall median is between w_F and w_M . When measuring gender gaps for two gender groups, there is a limited gain to choosing a scale other than the (standard) male median, and an obvious loss of comparability with other publicly and internationally available measures of the gender gap calculated using the standard formula. As we will discuss below, the choice of scale makes more of a difference when comparing pay differences across more than two groups.

Calculating gaps when there are more than two groups

Choosing the best approach to consistent measurement of pay gaps becomes less straightforward when we look beyond binary comparisons - as in the case when examining non-binary gender gaps or gaps between pairs of ethnic groups (eg: European:Māori, Māori:Pacific). When calculating inter-ethnic pay gaps, there are many more possible comparisons and choices of scale than when calculating (binary) gender pay gaps. Dealing with more than two groups means that there are many more possible pairwise comparisons that could be considered. Table 1 presents data for 6 ethnicity categories, so there are 30 different (ordered) pairs of ethnicities for which gaps could be calculated.² (When calculating pay gaps by gender and ethnicity, the number of categories doubles (to 12) and the number of possible pairwise gaps rises to 132.)

Choice of scale and comparator

In the standard gender pay gap formula ($G_{FM|M}$), men's pay is used as the scale as well as the comparator. As shown above, using women's pay as the scale yields a different sized (larger) gap. For inter-ethnic pay gaps, the pay level of any one of the six group-specific pay levels could be used

² Table 5 tabulates all 30 combinations – for two different measures of inter-ethnic pay gaps.

as the scale, or the scale could be the overall median. Furthermore, for each of the six ethnic groups, any one of the other five groups could be used as comparator.

There are advantages to using a common scale for all inter-ethnic pay gaps, so that all inter-group gaps are measured as a proportion of the same reference level. One common approach is to use the group with the highest median pay (European) as both the scale and the comparator group. All calculated gaps are then positive as they are calculated as a difference from the (highest) European median, and all are as a percentage of the European median. For any specific ethnic group (labelled A), the inter-ethnic gap between group A and European is calculated as:

$$G_{A,Eur|Eur} = \frac{(w_{Eur} - w_A)}{w_{Eur}} \quad (5)$$

This approach provides 5 inter-ethnic gap measures – one for each ethnic group other than European (for which the gap is, by definition, zero). Although generally referred to as the ethnic gap for a particular group (eg: the “Māori gap”), strictly speaking it is the gap between two groups – in this base between European and another group, with the comparator frequently not explicitly stated. For clarity, we will refer to gaps using the terminology [focus:comparator]. e.g., The gap between Māori and European ($G_{Maori,European}$) is referred to as the [Māori:European] gap.

The set of 5 [A:European] gaps do not directly provide gap estimates for other pairs of ethnic groups, although the use of a common scale makes calculation of such inter-group gaps relatively straightforward. For two ethnic groups (labelled as A and B), the formula using A as the focus, B as the comparator, and European pay as the scale is:

$$G_{A,B|Eur} = \frac{(w_B - w_A)}{w_{Eur}} = G_{B,Eur|Eur} - G_{A,Eur|Eur} \quad (6)$$

This gives a measure of how much lower group A’s (the focus’) pay is than that of group B (the comparator), as a percentage of the pay of Europeans (the scale). In words, if A has median pay 10% lower than European and B has median pay 15% lower than European, $G_{A,B|Eur} = -5\%$, so the gap between A and B (in favour of A) is equivalent to 5% of European median pay (–5% lower is interpreted as being 5% higher).

One disadvantage of using the European median as the scale is that inter-ethnic gaps calculated in this way are not completely comparable with the standard gender pay gap, which expresses the gaps as a proportion of *men’s* median pay rather than as a proportion of *European* median pay. Furthermore, if the calculation of gaps is extended to look at pay gaps by sex and ethnicity, the group with the highest median pay is then (usually) European men. If that is used as the scale measure, sex by ethnicity gaps cannot be directly compared with inter-ethnic gaps or with gender gaps because each is expressed as a proportion of a different scale.

An appealing alternative to equation (6) is to express all (inter-group) pay gaps as a proportion of the overall median pay. Equation (7) shows the formula for the group-specific [A:O] gap, where O refers to the overall pay level – which provides a separate gap measure for each ethnic group (including European). In words, this captures the difference between the group-specific median and the overall median, as a proportion of the overall median.

$$G_{A,O|O} = \frac{(w_O - w_A)}{w_O} \quad (7)$$

As in the case where the common scale is the European median (equation (6)), the inter-group gaps can be derived as the difference between two group-specific gaps, measured using the overall median pay as both the scale and the comparison pay.

$$G_{A,B|O} = \frac{(w_B - w_A)}{w_O} = G_{B,O|O} - G_{A,O|O} \quad (8)$$

Table 4 illustrates the calculation of inter-ethnic pay gaps using data from the June 2025 HLFS (income) Survey. The first column shows the median hourly pay for each ethnic group, from Table 1. The second column shows the difference of each of these from the overall median ($w_A - w_O$). The final column shows $G_{A,O|O}$ - the difference as a proportion of the overall median. For instance, European pay is 4.1% higher than the overall median (a negative gap means a gap in favour of Europeans), Māori pay is 8.6 percent below the overall median and Pacific pay is 11.4% below. Equation (9) shows how the [Māori:Pacific] pay gap can be calculated from these figures:

$$(G_{Māori,Pacific|O} = G_{Māori,O|O} - G_{Pacific,O|O} = 8.6\% - (11.4\%) = -2.9\%)^3 \quad (9)$$

The full set of inter-group gaps calculated in this way is shown in the upper panel of Table 5. Because of the use of a common scale, the calculated gaps for each pair are ‘reversible’. By ‘reversible’, we mean that the calculated size of the gap between a pair of ethnicities does not depend on the ordering of groups. Only the sign of the gap differs ($G_{AB|O} = -1 * G_{BA|O}$). For instance the [Māori:Pacific] gap (-2.9%, in favour of Māori) is -1 times the [Pacific:Māori] gap (2.9% in favour of Māori), where both are measured as a proportion of the overall median pay. This consistency is achieved whenever a common scale is used.

The lower panel of Table 5 shows inter-ethnic gaps calculated using the standard gender gap formula, with $G_{BA|B}$ measured relative to the median for group B. For instance, the [European:Māori] pay gap ($G_{Māo,Eur|Māo}$ measures how much lower is European pay than Māori pay) is -13.9% of the Māori median (i.e., in favour of European), whereas the [Māori:European] gap is 12.2% of the European median pay. The first column of panel (b) thus shows the gaps implied by equation (6), which uses the European median as the scale. The lack of a symmetric pattern to the gap sizes shows that gaps calculated in this way are not ‘reversible’.

Multiple-response ethnicity

Individuals can identify with more than one ethnic group. It is thus less straightforward to choose a scale that is completely independent of the focal group. For instance, comparing the median pay of Europeans with the median pay of Māori is confounded by the fact that some people are included in both measures. One response to this is to compare the median for a group with the median for everyone who is not part of that group (eg: median for European compared with the median for non-European). We refer to this comparator as the ‘complement’ group, with the complement of group A being denoted as \check{A} . The gap measure would be $G_{A\check{A}|\check{A}} = \frac{w_{\check{A}} - w_A}{w_{\check{A}}}$. Using this measure has advantages for some forms of statistical analysis, such as decompositions that have been developed for the analysis of differences between two disjoint groups. In the case of a binary gender gap comparison, this is equivalent to equation (1). In the context of multiple ethnicity, each ethnic gap would be measured on a different scale.

³ 8.6-11.4 is -2.8 but the difference is -2.9 due to rounding.

Choosing a comparator and a scale

Overall desirable properties

- Intuitive appeal: Gaps are interpretable. There are clear advantages to having a measure that can be clearly and easily described and communicated
- Data availability: Gaps are based on (available) statistically reliable measures of pay
- Comparability: A bigger gap means a larger difference in pay, whatever the groups.
- Distinct groups: The gap should be between non-overlapping groups.
- Unaffected by group size: The gap measure should not be affected by changing the sizes of groups

Desirable properties when choosing a comparator

- Uniform sign: presentationally, it is often easier to have all gaps as positive numbers, or all gaps as negative numbers. This is achieved by using the highest-paid (or lowest-paid) group as the common scale. This is straightforward if looking at only dimension of grouping (eg: gender or ethnicity or 'gender by ethnicity') but may be difficult if relativities change over time.

Desirable properties when choosing a scale

- The unit of measurement does not matter: eg: The pay gap measure is the same whether pay is measured in dollars or in cents, or if inflation increases all earnings proportionally. (This is true if the same scale is used for all groups)

Advantages of measures using a common scale

- Gaps are reversible: this means that the gap between A and B can be readily deduced from the gap between B and A. As discussed above, this is true if a common scale is used because the only difference is a change in sign. Without a common scale, the calculation is more cumbersome (see Table 6)
- Pairwise gaps can be combined (see Table 6)
- The size of gaps can be compared: With a common scale, a bigger dollar difference leads to a larger gap measure.⁴

Advantages & disadvantages of measures using the same common scale across different types of gaps

- The size of different types of gaps can be compared:
 - gender gaps, inter-ethnic gaps, and gaps between gender*ethnicity groups would all be comparable because they are all measured as a proportion of the same scale variable;
 - Such measures could be used for any dimension of gaps, including inter-industry pay gaps; inter-regional pay gaps; and inter-qualification pay gaps.
- It is plausible to use an overall pay measure as the scale rather than, say, measuring all gaps (gender, ethnicity, industry, etc) relative to a single high paid group such as European male median pay.
- Overall measures of pay, such as the overall median or average are generally available and more reliably measured from surveys than measures for any single subgroup.

⁴ A larger dollar gap $\left(\frac{G_{AB|O}}{G_{CD|O}} > 1\right)$ may, however, be consistent with a lower relative gap $\left(\frac{w_A}{w_B} < \frac{w_C}{w_D} \text{ if } \frac{w_B}{w_D} > \frac{G_{AB|O}}{G_{CD|O}}\right)$

- One disadvantage of using an overall pay measure as the scale when calculating gaps is that the gap measure is affected by changes in workforce composition. For instance, a higher proportion of women may lower the overall median, raising measured gaps even if the difference between men's and women's pay does not change.

Examples of gap calculations for New Zealand

This section briefly summarises the range of ways that gender and inter-ethnic gaps have been defined in a (non-exhaustive) sampling of recent New Zealand sources and studies.

Table 7 lists 11 sources that have summarised or analysed New Zealand gender gaps. Most use the standard formula ($G_{FM|M}$). A number of the studies use an alternative measure, being the logarithm of the ratio of men's to women's pay ($\ln \frac{w_M}{w_F}$), which is approximately equal to $-G_{FM|M}$. This is less appealing as a measure that can be readily and intuitively communicated to the general public but has considerable advantages for regression-based analysis. In that context, wage differences are often measured as the gender difference in the average of log wages. There is greater variation across sources in the definition of pay, as discussed in the next section. The measures range from median hourly earnings, to average annual salary, and include measures that rely on more detailed remuneration information that is not generally summarised in published statistics.

Table 8 lists 7 sources that examine inter-ethnic pay gaps. All use average rather than median hourly pay. The average pay of Europeans is the most common choice for comparator and scale when looking at inter-ethnic pay gaps, with the average pay of European men commonly used for analysis of gaps across groups defined by both ethnicity and gender. As in the case of gender gaps, the use of logarithms is prevalent – reflecting the types of analysis being done. Two sources use the complement as (a different) comparator for each ethnic group.

How is pay measured?

Our discussion has focused on median hourly earnings – to avoid complexity, but pay gaps can be measured using many different definitions of pay. Different measures can reveal different dimensions or aspects of gender and inter-ethnic pay gaps.

The official measure of the gender pay gap in New Zealand (using the standard formula) uses median hourly earnings from wages and salaries as the chosen measure of pay for both men and women. The median is a more representative measure of the centre of the earnings distribution – less affected by the presence of individuals with extreme (high) pay levels than is the average (mean). The median is also less sensitive to measurement errors and sampling variation, which is important when pay levels are estimated from sample surveys – as is the case with the data used here.⁵

Pay gaps can be (and have been) calculated for a range of different pay variables. The choice of measure may reflect what data are available, or may be intended to highlight particular aspects of pay differences. The range of measures can vary by coverage, length of pay period, hours of work, or scope of pay:

- Coverage of employees: Pay gaps could be calculated for all workers or could capture pay differences within subsets of workers. Calculations could exclude the chief executive, exclude casual workers, or could be calculated separately for occupational or other subgroups.

⁵ Statistics New Zealand (2020) note that median wages within an organisation may be more volatile than the average if pay is highly structured, with many people on the same band or level.

- Length of pay period: pay could be measured as hourly, weekly, monthly, or annual pay. Hourly pay captures a rate of pay whereas longer periods also capture intensity of employment. For instance, the NZ Ministry for Women report gender pay gaps by field of study using annual income (due to data availability).⁶
- Hours of work: The data used above is for all wage and salary earners. The OECD calculates “gender *wage* gaps” for many countries based on median hourly earnings of full-time workers only.
- Scope of pay: Gaps can be calculated based on wage rates, actual or usual wage and salary earnings, or broader measures of earnings. Gender gaps can also be calculated including other forms of remuneration such as allowances, fringe benefits, incentives and bonus payments (Statistics New Zealand, 2020; Strategic Pay, 2024).

Why are different measures of pay used?

We have noted above the statistical advantages of using median pay rather than average pay, and alluded to the attractiveness of the mean of the logarithm of pay for some forms of analysis. The choice of measure can also reflect the availability of estimates. In New Zealand, data on median hourly and weekly pay are available from Statistics New Zealand’s HLFS (income) for a variety of subgroups. In other contexts, or for some groupings, measures of average pay may be more readily available than median pay. The choice of measure may also reflect the reliability of estimates if, for example, some measures of pay are available from only a small sample of workers.

How much does it matter?

We have shown in earlier sections that different choices of comparator and of scale can give different numbers for gender and inter-ethnic gaps, but the differences are relatively small. Using a lower pay level as the scale will result in slightly larger gap estimates, as in the case where the gender gap is expressed as a proportion of women’s rather than men’s pay ($G_{FM|F}$). Figure 1 shows the variation over time in the gender gap, using a variety of different scales. The same time patterns of peaks and dips, and of general decline, are evident for all measures. Using women’s pay as the scale yields the largest gap estimates. Using the pay of European men as the scale gives the smallest gap estimates because European men’s pay is the highest of the scales used in Figure 1. The range of estimates for 1998 is between 16.2% and 19.4%. The range is lower in 2025 (4.9% to 5.5%). Gender gaps calculated using the pay of Europeans or of European men as the scale are not shown for all years because of the lack of consistent statistics for earlier years.

A similar comparison of inter-ethnic gaps is shown in Figure 2. The first panel shows median nominal hourly earnings for each ethnic group over time. The inter-ethnic gaps are based on the vertical distance between lines. Inter-ethnic gaps [Ethnic:European] are shown in panel (b), using the median for Europeans as the scale. The levels and changes over time are almost indistinguishable from those in panel (c), which shows [Ethnic:European] gaps calculated using overall median hourly pay as the scale. (The differences in 2025 can be seen by comparing the first columns of each panel in Table 5). The similarity is due to the fact that the male median and the European median are generally similar throughout the period. In 2025, w_M was \$35.62; w_{Eur} was \$36.44.

The choice of pay variable is more consequential than the choice of scale for generating different estimates of the gender and inter-ethnic gaps. Table 9 shows that the size of gaps varies considerably across different measures of pay, using data for 2025. The first two columns compare gender and inter-ethnic gaps based on median hourly earnings, using different choices of scale. The

⁶ <https://www.women.govt.nz/gender-pay-gaps/new-zealands-gender-pay-gap/field-study>

first column uses the most highly paid group (men and Europeans, respectively) for gender and inter-ethnic gaps. The second column uses the overall median. The general pattern of relative gap sizes is similar.

The third column uses the median hourly earnings of full-time workers as the wage measure, and the overall median as the scale. This is similar to the measure used by the OECD for the gender gap – the difference being that the figures in Table 9 use the overall median rather than the male median as the scale (and are thus slightly higher than the comparable OECD figures). The gender gap is considerably lower using this measure (2.7%). Inter-ethnic [Ethnicity:European] gaps are also somewhat larger than the measures based on median hourly earnings of full-time and part-time workers combined.

The final column of Table 9 uses average rather than median hourly earnings. Most of the gaps are larger than those reported in the first column, showing a gender gap of 9.1%. The greatest change in implied inter-ethnic gaps is for the [Pacific:European] gap, which is increased from 14.9% in column 1 to 18.8% in the final column – close to the (column 3) gap based on full-time workers.

Concluding comments

The standard measure of the gender gap uses the same group's pay (that of men) as both the comparator and the scale. When calculating other dimensions of pay gaps (inter-ethnic, between gender*ethnicity groups; inter-industry, between qualifications, etc), there is greater choice of possible comparators and scales. Our discussion highlights the advantages of using a common scale, to facilitate comparison of gaps between different pairs of groups, or calculated across different dimensions of pay gaps. The overall pay level is an attractive common scale variable that can be used for any pair of focus and comparator groups. It results in slightly higher measured pay gaps than are calculated using a high-paid group as the scale, but captures the same general differences between groups and patterns over time. The choice of pay measure can have a more substantial impact on the size of calculated gaps (see Table 9).

Given the range of plausible choices for comparator, scale, and pay measure, it is important when reporting pay gaps to be clear on the choices that are being made.

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Table 1: Earnings by sex and ethnicity (2025)

Row Labels	Average hourly earnings	Median hourly earnings	Number of people (000)
Male			
European	\$45.60	\$38.00	762.6
Māori	\$38.23	\$32.00	181.7
Pacific Peoples	\$35.90	\$31.97	81.3
Asian	\$39.72	\$33.08	259.7
MELAA	\$43.59	\$35.00	24.8
Other Ethnicity	\$47.00	\$36.00	14.0
Total Ethnic Groups	\$43.17	\$35.62	1187.2
Female			
European	\$40.98	\$35.39	767.2
Māori	\$36.26	\$31.33	172.0
Pacific Peoples	\$35.18	\$30.00	80.4
Asian	\$37.13	\$32.00	245.3
MELAA	\$41.65	\$33.56	19.0
Other Ethnicity	\$40.67	\$36.77	13.7
Total Ethnic Groups	\$39.42	\$33.76	1168.3
Total Both Sexes			
European	\$43.31	\$36.44	1529.8
Māori	\$37.27	\$32.00	353.8
Pacific Peoples	\$35.54	\$31.00	161.7
Asian	\$38.47	\$32.60	505.0
MELAA	\$42.77	\$33.93	43.8
Other Ethnicity	\$43.90	\$36.00	27.7
Total Ethnic Groups	\$41.33	\$35.00	2355.4

Source: Statistics NZ June 2024 Household Labour Force Survey (Income). Data obtained from <https://explore.data.stats.govt.nz> (Table name: "Earnings from wages and salaries and self-employment, by sex, region and ethnic groups" [INC_INC_009])

Table 2: Median earnings by sex – relative to overall median (2024)

	Median Earnings (1)	Difference from overall median $(w_{group} - w_*)$ (2)	Difference as a proportion of the overall median (3)
Men	\$35.62	$\$35.62 - \$35.00 = \$0.62$	$\$0.62/\$35.00 = 1.8\%$
Women	\$33.76	$\$33.76 - \$35.00 = -\$1.24$	$-\$1.24/\$35.00 = -3.5\%$
Total	\$33.56		
Inter-group difference in earnings [Men – Women]			
	$\$35.62 - \33.76 =\$1.86	$\$0.62 - (-\$1.24)$ = \$1.86	$\$1.86/\35.00 = 1.8% – (-3.5%) = 5.3%

Note: * Calculation in the final cell appears wrong due to rounding $(4.11\% - (-4.41\%) = 8.55\%)$

Table 3: Gender pay gap calculation – alternative scale (2024)

Scale	Gap calculation	Gap
w_M (Men's median = standard definition)	\$2.87/\$35.62	5.2%
w_F (Women's median)	\$2.87/\$33.76	5.5%
w_O (Overall median)	\$2.87/\$35.00	5.3%

Table 4: Median earnings by ethnicity – relative to overall median (2025)

	Median hourly pay (w_A)	Difference from overall median $(w_A - w_O)$	Gap Relative to overall med $G_{AO O} = -\frac{(w_A - w_O)}{w_O}$
European	\$36.44	\$1.44	-4.1%
Māori	\$32.00	-\$3.00	8.6%
Pacific	\$31.00	-\$4.00	11.4%
Asian	\$32.60	-\$2.40	6.9%
MELAA	\$33.93	-\$1.07	3.1%
Other	\$36.00	\$1.00	-2.9%
Total	\$35.00	\$0.00	0.0%

Note: w_O refers to the overall median

Table 5: Inter-group [row:col] inter-ethnic pay gaps (2025)

	European	Māori	Pacific	Asian	MELAA	Other
(a) Common reference gap: $(G_{row,col O})$ (scale=overall median)						
European	0.0%	-12.7%	-15.5%	-11.0%	-7.2%	-1.3%
Māori	12.7%	0.0%	-2.9%	1.7%	5.5%	11.4%
Pacific	15.5%	2.9%	0.0%	4.6%	8.4%	14.3%
Asian	11.0%	-1.7%	-4.6%	0.0%	3.8%	9.7%
MELAA	7.2%	-5.5%	-8.4%	-3.8%	0.0%	5.9%
Other	1.3%	-11.4%	-14.3%	-9.7%	-5.9%	0.0%
Overall median	4.1%	-8.6%	-11.4%	-6.9%	-3.1%	2.9%
(a) Standard gap: $(G_{row,col col})$ (scale defined by column median)						
Relative to:						
	European	Māori	Pacific	Asian	MELAA	Other
European	0.0%	-13.9%	-17.5%	-11.8%	-7.4%	-1.2%
Māori	12.2%	0.0%	-3.2%	1.8%	5.7%	11.1%
Pacific	14.9%	3.1%	0.0%	4.9%	8.6%	13.9%
Asian	10.5%	-1.9%	-5.2%	0.0%	3.9%	9.4%
MELAA	6.9%	-6.0%	-9.5%	-4.1%	0.0%	5.8%
Other	1.2%	-12.5%	-16.1%	-10.4%	-6.1%	0.0%
Overall median	4.0%	-9.4%	-12.9%	-7.4%	-3.2%	2.8%

Note: The final row of each panel shows the gap between the overall median and the group defined by each column. E.g., the overall median is lower than the European median. The gap is equivalent to 4.6% of the overall median, and 4.4% of the European median.

Table 6: Desirable properties: reversible and pairwise-combinable

Property	Common scale (w_O)	Standard (equation (2))
Reversible	$G_{A,B O} = -G_{B,A O}$	$G_{A,B B} = \frac{G_{B,A A}}{(1 - G_{B,A A})}$
Combining pairwise gaps		
1. $(G_{A,B} \& G_{B,C} \Rightarrow G_{A,C})$	$G_{A,C O} = G_{A,B O} + G_{B,C O}$	$G_{A,C C} = 1 - (G_{A,B B} - 1) * (G_{B,C C} - 1)$
2. $(G_{A,B} \& G_{A,C} \Rightarrow G_{B,C})$	$G_{B,C O} = G_{A,C O} - G_{B,C O}$	$G_{B,C C} = \frac{(G_{A,B B} - G_{A,C C})}{(G_{A,B B} - 1)}$

Note: The 'standard' definition used in the second column uses the same variable as the comparator and the scale.

Table 7: Selected New Zealand gender gap studies

Source	Gap formula	Wage measure
Alexander et al. (2006)	$\ln \frac{w_F}{w_M}$	Mean actual hourly earnings
Dixon (2000, 2004)	$1 - G_{FM M} = \frac{w_F}{w_M}$	Usual regular weekly earnings Usual regular hourly earnings
	$\ln \frac{w_F}{w_M}$	
Fabling et al. (2012)	$\ln \frac{w_F}{w_M}$	Mean monthly earnings
Pacheco et al. (2019)	$\ln \frac{w_F}{w_M}$	Mean hourly
Sin et al. (2022)	$\ln \frac{w_F}{w_M}$	Mean monthly earnings
Strategic Pay (2024)	$G_{FM M} = \frac{(w_F - w_M)}{w_M}$	Base (annual) salary Fixed remuneration Total remuneration Benefits
www.Mindthegap.nz	$G_{FM M} = \frac{(w_M - w_F)}{w_M}$	Median hourly
Te Kawa Mataaho (2021)	$G_{FM M} = \frac{(w_M - w_F)}{w_M}$	Mean annual salary
Iusitini et al. (2024)	$G_{FM M} = \frac{(w_M - w_F)}{w_M}$ $\ln \frac{w_F}{w_M}$	Mean hourly
Statistics New Zealand (2021)	$G_{FM M} = \frac{(w_M - w_F)}{w_M}$	Median hourly
Statistics New Zealand (2020)	$G_{FM M} = \frac{(w_M - w_F)}{w_M}$	Suggests a broad range of pay measures

Notes: Mathematically, $\ln \frac{w_F}{w_M} \approx \left(\frac{w_F}{w_M} - 1 \right) = -G_{FM}$

Table 8: Selected New Zealand inter-ethnic gap studies

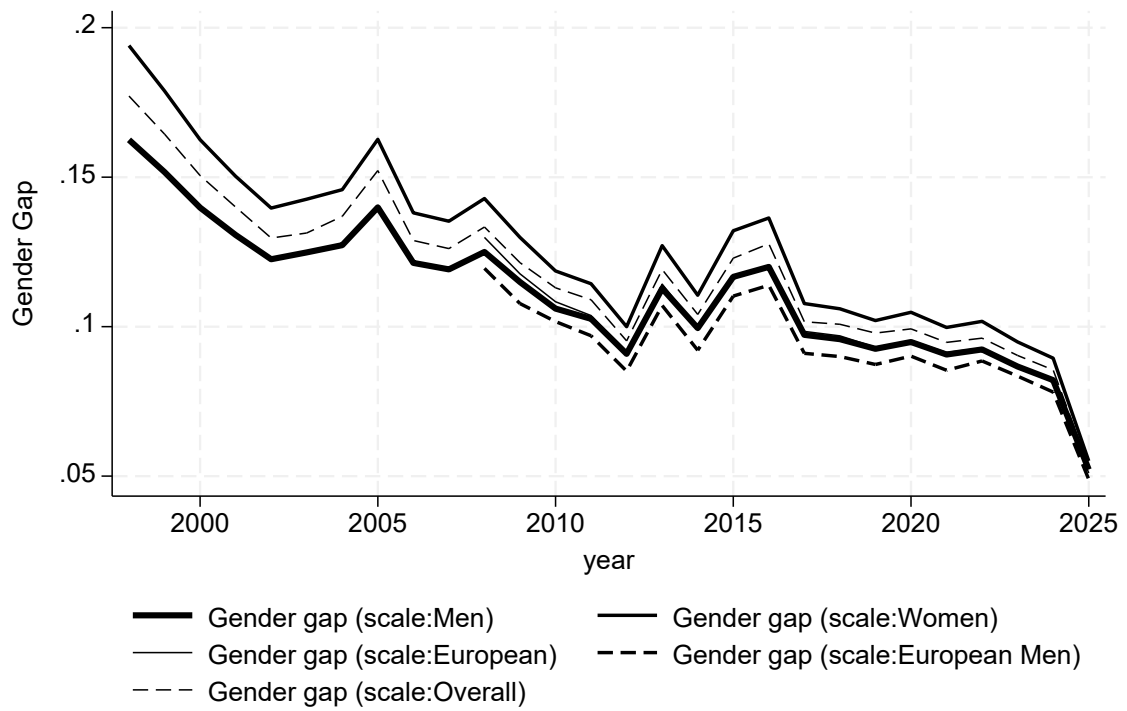
Source	Gap formula	Wage measure
Alexander et al. (2001)	$\ln \frac{w_A}{w_{Eur}}$	Average usual hourly
Cochrane & Pacheco (2022)	$\frac{w_A}{w_{Eur}}$ $\ln \frac{w_A}{w_{Eur}}$	Average hourly
Iusitini et al. (2024)	$G_{A,Eur Eur}; G_{A,Eur_men Eur_men}$ $\ln \frac{w_A}{w_{Eur}}; \ln \frac{w_A}{w_{Eur_men}}$	Average hourly
Te Kawa Mataaho (2021)	w_A $G_{A,\check{A} \check{A}}$	Average Annual salary
Treasury (2018)	$\frac{w_A}{w_{Eur}}; \frac{w_A}{w_{Eur_men}}$ $\ln \frac{w_A}{w_{Eur}}; \ln \frac{w_A}{w_{Eur_men}}$	Average hourly
Maré (2022)	$\frac{w_A}{w_{Eur}}; \frac{w_A}{w_{Eur_men}}$ $\ln \frac{w_A}{w_{Eur}}; \ln \frac{w_A}{w_{Eur_men}}$	Average hourly
Benison et al (2025)	$\ln \frac{w_A}{w_{\check{A}}}$	Average hourly

Notes: Mathematically, $\ln \frac{w_A}{w_{Eur}} \approx \left(\frac{w_A}{w_{Eur}} - 1 \right) = -G_{A,Eur|Eur}$. For ethnic group A, \check{A} is the complement of A and denotes all people not in A.

Table 9: Gap estimates: different definitions of pay (2025)

	Earnings measure			
	Median hourly earnings	Median hourly earnings	Median hourly earnings (FT only)	Average hourly earnings
	(a) Gender gap $\hat{G}_{F,M <col>}$			
	Scale= Male median	Scale= Overall median	Scale= Overall FT median	Scale= Overall average
Gender [Fem:Male]	5.2%	5.3%	2.7%	9.1%
	(b) [Ethnicity:European] gap $\hat{G}_{A,Eur <col>}$			
	Scale= European median	Scale= Overall median	Scale= Overall FT median	Scale= Overall average
[Māori:European]	12.2%	12.7%	13.9%	14.6%
[Pacific:European]	14.9%	15.5%	18.1%	18.8%
[Asian:European]	10.5%	11.0%	12.9%	11.7%
[MELAA:European]	6.9%	7.2%	6.0%	1.3%
[Other:European]	1.2%	1.3%	1.5%	-1.4%

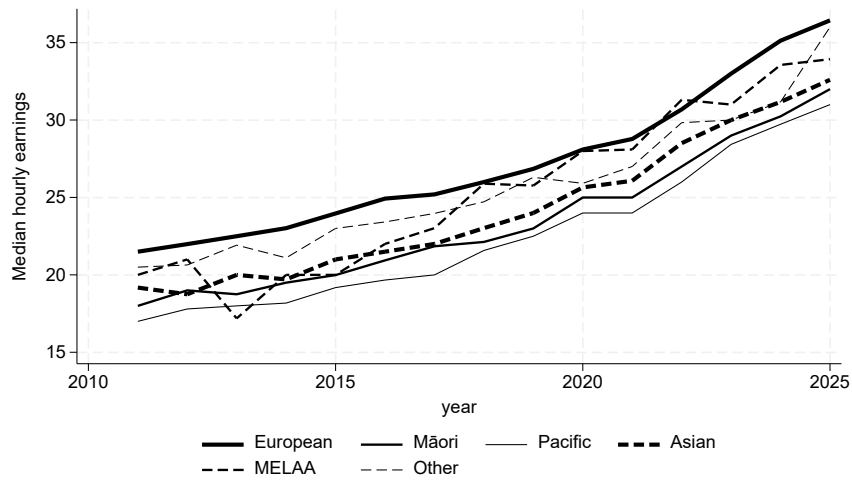
Figure 1: Gender gap in New Zealand (1998-2025): based on different scales



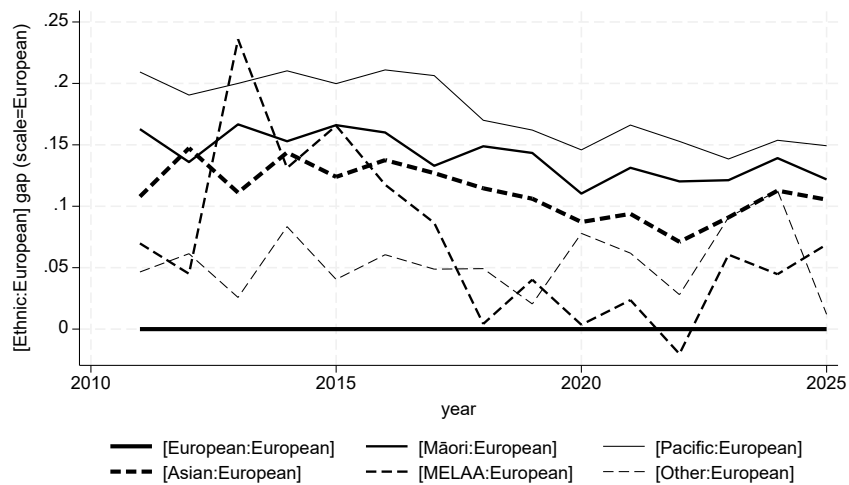
Notes: Gender gaps are calculated using median hourly earnings for men, women, and the scale variable.

Figure 2: Inter-ethnic pay and pay gaps (2011-2025): based on different scales

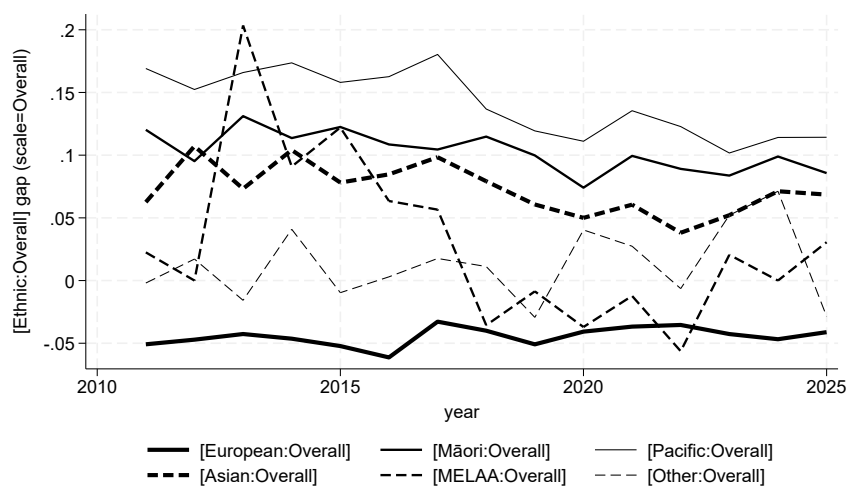
(a) Median hourly earnings (by ethnicity)



(b) [Ethnic:European] gaps (scale-European median)



(c) [Ethnic:Overall] gaps (scale-overall median)



Note: wage in panel (a) is nominal (i.e., not adjusted for CPI changes). Gaps are calculated using median hourly earnings.