

Analytics and Insights Team, The Treasury

**Research Report**

## Statistical analysis of ethnic wage gaps in New Zealand

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# Statistical Analysis of Ethnic Wage Gaps in New Zealand

Analytical Paper 18/03

September 2018

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# Executive summary

This paper estimates the contribution of differences in measured personal and job characteristics to New Zealand's ethnic wage gaps. There are substantial and persistent gaps between the average hourly wages of Pākehā, Māori and Pacific employees. Survey estimates published by Statistics NZ show that the average hourly wage earned by Māori employees was 82% of the average hourly Pākehā wage in 2017, while the average wage earned by Pacific employees was 77% of the average Pākehā wage.

The purpose of the paper is to investigate the extent to which ethnic group differences in demographic, productivity-related or job characteristics may be contributing to the ethnic pay gaps. The Treasury has produced this paper as one of its contributions to He kai kei aku ringa, the previous Government's Māori economic development strategy.

The paper uses 2016-17 data from the Household Labour Force Survey and standard Oaxaca-Blinder decomposition methods. The statistical models used here indicate that ethnic differences in personal and job characteristics account for 68–73% of the Māori-Pākehā hourly wage gap for males, 75% of the Māori-Pākehā wage gap for females, 39–55% of the Pacific-Pākehā wage gap for males, and 41–55% of the Pacific-Pākehā wage gap for females.

Educational level and occupation are the two factors that have the largest impact on Māori-Pākehā and Pacific-Pākehā wage disparities, amongst all those considered. In our models of the Māori-Pākehā wage gap:

- differences in highest qualification account for 18–22% of the wage gap for males and 22–25% of the wage gap for females
- differences in occupation account for 26–28% of the wage gap for males and 21–24% of the wage gap for females.

In our models of the Pacific-Pākehā wage gap:

- differences in highest qualification account for 19–22% of the wage gap for males and 20–22% of the wage gap for females
- differences in occupation account for 31–33% of the wage gap for males and 29–33% of the wage gap for females.

This implies that reducing ethnic differences in educational attainment and/or occupational status could help to reduce the size of the aggregate wage disparities.

The 'unexplained' parts of the wage gaps could be caused by a variety of factors, including ethnic group differences in skills that haven't been included in the models (such as the field of the qualification that is held, English language proficiency, detailed occupational skills, or firm-specific skills and experience); differences in preferences for different jobs because of their non-wage characteristics, and discrimination.

Future research could use other methods, such as field experiments and interviews with employers, to gain insights into the causes and effects of ethnic discrimination in the labour market.

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# 1 Introduction

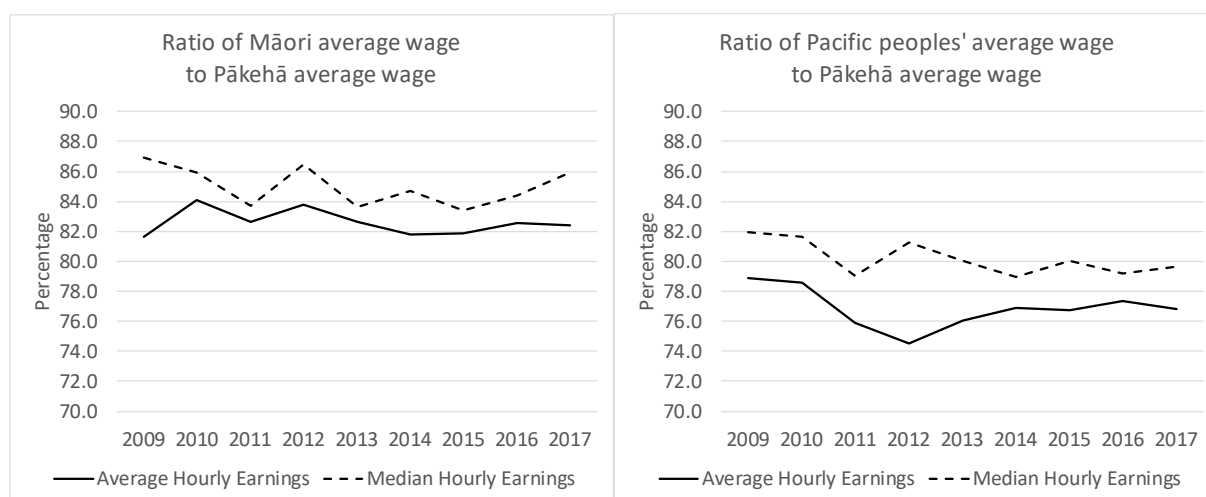
This paper estimates the contribution of differences in measured personal and job characteristics to New Zealand's ethnic wage gaps. There are substantial and persistent gaps between the average hourly wages of Pākehā, Māori and Pacific employees. Survey estimates published by Statistics NZ show that the average hourly wage earned by Māori employees was 82% of the average hourly Pākehā wage in 2017, while the average wage earned by Pacific employees was 77% of the average Pākehā wage. These ratios have not changed materially in recent years, as shown in Figure 1 (there has been movement from year to year but no consistent upward or downward trend).

The paper uses 2016-17 data from the Household Labour Force Survey and standard Oaxaca-Blinder decomposition methods. The purpose of the paper is to investigate the extent to which ethnic group differences in demographic, productivity-related or job characteristics may be contributing to the ethnic pay gaps. Treasury has produced this paper as one of its contributions to He kai kei aku ringa, the Government's Māori economic development strategy.

Ethnic wage gaps are the focus of the paper. For a broader perspective on the employment and economic outcomes of the New Zealand Pacific population, see Kriebler and Gamperle (2016). For a broader perspective on Māori employment, see Ministry of Business, Innovation and Employment (2017).

Section 2 describes the methods. Section 3 provides summary statistics on ethnic group differences in wages and wage-related characteristics. Section 4 gives the results of the decompositions. Section 5 discusses the interpretation of the findings, their limitations, and directions for further research.

**Figure 1:** Ratio of Māori and Pacific people's hourly wages to Pākehā hourly wages



Source: Household Labour Force Survey, Statistics NZ published estimates.



## 2 Methods

### 2.1 Data sources

Our main data source is the June 2016 and June 2017 quarters of the Household Labour Force Survey (HLFS). Income questions are asked in June quarters only in the HLFS.

We pool data from the latest two years of the survey in order to increase sample sizes. We don't use data for earlier years because of changes to the questionnaire between 2015 and 2016, altering some of the key variables.

The Integrated Data Infrastructure (IDI) is a secondary data source, which is used solely to derive a measure of time spent in wage or salaried employment during the past 5 years, for each person in the study population.

### 2.2 Study population

The study population includes all wage and salary earners aged 15-69 years who provided responses to the survey questions on their earnings, directly or through another member of their household.

Respondents whose earnings responses were later imputed by Statistics NZ – because they answered the core HLFS questions but not the additional earnings questions – are not included in the sample for analysis. Fourteen percent of records were excluded because of the imputation of the person's earnings. Approximately 40% of earnings responses in the remaining sample were provided by a proxy respondent – that is, by another member of the family.

### 2.3 Definitions and relative size of each ethnic group

Ethnic groups are defined as in Table 1.

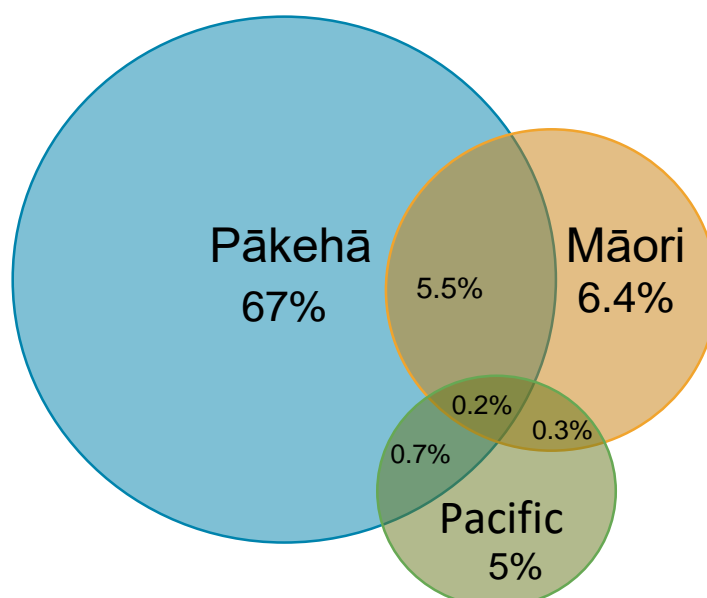
**Table 1:** Ethnic group definitions

Group	Definition
Māori	People who gave 'Māori' as one of their ethnic groups
Sole Māori	People who gave 'Māori' as their only ethnic group
Pākehā	People who gave 'European' or 'Pākehā' as one their ethnic groups
Pacific peoples	People who gave any of the Pacific ethnicities as one of their ethnic groups. This includes all of the islands of the Pacific (Polynesia and Melanesia).

The Pākehā group incorporates 73.3% of wage and salary earners in the sample; the Māori group 12.4%; sole Māori 6.4%; and the Pacific peoples group 6.3%.

It has become standard practice to define ethnic groups in an inclusive way, counting everyone who listed the specified group as one of their ethnicities. This means that the ethnic groups overlap (with the exception of the sole Māori group). Figure 2 shows the extent of overlap between the three main ethnic groups within our sample of wage and salary earners.<sup>1</sup>

**Figure 2:** Percentage of wage and salary earners in each ethnic group and their combinations, HLFS June quarters 2016-17



The biggest overlap is of Pākehā and Māori. 5.7% of all wage and salary earners said they were both Pākehā and Māori, and this sub-group made up 46% of the entire 'Māori' ethnic group, and 7.7% of the entire 'Pākehā' ethnic group.

Approximately 85% of all wage and salary earners are accounted for in Figure 2. The other 15% were not members of any of the three ethnic groups that are the focus of this paper (and were instead classified to the Asian, MELAA<sup>2</sup> or other ethnic groups).

## 2.4 Measure of earnings

The measure of earnings used in this paper is the worker's total before-tax average hourly earnings in their main job. The main job is defined as the one in which the respondent usually worked the most hours. The words 'wage' and 'average hourly earnings' mean the same thing in this paper and are used interchangeably.

<sup>1</sup> Note that the results in Figure 1 are for wage and salary earners only. The ethnic composition of all persons in employment – including the self-employed – differs from this. Pākehā are more likely than Māori and Pacific peoples to be self-employed, and therefore they make up a larger proportion of all persons in employment.

<sup>2</sup> Middle Eastern, Latin American or African.

## 2.5 Other variables

Most personal and job variables used in this paper were sourced from the HLFS. We added a measure of employment history by linking administrative data on wage and salary earnings during the past 5 years to each individual's HLFS record. We then count the number of calendar months in the 5-year-period in which any wage or salary earnings were recorded. This gives a rough measure of employment continuity.

88% of individuals in the sample had already been linked to an identity in the Integrated Data Infrastructure by Statistics NZ. Additional linkages were made by Treasury by linking individuals living at the same address with matching gender, year of birth and month of birth. The final linkage rate was 96%.

## 2.6 Oaxaca-Blinder decomposition

Oaxaca (1973) and Blinder (1973) introduced an approach for estimating wage discrimination which has been much used in the literature on gender and ethnic earnings disparities.

Consider two ethnic groups, group 1 and group 2, where group 1 is a numerically dominant ethnic group (such as Pākehā in New Zealand), and group 2 is a minority ethnic group. Log wage regressions are estimated separately for the members of each ethnic group, by regressing a set of covariates  $X_i$  on the log of wages. These take the form:

$$\ln w_i^1 = \beta^1 X_i^1 + \varepsilon_i^1 \quad (1a)$$

$$\ln w_i^2 = \beta^2 X_i^2 + \varepsilon_i^2 \quad (1b)$$

where the 1 and 2 superscripts denote the two ethnic groups, the  $i$  subscript denotes the  $i^{\text{th}}$  wage earner, and  $w$  stands for wages.  $X$  represents a vector of explanatory variables, such as age and education.

Because OLS regression lines pass through the means of each of the variables, the log wage gap between the two groups is equivalent to:

$$\overline{\ln w^1} - \overline{\ln w^2} = \overline{\beta^1 X^1} - \overline{\beta^2 X^2} \quad (2)$$

where  $\overline{X^1}$  and  $\overline{X^2}$  are vectors containing the means of the explanatory variables for each ethnic group, and  $\beta^1$  and  $\beta^2$  are the vectors of estimated coefficients from the group 1 and group 2 wage regressions.

Given this result, the log wage differential can be decomposed in various ways. Oaxaca proposed the following forms:

$$\overline{\ln w^1} - \overline{\ln w^2} = (\overline{X^1 - X^2})\beta^1 + (\beta^1 - \beta^2)\overline{X^2} \quad (3a)$$

and

$$\overline{\ln w^1} - \overline{\ln w^2} = (\overline{X^1 - X^2})\beta^2 + (\beta^1 - \beta^2)\overline{X^1} \quad (3b)$$

The first term on the right-hand side of these equations represents the part of the log wage differential that is due to the ethnic group differences in mean characteristics. If the characteristics included in  $X$  are age, education, experience, and other direct or indirect measures of skill, this term can be interpreted as measuring the effects of differences in the groups' current average productive capacity on the ethnic gap in earnings.

The second term in the equations represents the effect of ethnic group differences in the estimated coefficients, which represent the log wage returns to characteristics. There are several possible sources of these differences in returns. They may be due to unmeasured differences in the level or quality of the characteristics that are included in the equation; to other measurement errors in variables; or to ethnic group differences in skills or productivity-related characteristics that are unmeasured in surveys, and therefore omitted from the regression. They may partly reflect ethnic group differences in preferences for non-wage job characteristics. They may also be due to discriminatory differences in the wage rates that people of different ethnicities receive for a given level of skills. Because the interpretation of the second term in the decompositions is problematic, and can't be attributed solely to discrimination, we focus on the first term in this analysis of ethnic wage gaps.

There are two possible weighting schemes in the Oaxaca decomposition. The first weighting scheme (3a above) uses the Group 1 wage structure to value (ie, assign a price to) the attributes of both ethnic groups. Intuitively, this assumes that the dominant ethnic groups' wage rates are unaffected by discrimination, and would prevail in the absence of discrimination against ethnic minorities. The converse is true of the second weighting scheme (3b above). (3a) is typically used in the ethnic wage inequality literature.

Neumark (1988) suggested a more general weighting method:

$$\overline{\ln w^1} - \overline{\ln w^2} = (\overline{X^1} - \overline{X^2})\beta + [(\beta^1 - \beta)\bar{X}^1 - (\beta^2 - \beta)\bar{X}^2] \quad (4)$$

where  $\beta$  is estimated from a pooled regression of all employees. This version is intuitively appealing if one believes that the wage structures of all groups are influenced by the unequal treatment of different ethnic groups in the labour market. The (employment weighted) overall average coefficients are assumed to be a reasonable representation of the prices for different attributes that would prevail if all groups were treated equally in the labour market.

The choice of weighting scheme for the decomposition can lead to significant variations in the results obtained. In this paper we present results using two alternative weighting schemes, following equations 3a and 4. The first version, which weights the gap in productive attributes with the coefficients from the Pākehā regression (the largest ethnic group), is the weighting method most commonly used in research on ethnic wage differentials. The second version, which uses the coefficients from a pooled regression as weights, is also presented because it does not require such strong assumptions about the alternative wage structure that would prevail in a labour market free from ethnic inequities.

### 3 Ethnic group differences in wages and characteristics

Table 2 shows the mean hourly wages of the employees in each ethnic group in 2016-17 (using June 2017 dollar values). The ratio of the Māori mean to the Pākehā mean is 82%, or 80% in the case of sole Māori. The ratio is higher for females than for males, by about 5 percentage points. The ratio of the Pacific mean to the Pākehā mean is 76%. As for Māori, the ratio is higher for females than for males.

**Table 2:** Mean ethnic group hourly wages and their ratios: HLFS June quarters 2016-17

	Total \$	Male \$	Female \$	Total wage as percentage of Pākehā wage \$	Male wage as percentage of Pākehā male wage \$	Female wage as percentage of Pākehā female wage \$
Pākehā	30.09	32.61	27.55			
Māori	24.72	26.02	23.43	82.2	79.8	85.0
Sole Māori	24.09	24.99	23.21	80.1	76.6	84.2
Pacific peoples	22.96	24.13	21.71	76.3	74.0	78.8

Source: Author's analysis of data from the June 2016 and June 2017 quarters of the HLFS. Notes: Dollars are in June 2017 values. The wages shown represents pre-tax average hourly earnings.

Summary descriptive statistics for the males and females in each ethnic group in the wage earner sample are set out in Table 3, focusing on the key personal and job characteristics that are associated with wage differentials.

**Table 3:** Average personal and job characteristics of employees in each ethnic group

	Pākehā		Māori		Sole Māori		Pacific peoples	
	M	F	M	F	M	F	M	F
N - unweighted sample size	8,754	9,216	1,404	1,509	756	816	828	807
Real hourly wage (mean)	32.6	27.5	26.0	23.4	25.0	23.2	24.1	21.7
Real weekly earnings (mean)	1375.5	946.0	1073.7	806.6	1038.9	827.9	969.9	762.3
Log of real hourly wage (mean)	3.36	3.22	3.17	3.09	3.15	3.08	3.11	3.03
Age (mean)	40.0	41.0	38.0	39.0	41.0	41.0	37.0	37.0
Months with some W&S employment in the past 5 years (mean)	48.6	47.2	46.1	43.3	47.8	44.9	44.6	41.7
Hours (mean)	41.4	33.2	41.1	33.6	41.6	35.1	40.1	34.6
Years in current job (mean)	6.7	6.0	6.2	5.4	6.6	6.1	5.4	5.1
<b>Age group</b>								
15-24	17.1	15.9	23.1	19.0	16.8	12.6	20.4	21.7
25-34	22.6	19.5	23.2	21.8	22.7	21.0	28.1	25.0
35-44	19.8	19.4	19.0	20.6	18.1	21.3	20.9	20.1
45-54	20.3	22.9	18.7	22.7	22.5	26.3	16.8	21.3
55-69	20.2	22.2	16.0	16.0	19.9	18.8	13.9	11.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Parental status</b>								
Joint parent	33.3	28.0	37.8	28.3	36.8	27.0	46.6	33.7
Sole parent	1.4	6.3	2.6	15.6	3.2	15.9	2.0	9.7

	Pākehā		Māori		Sole Māori		Pacific peoples	
	M	F	M	F	M	F	M	F
<b>Region</b>								
Northland	2.9	3.0	6.9	7.0	6.7	8.5	S	1.0
Auckland	28.5	28.3	21.2	22.4	16.2	20.5	65.8	65.8
Waikato	9.6	9.4	11.5	13.7	12.4	14.1	4.3	4.1
Bay of Plenty	5.7	6.5	10.5	10.3	12.8	11.9	3.8	2.7
Gisborne / Hawkes' Bay	3.4	4.2	9.3	9.8	13.9	13.9	1.9	1.8
Taranaki	2.5	2.3	3.1	2.5	3.6	3.1	S	S
Manawatu / Whanganui	5.5	5.2	9.8	10.4	10.9	10.3	2.8	2.7
Wellington	12.7	13.0	10.9	9.8	10.4	8.9	11.5	13.2
Nelson/Marlborough/West Coast	4.3	4.2	3.7	3.0	3.7	1.8	1.8	1.5
Canterbury	16.7	16.1	8.1	7.6	5.4	4.4	5.0	4.2
Otago	5.3	5.5	2.5	1.7	2.5	1.0	1.0	2.0
Southland	2.7	2.3	2.4	2.0	1.6	1.4	S	S
<b>Highest qualification</b>								
Post-graduate degree	9.2	11.6	3.5	6.4	3.4	7.1	1.9	4.3
Bachelor's degree	17.8	24.4	8.6	16.9	7.5	14.9	8.2	14.3
Certificate / Diploma level 4-6	23.8	12.1	20.3	13.1	20.1	13.9	17.5	16.4
PS certificate level 1-3 or PS level NS	8.7	12.4	9.7	15.1	10.1	14.3	7.6	14.0
School level 3	8.0	7.4	6.9	8.4	4.3	7.4	9.9	9.3
School level 2	9.4	9.0	12.2	10.5	8.9	10.0	8.8	8.7
School level 1	7.3	9.0	11.1	9.8	11.3	9.0	6.2	6.0
No Qualification	12.0	10.2	23.5	16.7	28.9	19.9	27.1	17.7
Qualifications NS	3.8	3.9	4.3	3.2	5.5	3.8	12.8	9.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Months with some W&amp;S employment in the past 5 years</b>								
None	4.2	4.7	3.7	5.5	4.1	4.3	4.0	5.6
1-12	6.0	5.9	8.0	8.5	5.4	7.4	9.7	10.8
13-24	5.6	6.5	6.0	8.6	5.3	7.7	7.6	9.2
25-36	7.2	7.2	8.3	9.2	8.3	9.0	9.2	9.4
37-48	8.3	10.9	10.3	11.6	11.4	11.8	8.9	10.7
49-60	65.8	61.4	59.3	51.8	60.6	55.4	54.4	49.7
Missing	2.9	3.4	4.6	4.9	4.9	4.5	6.0	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Hours</b>								
<10 hours	2.9	6.5	3.4	6.6	2.3	4.8	2.0	4.7
10-<20 hours	3.3	10.7	4.4	9.6	4.5	8.1	2.4	8.3
20-<30 hours	4.0	14.7	4.9	12.6	4.9	10.5	6.4	11.6
30-<50 hours	67.6	59.1	63.2	62.7	62.7	67.5	73.1	69.5
50+ hours	22.1	9.1	24.0	8.5	25.6	9.1	15.9	5.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

	Pākehā		Māori		Sole Māori		Pacific peoples	
	M	F	M	F	M	F	M	F
<b>Job tenure</b>								
< 6 months	11.7	12.3	14.7	13.8	13.4	12.1	14.2	12.2
6 –<1 year	12.5	13.5	12.4	15.6	12.4	14.8	12.7	13.5
1 –<3 years	23.7	23.5	23.0	23.8	23.1	22.1	25.9	26.9
3 –<5 years	9.2	9.5	9.8	8.0	9.0	8.1	8.8	10.9
5 –< 10 years	18.5	19.0	17.0	19.3	18.5	19.0	20.5	19.3
10+ years	24.5	22.2	23.2	19.5	23.6	23.9	18.1	17.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Occupation</b>								
Managers	19.5	11.8	12.5	10.3	10.4	9.8	8.8	6.9
Professionals	22.3	31.8	13.6	24.8	11.9	25.2	8.1	17.2
Technicians and trades	18.6	4.9	17.1	4.5	16.4	3.9	17.0	4.2
Community and personal service	5.9	12.5	7.5	16.9	7.7	16.1	7.8	18.2
Clerical and administrative	5.4	20.4	5.2	15.8	4.8	15.4	6.3	18.5
Sales	7.2	11.1	4.8	10.7	3.5	10.3	4.7	11.7
Machinery operators and drivers	9.3	1.0	15.9	2.5	19.1	2.4	22.3	6.0
Labourers	11.4	6.2	23.4	13.9	26.1	16.2	24.6	16.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Industry</b>								
Agriculture, forestry and fishing, and mining	5.8	2.1	8.5	3.3	9.5	4.2	3.4	1.0
Manufacturing	15.0	4.9	18.9	7.2	20.5	7.0	24.7	12.2
Electricity, gas, water and waste services	1.4	0.6	1.2	0.5	1.7	S	1.3	S
Construction	13.5	2.2	16.1	1.2	15.5	S	16.9	S
Wholesale trade	7.1	3.6	4.7	2.7	3.5	2.1	7.1	2.7
Retail trade	8.1	10.8	6.3	10.8	5.3	9.5	7.3	11.1
Accommodation and food services	3.0	7.2	3.7	9.8	3.7	7.9	3.4	8.7
Transport, postal and warehousing	5.6	2.0	7.9	2.7	10.6	3.4	9.2	6.5
Information media and telecommunications	2.2	1.5	1.5	0.8	S	1.0	S	S
Financial and insurance services	2.9	4.1	1.4	3.3	1.0	2.6	2.3	4.0
Rental, hiring and real estate Services	1.2	1.6	0.9	0.7	S	S	0.9	1.2
Professional, scientific and technical services	8.6	8.7	3.2	4.4	1.8	3.4	2.1	2.0
Administrative and support services	2.4	2.6	3.1	3.1	3.8	3.2	4.1	5.3
Public administration and safety	8.1	6.9	7.9	8.4	7.4	9.5	6.1	6.9
Education and training	5.9	16.3	5.2	16.1	6.4	17.3	3.3	12.2
Health care and social assistance	3.6	18.8	4.2	17.7	3.9	20.6	3.5	18.9
Arts and recreation services	1.6	1.8	1.8	2.1	1.3	1.7	1.5	1.7
Other services / NS	4.0	4.2	3.2	5.2	2.9	4.6	2.4	3.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Sample sizes have been randomly rounded.

The mean age of this sample of Māori wage and salary earners was about 2 years younger than the mean age of the Pākehā sample. The Pacific peoples' sample was about 3 years younger on average. The sole Māori sample, in contrast, was similar in its age structure and average age to the Pākehā sample (and older than the full Māori sample).

Māori and Pacific males were more likely to be joint parents of dependent children, and slightly more likely to be sole parents of dependent children, than Pākehā males. Turning to females, the proportion of Māori who were sole parents was much higher than the proportion of Pākehā, while Pacific women were more likely to have dependent children in both partnerships and as sole parents.

The regional profiles of the ethnic groups are different, with Māori being less likely than Pākehā to live in the Auckland, Wellington and Canterbury regions and more likely to live elsewhere in the North Island, and Pacific peoples being far more likely to live in Auckland than anywhere else. Two-thirds live in Auckland.

The qualification profiles also show some quite large ethnic group differences, with Pākehā holding higher qualifications than the other two groups on average. For instance, 36% of women in the Pākehā sample held a degree, compared with 23% of Māori women and 19% of Pacific women.

Counting the number of calendar months in the past 5 years in which income from wages or salaries was earned (any amount), we find that Pākehā workers had somewhat greater employment continuity than Māori or Pacific workers. The male means are 48.6 months for Pākehā, 46.1 months for Māori, and 44.6 months for Pacific peoples. The female means are 47.2 months for Pākehā, 43.3 months for Māori, and 41.7 months for Pacific peoples.<sup>3</sup>

Turning to current job characteristics, we consider hours worked because there is a correlation between part-time hours and lower wages for workers in general, but the results show very little difference between the mean weekly hours of the different ethnic groups. Job tenure (ie time spent in the current job) is positively correlated with wage level on average, and the tenure measures do show some small differences, with Māori and Pacific employees having lower job tenure on average.

Occupation is a key determinant of earnings, and the statistics on the proportion of each ethnic group in each 1-digit occupational group indicate that Pākehā were much more likely to hold managerial or professional jobs, and much less likely to be in the two least skilled occupational groups (machinery operators and drivers and labourers), compared with Māori and Pacific peoples. The industry statistics show that Māori were more likely than Pākehā to work in the primary industries, in manufacturing, or in transport, postal and warehousing, while Pacific peoples were more likely to work in manufacturing or in transport, postal and warehousing.

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<sup>3</sup> Months of self-employment are not counted, because monthly data on self-employment income are not available.



## 4 Contribution of differences in characteristics to the ethnic wage gaps

Table 4 and Table 5 set out our estimates of the contribution of differences in measured characteristics to the hourly wage gaps, using the Oaxaca-Blinder decomposition method. Note that these decompositions are carried out using the natural log of wages rather than wage levels. This is the standard approach, adopted because taking the log of each person's wage makes the distribution of the wage variable less skewed to the right, so that the mean is closer to the centre of the wage distribution and closer to the wage earned by the typical worker.

In Table 4, coefficients from a wage regression using the Pākehā sample were used to weight the mean differences in characteristics. In Table 5, coefficients from a wage regression using people of all ethnic groups are used to weight the differences in characteristics. If Pākehā are rewarded more highly for each characteristic, then the first weighting approach will tend to lead to higher estimates of the 'explained' portion of the total ethnic wage gap.

The results of decompositions using personal characteristics only are presented in the upper section of the tables. The variables included here are age, highest qualification, parental status, region and employment continuity (measured by the number of months of wage or salaried employment in the past 5 years). Age is a proxy measure of employment experience. Highest qualification is a proxy measure of job-related skill level. Parental status is a productivity-related characteristic because it can affect individuals' preferred hours of work or willingness to work in particular jobs and locations. Region of residence is a productivity-related characteristic because labour is more valuable in regions of higher labour demand. The employment continuity measure is another measure of employment experience.

Focusing on Table 4, the first five variables (age, highest qualification, parental status, region and employment continuity) together explain 59% of the Māori-Pākehā wage gap for males and 68% of the Māori-Pākehā wage gap for females. The difference in qualifications makes the largest contribution, with smaller contributions coming from age, region of residence, employment continuity, and parental status in the case of females. Māori employees are younger, less likely to live in higher paying regions such as Auckland, Wellington and Christchurch, and if female are more likely to be sole parents. They had slightly less employment continuity than Pākehā (as shown in Figure 3).

The explanatory power of these 'personal' variables is lower when sole Māori are compared with Pākehā (reflecting, among other things, the fact that the sole Māori group is older than the total Māori group). It is substantially lower when Pacific peoples are compared with Pākehā. These variables explain 16% of the Pacific-Pākehā wage gap for males and 21% of the Pacific-Pākehā wage gap for females. The difference in qualifications makes the largest contribution to the wage gap between Pacific peoples and Pākehā, with a smaller contribution coming from differences in age (reflecting the fact that Pacific employees are younger). The regional location of Pacific peoples has a *negative* sign in the decomposition (reducing the total explanatory power of the model), because Pacific peoples are disproportionately located in Auckland, a region in which Pākehā wages are higher than average. This residence pattern should lead to higher wages for Pacific peoples, but it does not. Two thirds of the Pacific peoples in the sample were living in the Auckland region, compared with 28% of Pākehā and 21% of Māori.

**Table 4:** Decomposition results using Pākehā wage regression coefficients as weights

	Māori		Sole Māori		Pacific peoples	
	M	F	M	F	M	F
Log hourly wage differential, compared with Pākehā	0.191	0.137	0.216	0.142	0.248	0.197
<b>Model 1: Personal characteristics</b>						
Age	0.027	0.009	-0.003	-0.010	0.022	0.017
Parental status	-0.008	0.007	-0.007	0.007	-0.019	0.000
Region	0.020	0.018	0.031	0.023	-0.057	-0.053
Qualifications	0.066	0.049	0.081	0.055	0.082	0.063
Employment continuity*	0.007	0.011	0.004	0.007	0.011	0.015
All personal characteristics	0.113	0.093	0.106	0.082	0.039	0.042
% Age	14.3	6.8	-1.5	-7.3	9.0	8.4
% Parental status	-4.1	4.8	-3.3	5.3	-7.8	-0.1
% Region	10.6	12.9	14.4	16.3	-22.9	-26.6
% Qualifications	34.6	35.7	37.7	38.4	33.0	31.8
% Employment continuity	3.5	8.0	1.9	4.9	4.3	7.5
<b>% Explained</b>	<b>58.9</b>	<b>68.3</b>	<b>49.2</b>	<b>57.5</b>	<b>15.6</b>	<b>21.1</b>
<b>Model 2: Personal and job characteristics</b>						
Age	0.020	0.005	-0.002	-0.005	0.018	0.010
Parental status	-0.007	0.003	-0.006	0.004	-0.016	-0.002
Region	0.015	0.014	0.023	0.019	-0.041	-0.039
Qualifications	0.043	0.034	0.052	0.037	0.053	0.044
Employment continuity	0.003	0.004	0.002	0.003	0.004	0.005
Hours	0.002	-0.002	0.002	-0.003	-0.002	-0.005
Job tenure	0.003	0.005	0.001	-0.001	0.005	0.005
Type employment relationship	0.001	0.000	0.000	0.000	-0.001	0.001
Occupation	0.049	0.028	0.063	0.029	0.076	0.057
Industry	0.009	0.010	0.014	0.010	0.001	0.003
All characteristics	0.139	0.102	0.148	0.093	0.098	0.080
% Age	10.7	3.6	-1.1	-3.4	7.2	5.2
% Parental status	-3.4	2.2	-2.8	2.7	-6.2	-1.0
% Region	7.7	10.6	10.4	13.4	-16.5	-19.6
% Qualifications	22.3	25.2	24.0	26.4	21.5	22.1
% Employment continuity	1.4	3.1	0.9	2.0	1.6	2.7
% Hours	1.0	-1.2	0.9	-2.3	-0.7	-2.3
% Job tenure	1.6	3.4	0.6	-0.7	2.1	2.5
% Employment relationship	0.4	0.2	0.2	0.2	-0.4	0.5
% Occupation	25.8	20.5	29.2	20.5	30.5	28.8
% Industry	4.9	7.2	6.3	6.7	0.3	1.5
<b>% Explained</b>	<b>72.5</b>	<b>74.6</b>	<b>68.5</b>	<b>65.3</b>	<b>39.3</b>	<b>40.5</b>

\* Employment continuity means months of wage or salaried employment in the past 5 years.

**Table 5:** Decomposition results using full sample wage regression coefficients as weights

	Māori		Sole Māori		Pacific peoples	
	M	F	M	F	M	F
Log hourly wage differential, compared with Pākehā	0.191	0.137	0.216	0.142	0.248	0.197
<b>Model 1: Personal characteristics</b>						
Age	0.024	0.009	-0.003	-0.008	0.022	0.017
Parental status	-0.006	0.005	-0.005	0.006	-0.016	0.000
Region	0.014	0.014	0.021	0.019	-0.025	-0.031
Qualifications	0.062	0.048	0.078	0.055	0.082	0.065
Employment continuity	0.009	0.014	0.005	0.008	0.015	0.018
<b>All personal characteristics</b>	<b>0.103</b>	<b>0.091</b>	<b>0.096</b>	<b>0.080</b>	<b>0.078</b>	<b>0.069</b>
% Age	12.7	6.8	-1.4	-5.8	8.7	8.4
% Parental status	-3.2	3.9	-2.5	4.2	-6.4	-0.1
% Region	7.3	10.5	9.7	13.3	-10.2	-15.7
% Qualifications	32.4	35.3	35.9	38.8	33.2	33.1
% Employment continuity	4.6	9.9	2.5	5.9	6.0	9.3
<b>% Explained</b>	<b>53.7</b>	<b>66.4</b>	<b>44.2</b>	<b>56.5</b>	<b>31.2</b>	<b>35.0</b>
<b>Model 2: Personal and job characteristics</b>						
Age	0.017	0.005	-0.002	-0.004	0.016	0.010
Parental status	-0.005	0.003	-0.005	0.003	-0.012	-0.001
Region	0.008	0.012	0.012	0.016	-0.015	-0.020
Qualifications	0.034	0.030	0.042	0.034	0.047	0.040
Employment continuity	0.004	0.006	0.003	0.004	0.007	0.008
Hours	0.001	-0.001	0.001	-0.001	-0.001	-0.003
Job tenure	0.003	0.004	0.001	-0.001	0.006	0.005
Type employment relationship	0.001	0.001	0.000	0.000	0.002	0.002
Occupation	0.053	0.033	0.068	0.034	0.083	0.065
Industry	0.013	0.010	0.018	0.010	0.006	0.004
<b>All characteristics</b>	<b>0.130</b>	<b>0.103</b>	<b>0.139</b>	<b>0.096</b>	<b>0.137</b>	<b>0.109</b>
% Age	9.1	3.4	-1.0	-2.6	6.5	5.1
% Parental status	-2.7	1.9	-2.1	2.3	-5.0	-0.7
% Region	4.3	8.8	5.6	11.2	-6.1	-10.3
% Qualifications	17.7	22.2	19.5	23.9	18.7	20.1
% Employment continuity	2.3	4.6	1.4	2.7	2.8	4.2
% Hours	0.7	-0.6	0.7	-0.9	-0.4	-1.4
% Job tenure	1.5	3.0	0.6	-0.8	2.4	2.4
% Employment relationship	0.4	0.4	-0.1	0.2	0.8	1.1
% Occupation	28.0	24.0	31.6	24.3	33.3	32.7
% Industry	6.8	7.4	8.3	7.1	2.3	2.2
<b>% Explained</b>	<b>68.0</b>	<b>75.1</b>	<b>64.4</b>	<b>67.3</b>	<b>55.3</b>	<b>55.3</b>

\* Employment continuity means months of wage or salaried employment in the past 5 years.

The results of decompositions using information on both personal and job characteristics are presented in the lower section of the tables. The additional variables included in the second set of wage regressions as explanatory variables are hours of work; job tenure; whether the job involved a non-standard employment relationship (fixed-term, employment agency, casual, or seasonal); 1-digit occupation and 1-digit industry. These job characteristics were chosen because measures are available in the HLFS and they are empirically associated with significant wage variations in the labour market.

In Table 4, the full set of variables included in the second regression model explains 73% of the Māori-Pākehā wage gap for males and 75% of the Māori-Pākehā wage gap for females. In these Māori-Pākehā wage gap decompositions, occupation plays the biggest role, accounting for about 26% percent of the entire wage gap for males and 21% for females. Highest qualification is the second most important variable. Age, region of residence and industry each make a small contribution. Differences in hours of work, job tenure, and type of employment relationship are of little importance once the other variables have been included.

The explanatory power of the full set of variables is similar but lower when sole Māori are compared with Pākehā.

The variables included in the second regression model together explain 39% of the Pākehā-Pacific wage gap for males and 41% of the Pākehā -Pacific wage gap for females. Occupation is the most important explanatory variable, with highest qualification also making a strong contribution to the total wage gap. Parental status, region and hours of work all make very small negative contributions to these decompositions, indicating that the distribution of these characteristics among Pacific peoples is slightly more favourable towards higher wage levels than the distribution among Pākehā.

By comparing Table 4 and Table 5 we can see that the choice of weighting scheme makes little difference to the decomposition of the Māori-Pākehā wage gap. The 'explained' proportion is only slightly higher in Table 5 (see the bottom rows of Table 4 and Table 5). It is a different story for the Pacific-Pākehā wage gap: using the coefficients from the pooled sample wage regression (ie using data for all ethnic groups) materially raises the 'explained' proportion of the Pacific-Pākehā wage gap for both males and females, from less than 40% to about 55%.

It's worth noting that the explanatory power of every factor is influenced by the choice of other variables to be included in the model. The explanatory power of education in the decomposition of the Māori-Pākehā wage gap, for example, is reduced by about 12 percentage points when job characteristics are also included. Therefore, this method does not give a definitive, single result for the role of a specific factor like education when understanding ethnic wage differences. The models are most useful in giving an indication of the *relative* importance of specific factors, such as age or education, relative to the other factors that have been included in the same model.

## 5 Summary and discussion

### 5.1 Summary

This analysis has estimated the statistical contribution of a number of measured productivity-related characteristics to ethnic wage disparities.

We find that educational level and occupation are the two factors, among the set of factors considered, that have the largest impact on Māori-Pākehā and Pacific-Pākehā wage disparities. In the full models for the Māori-Pākehā wage gap, differences in highest qualification account for 18–22% of the wage gap for males and 22–25% of the wage gap for females, while differences in occupation account for 26–28% of the wage gap for males and 21–24% of the wage gap for females. In the full models for the Pacific-Pākehā wage gap, differences in highest qualification account for 19–22% of the wage gap for males and 20–22% of the wage gap for females, while differences in occupation account for 31–33% of the wage gap for males and 29–33% of the wage gap for females.

This implies that reducing ethnic differences in educational attainment and/or occupational status could help to reduce the size of the aggregate wage disparities.

These statistical models account for 68–73% of the entire Māori-Pākehā wage gap for males, 75% of the Māori-Pākehā wage gap for females, 39–55% of the Pacific-Pākehā wage gap for males, and 41–55% of the Pacific-Pākehā wage gap for females. The remaining portions of the wage gaps could be caused by a variety of factors, including differences between ethnic groups of other characteristics that haven't been included in the model (such as the field of the qualification that is held, English language proficiency, detailed occupational skills, and firm-specific skills and experience); differences between ethnic groups in preferences for different jobs because of their non-wage characteristics, or discrimination.

About 18% of the Pākehā wage earners in the study sample and 54% of the Pacific wage earners in the study sample were born overseas. Therefore, a more complete explanation of the Pacific-Pākehā wage gap would need to take into account the effects of being an immigrant on earnings, including the effects of variations in English language skills, variations in social capital and social networks, and discrimination against migrants. These factors would also be important for any future analysis of Asian wage earners.

### 5.2 What have we learnt about ethnic wage gaps?

Ethnic group differences in hourly earnings are partly due to ethnic group differences in productivity-related characteristics and partly due to differences in job characteristics. Part of each pay gap remains unexplained. The 'currently unexplained' portion is larger for Pacific peoples than for Māori.

Because of the statistical importance of ethnic differences in educational attainment and occupational status, reducing the size of these differences would be particularly useful.

Alongside these pay gaps, there is also the issue of higher unemployment rates for Māori and Pacific peoples compared with Pākehā. As at June 2017, the unemployment rate for Pākehā was 3.4%, for Māori it was 11.1% and for Pacific peoples it was 10.1%. Reducing the gaps in education attainment could also help to reduce the unemployment rates for Māori and Pacific peoples.

## 5.3 What have we learnt about discrimination?

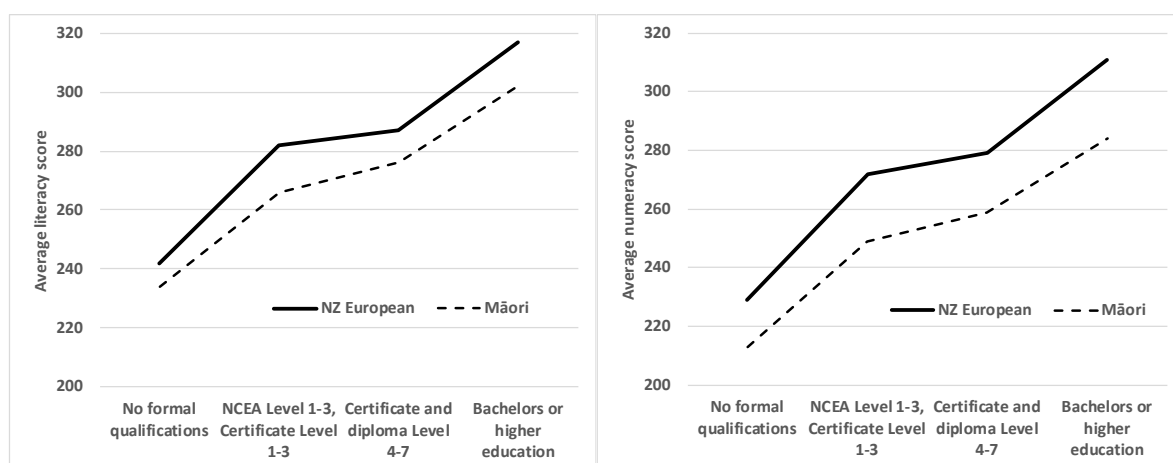
Many Māori and Pacific people experience discrimination (see, for example, Statistics New Zealand 2016). This is backed up in a range of studies, described in Section 5.4 below. This particular paper, however, is not designed to robustly test for discrimination.

Oaxaca-Blinder decompositions were originally developed as a tool for estimating how much of a particular wage gap might be due to discrimination. Historically, some researchers who presented Oaxaca-Blinder decompositions attributed the ‘explained’ portion of the wage gaps to differences in the average productivity of each group, and the ‘unexplained’ portion to discrimination.

Most labour economists no longer support this interpretation and have moved onto using other methods to study discrimination. There are several reasons why the ‘unexplained’ portion of ethnic wage gaps can’t be validly attributed to discrimination.

First, as already noted, the current regression models don’t include all dimensions of workers’ skill and labour market productivity, only the aspects for which data are available. For example, we only know the highest qualification of each worker, and not the subject field, the year and institution where the qualification was obtained, or whether multiple qualifications are held. Nor do we have measures of other types of skill that also influence earnings, such as literacy skills, numeracy skills, and written communication skills. Another important gap is that we have little information on workers’ employment history, but much of the skill variation that leads to wage variation is acquired on-the-job over the course of a worker’s lifetime, and is influenced by the organisations worked at and the specific roles that are undertaken. Because the measures of skill included in the model are so limited, the impact of ethnic skill differences on wages is likely to be significantly under-estimated. This in turn means that the portion of the wage gap that is ‘unexplained’ by productivity-related characteristics is likely to be significantly over-estimated.

**Figure 3:** Literacy and numeracy skills by ethnicity and highest qualification – people aged 15 to 65



Source: Ministry of Education and Ministry of Business, Innovation and Employment, 2016, Figure 9 and Figure 10.



The Survey of Adult Skills (2014) provides some evidence of differences in the skills of Pākehā and Māori who have the same level of highest qualification. Figure 3 reproduces Figure 9 and Figure 10 from a Ministry of Education and Ministry of Business, Innovation and Employment report (2016, pp13-14). It shows that Māori adults in each educational attainment group have lower literacy and numeracy skills, on average, than NZ Europeans in the same educational attainment group.

Second, discrimination in the labour market or in the wider society may influence the development of workers' skills and productivity-related characteristics in a variety of different ways. For example, if the educational outcomes of Māori and Pacific youth are partly due to the low expectations of their teachers, or the students' own perceptions of the jobs they are likely to be employed in, then their current educational attainment has potentially been influenced by discrimination. Similarly, a worker's employment history and their current job characteristics (and earnings) can clearly be shaped by discrimination if there is discrimination in hiring. This means that the 'explained' component of the wage gap is not free from the effects of discrimination, and discrimination, if it exists, is likely to be contributing to both the 'explained' and 'unexplained' portions of the earnings gap.

## 5.4 Other types of evidence on discrimination

Because of the difficulties of identifying discrimination using regression decompositions, this approach has been largely replaced in the economics discipline by other approaches, such as production-function analyses in which the productivity of each worker is estimated and compared with their wages, and experiments that are designed to study the behaviour of people in contexts where discrimination can occur. These methods are reviewed in Neumark (2016). Experimental evidence is favoured on the grounds that this type of evidence is more able to demonstrate the existence of discrimination, provided the experiments are well designed.

Reviewing the evidence from experiments conducted in the US, Newmark notes that much of this evidence provides confirming evidence of hiring discrimination, especially with respect to ethnicity and race (ibid, p73). Newmark says that 'this review reinforces the conclusion that hiring discrimination is pervasive' (p.74). If discrimination in hiring reduces the likelihood of applicants from ethnic minorities being recruited or being recruited to better-paying jobs, then it is likely to be one of the causes of ethnic gaps in average earnings. This could be the case in New Zealand as well as in the US.

There is a small body of literature on bias against Māori in hiring decisions. This mostly comprises psychological laboratory experiments or self-reported attitudes in surveys or interviews. For example, McKenzie (1996) finds bias in attitudes towards Māori among employers surveyed. A further body of work finds bias against other ethnic groups such as Indian and Chinese, such as Wilson *et al* (2005) and Wilson and Parker (2007).

Using a sample of 210 university students, Singer and Eder (1989) test perceptions of highly qualified and less qualified Māori with and without strong Māori accents. Māori applicants were less likely to be shortlisted than Dutch applicants. In a similar psychology study, Jackson and Fischer (2007) test perceptions of Māori and Pākehā in a laboratory experiment. They presented two sets of identical resumes to 114 Pākehā undergraduate psychology students. Identical high-qualification resumes were presented. Of these, Māori were rated slightly more favourably than high-merit Pākehā. However, when low-qualification resumes were presented, the identical Māori resumes were rated lower.

There appears to be a gap in the literature: using experiments and data from real employers to explore the occurrence of and reasons for discrimination against Māori and Pasifika. Jackson and Fischer (2007) write:

“...relatively less research has been conducted on the effects of applicant ethnicity in written job applications (i.e. curricula vitae or application forms), particularly comparing Māori and New Zealand European/ Pākehā applicants.”

A decade later, in 2018, this appears to still be the case.

The best current evidence that ethnic minorities may face a higher level of discrimination than Pākehā comes from the New Zealand General Social Survey, 2014. This found that 26% of Māori felt they had been discriminated against over the last year, as did 20% of Pacific peoples and 27% of Asian peoples, compared with 15 percent of New Zealand Europeans.<sup>4</sup> These figures include all forms of discrimination on all grounds (eg, gender, ethnicity, age, appearance, or disability).

## 5.5 Future research

Neumark (2016) notes that while there is extensive experimental evidence on discrimination in hiring, studying the role of discrimination in other employer decisions (such as pay setting or promotion) has been much more difficult, and a comparable set of experimental evidence on discrimination in pay decisions or promotions does not yet exist.

He argues that future experimental research should do more than simply demonstrate that some population groups face employer discrimination in hiring. To design good policy responses, the nature of and the reasons for the discrimination need to be known. These may vary across different contexts and population groups. For example, groups that are noticeably different from the employer's population group may face 'taste' discrimination, while groups that present a potential employment issue that is unknown or unpredictable at the time of recruitment (such as mothers of young children or people who have previously experienced a mental illness) may face statistical discrimination (Neumark, 2016, p.77).

Field experiments should ideally be supplemented with survey or interview evidence on what employers know, what information they use, what assumptions they make, and how this changes during the search, interview and job offer process (ibid, p76), in order to build better evidence about the basis for employer discrimination. This could possibly build on the methods used recently in South Auckland by the Auckland Co-Design Lab (2016) to investigate the issues and barriers perceived by employers when they seek to hire young school leavers.

Another challenge for the experimental research is determine whether the situations in which discrimination has been shown to occur are representative of what happens in the rest of the labour market. Conducting studies in a wider range of occupational and firm settings may help.

At a broader level, Treasury will monitor ethnic differences in income and material standard of living as part of its work on the Living Standards Framework. The Living Standards Framework aims to achieve higher living standards for New Zealanders, and will involve developing a set of indicators that go beyond economic measures to include wellbeing and sustainable development. This will include further analysis of factors associated with relatively good and poor outcomes.

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<sup>4</sup> Statistics New Zealand. New Zealand General Social Survey 2014 information release.



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