

The Experimental Administrative Population Census (APC)

NZPopCon, Auckland - 29 August 2023

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IDI Disclaimer

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit <https://www.stats.govt.nz/integrated-data/>.

These results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes and is not related to the data's ability to support Inland Revenue's core operational requirements.

History of Administrative Data and the New Zealand census

Traditional census
–2013

Combined model
2018, 2023

APC
(2021 – 2023)



Waikato Region

Find 2018 Census data about **Waikato Region** ([find map boundary](#)). Topics include population, ethnicity, religion, health, employment, income, education, and housing.

Search by small area, district or region

X

On this page

[Population and dwellings](#)

[Ethnicity, culture, and identity](#)

[Health](#)

[Work, income, and unpaid activities](#)

[Education and training](#)

[Transport](#)

[Housing](#)

[More data and information](#)

Population and dwellings

Find our population count by age and sex, and the number of dwellings. Also find where we lived a year before the census, the status of our relationships, and number of children born.

Population counts

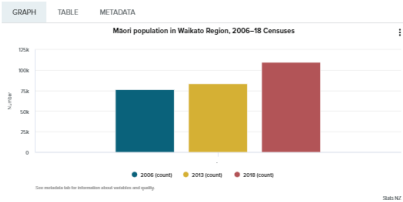
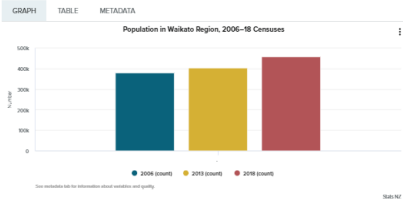
Find information about the number of people in **Waikato Region** for the census usually resident population, how old they are, and how many are male or female.

The census usually resident population count variable is rated as very high quality. [Census usually resident population count](#) has more information about this variable, for example, definitions and data quality.

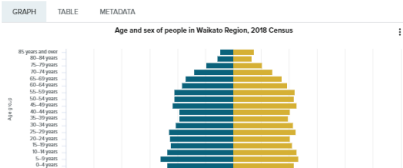
Quick stats about population counts for Waikato Region (2018 Census)

Number of people	Median age	Males
458,202	37.4 years	226,386
Females	Number of Māori	Mean median age
231,816	109,488	25.0 years

Population counts, over time



Population counts, by age and sex



What is the experimental Administrative Population Census?

*“A **practical** demonstration of what can be achieved **now** with admin data **only*** to produce census-type information.”*

APC's purpose:

- Gauge technical feasibility of admin first census to enable decision making
- Evaluate the data and methods as used in the APC
- Enable engagement on whether information needs are met
- Use feedback to direct further development

=> The APC is a conversation **catalyst**

The APC

- isn't Census 2023 (...)
- isn't Census 2028 (...)
- isn't official statistics (...)
 - ..., but there is knowledge sharing, common methodology, common data sources, and mutual benchmarking.
- does not represent all population measurement research.



What does the APC include?

Annual time series: 2006 – 2021 (reference date 30th June)

Admin New Zealand resident population ("IDI-ERP")

19 census variables:

- [Population structure](#): Age, sex, geography (address), usual residence n years ago, number of children born
- [Identity and culture](#): ethnicity (Level 1-4), Māori descent, birthplace, and years since arrival in NZ
- [Income](#): total personal income by income source
- [Education](#): highest qualification, post-school field of study, study participation
- [Work](#): employment indicator, employment status, industry, sector of ownership

APC Products

- Available to all IDI researchers
 - Unit record data
 - Source code & Metadata
 - ARP spells
 - Unit record quality scores
- Publicly available on stats.govt.nz
 - Aggregate tables
 - Methodology report
 - Information for Māori
 - Interactive App

Interactive App

App Allows

- Limited crosstabs
- Maps to small geography level
- Timeseries
- Customised table download

Select an attribute:
Select an attribute:
Income sources

Select geographic level:
☐ SA2 ☐ TALB ☒ National

Select a year range:
2006 2021

Select sex:
☒ Total ☐ Male ☐ Female

Select age grouping:
☐ Single year ☒ Five years
☐ Life cycle ☐ No age

Select ages:
15-19 Years 20-24 Years 25-29 Years

Select source of income:
Self-employed income

Display as:
☒ Counts ☐ Percentage population

Show:
☐ Codes ☒ Names ☐ Both

Apply filters

About Map Time Series Tables

About Map Time Series Tables

Search:

year	age_type	age_group	area_name	data_name	Total	total_coverage	TP_total
2006	Five years	15-19 Years	New Zealand	Self-employed income	8730	2.8	311802
2006	Five years	20-24 Years	New Zealand	Self-employed income	18504	6.36	290814
2006	Five years	25-29 Years	New Zealand	Self-employed income	27807	10.51	264693
2007	Five years	15-19 Years	New Zealand	Self-employed income	8988	2.82	318636
2007	Five years	20-24 Years	New Zealand	Self-employed income	19017	6.53	291030
2007	Five years	25-29 Years	New Zealand	Self-employed income	28029	10.44	268542
2008	Five years	15-19 Years	New Zealand	Self-employed income	8700	2.7	322170
2008	Five years	20-24 Years	New Zealand	Self-employed income	18561	6.31	294024
2008	Five years	25-29 Years	New Zealand	Self-employed income	28011	10.24	273570
2009	Five years	15-19 Years	New Zealand	Self-employed income	6780	2.09	324042

Show 10 entries

Showing 1 to 10 of 48 entries

Previous 1 2 3 4 5 Next

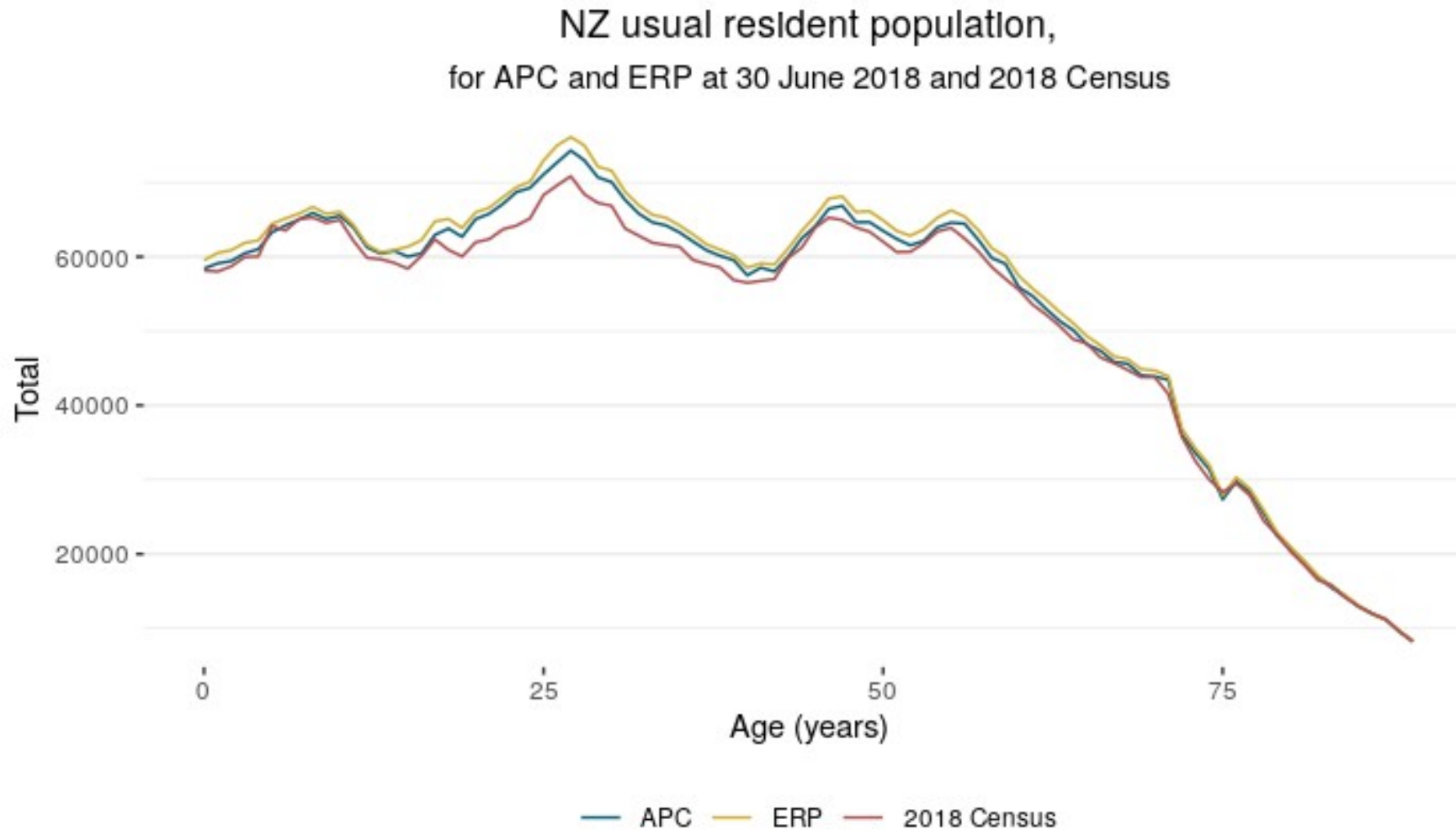
Export

filename.csv

Web App Link

<https://www.stats.govt.nz/experimental/experimental-administrative-population-census>

What does the admin population look like?



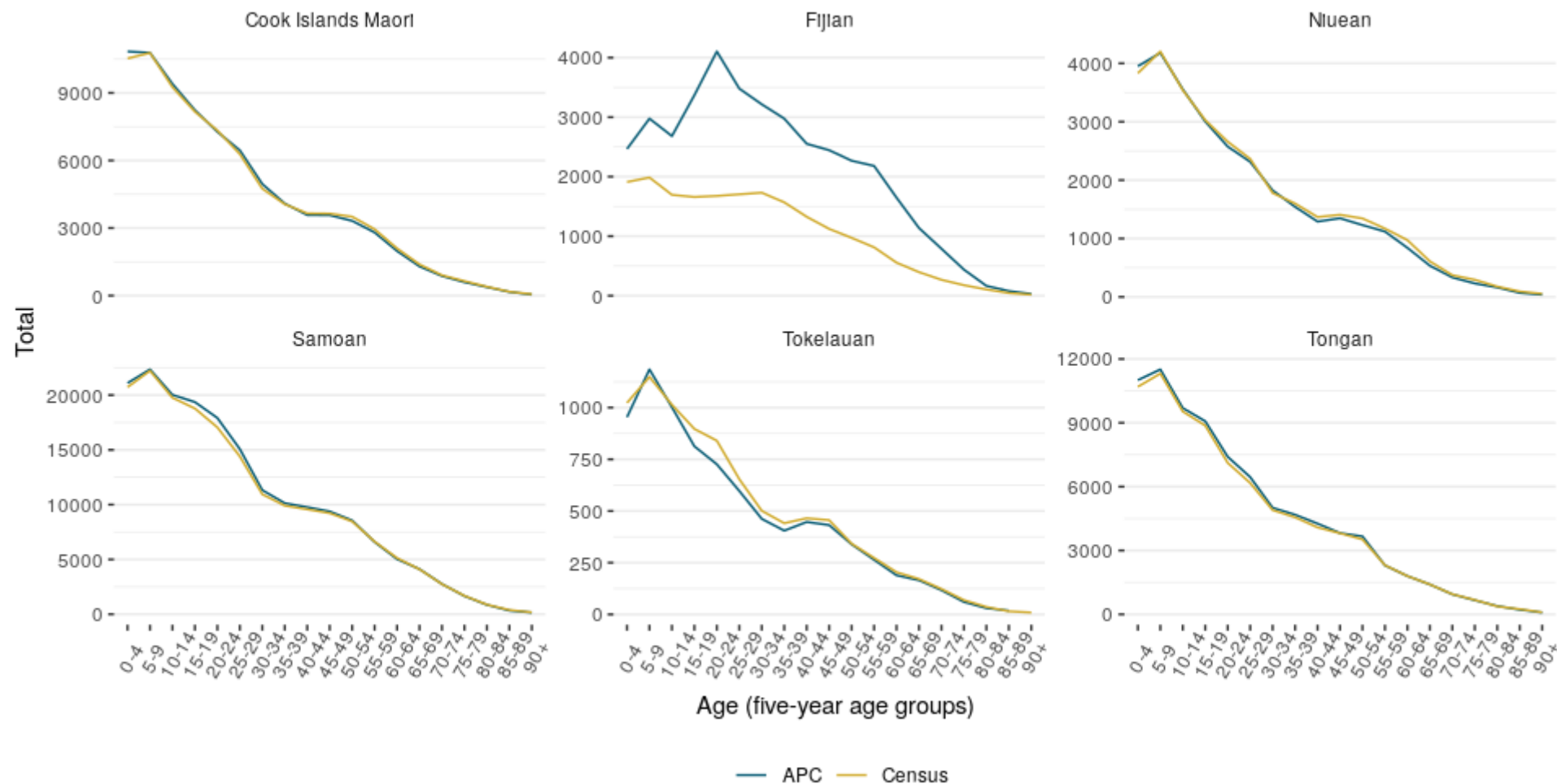
APC is not quite ready to provide the official estimated resident population

It needs a population estimation adjustment:

- for under- and over-coverage
- for misclassification and linkage errors
- for error bounds

Age distributions for some Pacific ethnicities, APC and 2018 Census

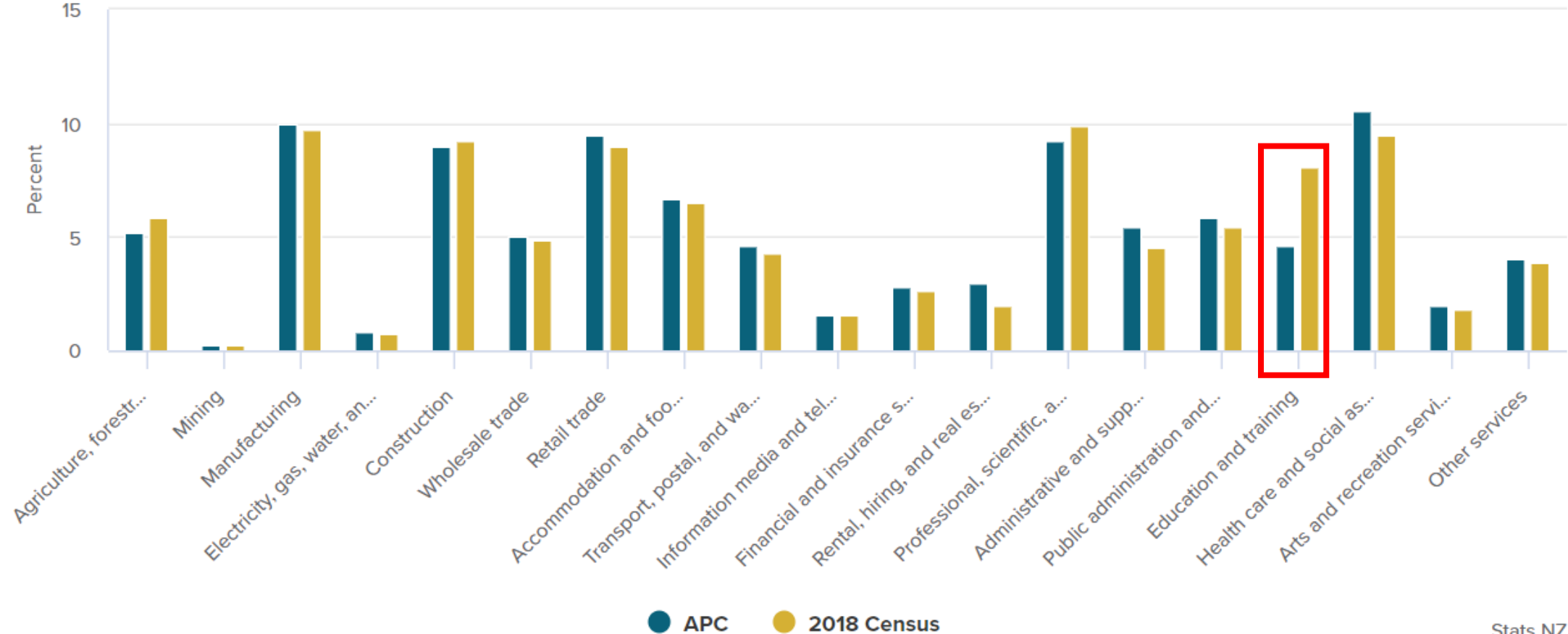
Counts of Pacific level 2/3 ethnicities, by five-year age groups
comparison between APC in 2018 and 2018 Census



What does the data look like?

Distribution of broad industry, for the APC in 2018 and 2018 Census

⋮



Opportunities, that we can see

- Frequency + Detail: Outputs every year (or more often), with all variables available for all reference dates.
Already a 16 year time series 2006 -2021
- Quality: More precise, more detailed information, or more accurate – not constrained by respondent's ability to answer questions.
- Resilience: Inherently less exposed to extreme risks or system failure.
For example, easier to recover from earthquakes, pandemics.
- Longitudinal: The unit record data is longitudinal – this is immensely powerful and largely untapped.
For example, detailed analysis of flows, cohorts, generational effects.
- Synergies with other research: Potential to be a multiplier for other research.
 - Providing common baselines for researchers in the IDI.
 - **IF** iwi affiliation can be included, one could provide iwi-specific admin censuses.



He pātai?



Ngā mihi nui

Individual form census questions in APC

Very **rough** approximation, which does not take into account:

- importance of questions,
- questions that need to be asked on any survey for linking and operational purposes,
- range of the orange category, and
- some details within questions.

New Zealand Census of Population and Dwellings
Individual Form
Tuesday 7 March 2023

Completing census forms is required by law. Fill in an Individual Form for each person staying in this dwelling on the night of Tuesday 7 March 2023. The information you provide will be kept confidential by Stats NZ and is protected by the Data and Statistics Act 2022. Stats NZ will also use census responses to select participants for a survey after the census.

1 What is your full name?
Print in CAPITALS
first names
family name

2 When were you born?
day (eg 06) month (eg 2) year (eg 1984)

3 What is your gender?
male female
Mark your answers like this: —
another gender. Please state.

4 What was your sex at birth?
For example, what was recorded on your birth certificate.
male female

5 Where do you usually live?
Students and overseas residents see the Guide Notes for more information.
In New Zealand, Print the address where you usually live
street number flat number
street name
suburb or rural locality
city, town or district
or overseas. Print the name of the country where you usually live.

6 If you gave a New Zealand address in 5, how long have you lived there?
less than 1 year
or years

7 On the night of Tuesday 7 March 2023, which address are you at?
Print the address as fully as you can
street number flat number
street name
suburb or rural locality
city, town or district

8 If you live in New Zealand but were not born here, when did you first arrive to live in New Zealand?
1 If in 5, in 5 you have given an address in 5, print the address as fully as you can
street number flat number
street name
suburb or rural locality
city, town or district

9 Are you descended from Māori?
yes no
If yes, print the name of your ancestor(s) in 5, as fully as you can
city, town or district

10 Which ethnic group do you belong to?
Mark the space or spaces which apply to you.
New Zealand European
Māori
Samoan
Cook Islands Māori
Tongan
Niuean
Chinese
Indian
other, eg DUTCH, JAPANESE, TOKELAUAN. Please state.
street name
suburb or rural locality
city, town or district

11 Which country were you born in?
New Zealand = go to 12
other, eg ENGLAND, COOK ISLANDS, USA. Print the current name of the country.
yes no
or no religion object to answering

12 Where did you usually live 1 year ago, on 7 March 2022?
not born 1 year ago
at my usual address, given in 5
at another New Zealand address:
street number flat number
street name
suburb or rural locality
city, town or district
or I lived overseas 1 year ago. Print the name of the country:
\$50,001 – \$60,000
\$60,001 – \$70,000
\$70,001 – \$100,000
\$100,001 – \$150,000
\$150,001 – \$200,000
\$200,001 or more

13 Who lives with you at your usual address?
Mark the space or spaces which apply to you.
I live alone
my spouse / partner, eg husband
my parent(s), eg mother
my child(ren), eg daughter
my sibling(s), eg brother
other, eg MOTHER-IN-LAW, STEP-CHILD. Please state.
street number flat number
street name
suburb or rural locality
city, town or district

14 Where did you usually live 1 year ago, on 7 March 2022?
not born 1 year ago
at my usual address, given in 5
at another New Zealand address:
street number flat number
street name
suburb or rural locality
city, town or district
or I lived overseas 1 year ago. Print the name of the country:
\$50,001 – \$60,000
\$60,001 – \$70,000
\$70,001 – \$100,000
\$100,001 – \$150,000
\$150,001 – \$200,000
\$200,001 or more

15 Do you smoke cigarettes regularly (that is, one or more a day)?
Don't count pipes, cigars or e-cigarettes.
Count only tobacco cigarettes.
yes = go to 16
no

16 Have you ever been a regular smoker of one or more cigarettes?
yes = go to 17
no

17 This question is about difficulties you may have doing certain activities because of a health problem.
Do you have difficulty with any of the following?
some difficulty a lot of difficulty cannot do at all
• hearing, even if using a hearing aid
• walking or climbing steps?
• washing all over or dressing?
• communicating using your usual language, for example understanding or being understood by others?
• Do you have a disability, long-term condition, or mental health condition that limits your ability to carry out everyday activities?
yes no
• if you are:
15 years or older = go to 18
if not = go to 19

18 What is your highest secondary school qualification?
none
one of:
• NZ School Certificate in one or more subjects, or
• National Certificate level 1, or
• NCEA level 1
one of:
• NZ Sixth Form Certificate in one or more subjects, or
• National Certificate level 2, or
• NZ UE before 1986 in one or more subjects, or
• NCEA level 2
one of:
• NZ Higher School Certificate, or
• NZ University B Scholarship, or
• National Certificate level 3, or
• NZ Scholarship
other secondary qualification gain Zealand. Please state.

19 Apart from secondary qualifications, do you have another completed qualification?
Don't count qualifications less than 3 months study to get.
yes = go to 20
no = go to 21

20 What is your highest qualification?
Level 1 Certificate
Level 2 Certificate
Level 3 Certificate
Level 4 Certificate
Level 5 Diploma
Level 6 Diploma
Bachelor's Degree
Bachelor's Honours Degree or Postgraduate Certificate / Diploma
Master's Degree
PhD or other doctorate
other qualification

21 Which of the following best describes how you think of yourself?
heterosexual / straight
gay or lesbian
bisexual
another identity. Please state.

22 Which of the following best describes how you think of yourself?
number born
none
or object to answering

23 If your sex at birth was male = go to 24
If your sex at birth was female, answer this question.
How many babies have you given birth to?
number born
none
or object to answering

24 What is the main subject of your highest qualification?
eg ELECTRICAL ENGINEERING

25 What is your highest qualification gained in New Zealand or overseas?
New Zealand overseas
own or partly own it, with or without a mortgage?
neither of these, eg renting
Mark as many spaces as you need to show all the ways you yourself got income in the 12 months ending today.
Don't count loans because they are not income.
wages, salary, commissions

26 Thinking about the dwelling that you usually live in, do you yourself:
hold it in a family trust?
own or partly own it, with or without a mortgage?
neither of these, eg renting
Mark as many spaces as you need to answer this question.
In the 7 days that ended on Sunday 5 March, which of these did you do?

27 What is the main activity of that business or employer?
eg PRIMARY SCHOOL, EDUCATION, CIVIL ENGINEERING, CONSTRUCTION, ACCOMMODATION

28 Mark as many spaces as you need to show all the ways you looked for paid work in the last 4 weeks.
looked at job advertisements
wrote, phoned or applied in person to an employer
contacted Work and Income to look for a job
contacted friends or relatives for help in finding a job
contacted career advisers
other method(s)

29 If a paid job had been available, would you have started last week?
yes no

30 In the last 4 weeks, which of these have you done, without pay?
Mark the space or spaces which apply to you.
household work, cooking, repairs, gardening, etc, for my household
looked after a child who is a member of my household
looked after a member of my household who is ill or has a disability
looked after a child (who does not live in my household)
other help or voluntary work for or through any organisation, group or marae
none of these

31 Please give a contact phone number. We may contact you if you are selected for the follow-up survey after the census.
Phone number (including area code if it is a landline).

32 Please check your answers before you sign.
By signing this form you are declaring that the information given is true and complete.
Yes, I declare that the information is true and complete.

33 Thank you for your time and effort

Please place any blank unused forms in your recycling



concept part of APC



concept potentially available from admin data



concept unlikely to be available from admin data

How the ARP is created

For any reference date:

1. Start with the spine
2. Remove non-births, + deaths
3. Remove non-residents 12/16 and 6/12
4. Remove non-active units

“Revisions” between releases due to

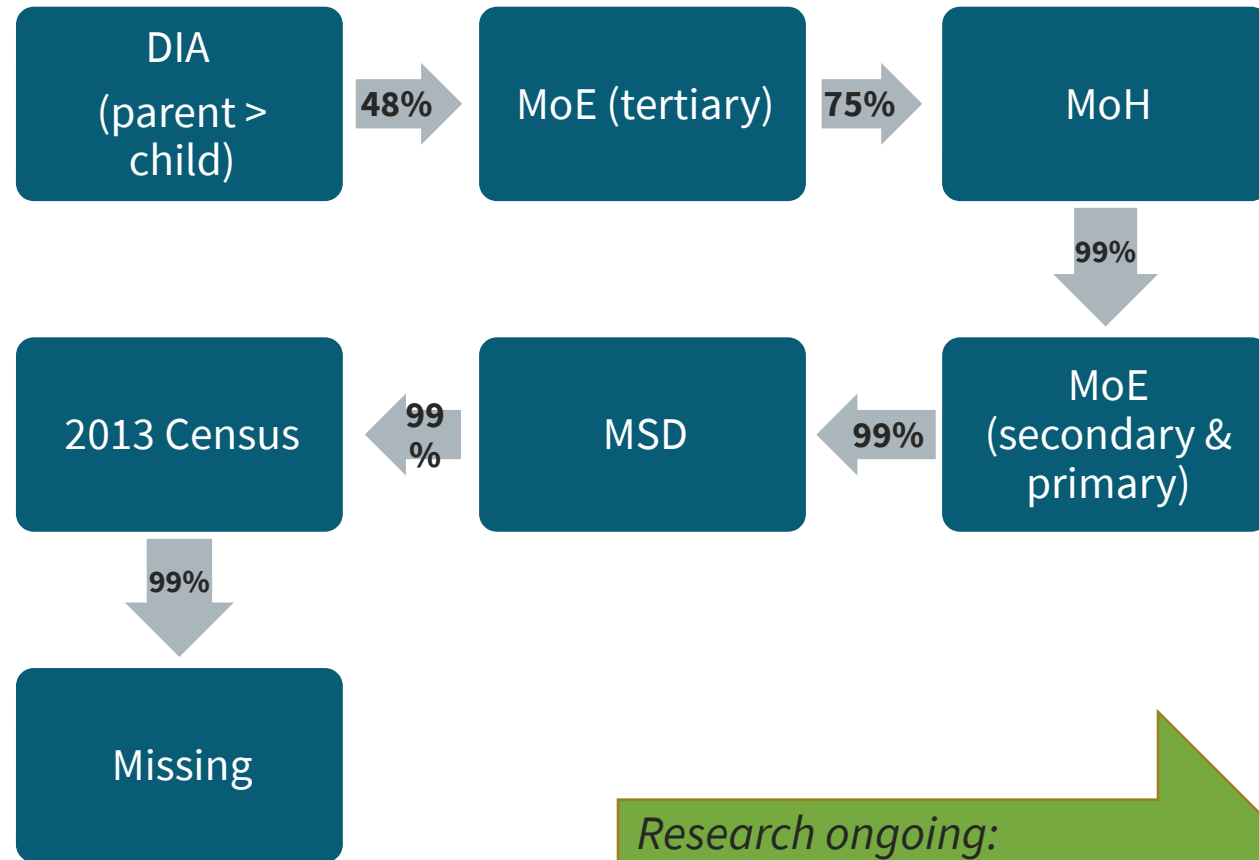
- Changes in the spine, linking, and historical data
- 12/16 availability for recent years
- Changes in methodology (experimental product)

Quality

Variable	Missing (percent)	Non-missing quality rating	Output quality
Ethnic group level 1: European	< 1	0.96	0.96
Ethnic group level 1: Māori	< 1	0.94	0.94
Ethnic group level 1: Pacific Peoples	< 1	0.92	0.92
Ethnic group level 1: Asian	< 1	0.96	0.96
Ethnic group level 1: MELAA	< 1	0.79	0.79
Ethnic group level 1: Other	< 1	0.26	0.26
Māori descent	14	0.95	0.82
Birthplace	5	0.96	0.91
Years since arrival in NZ	4	0.93	0.89

How ethnicity is derived

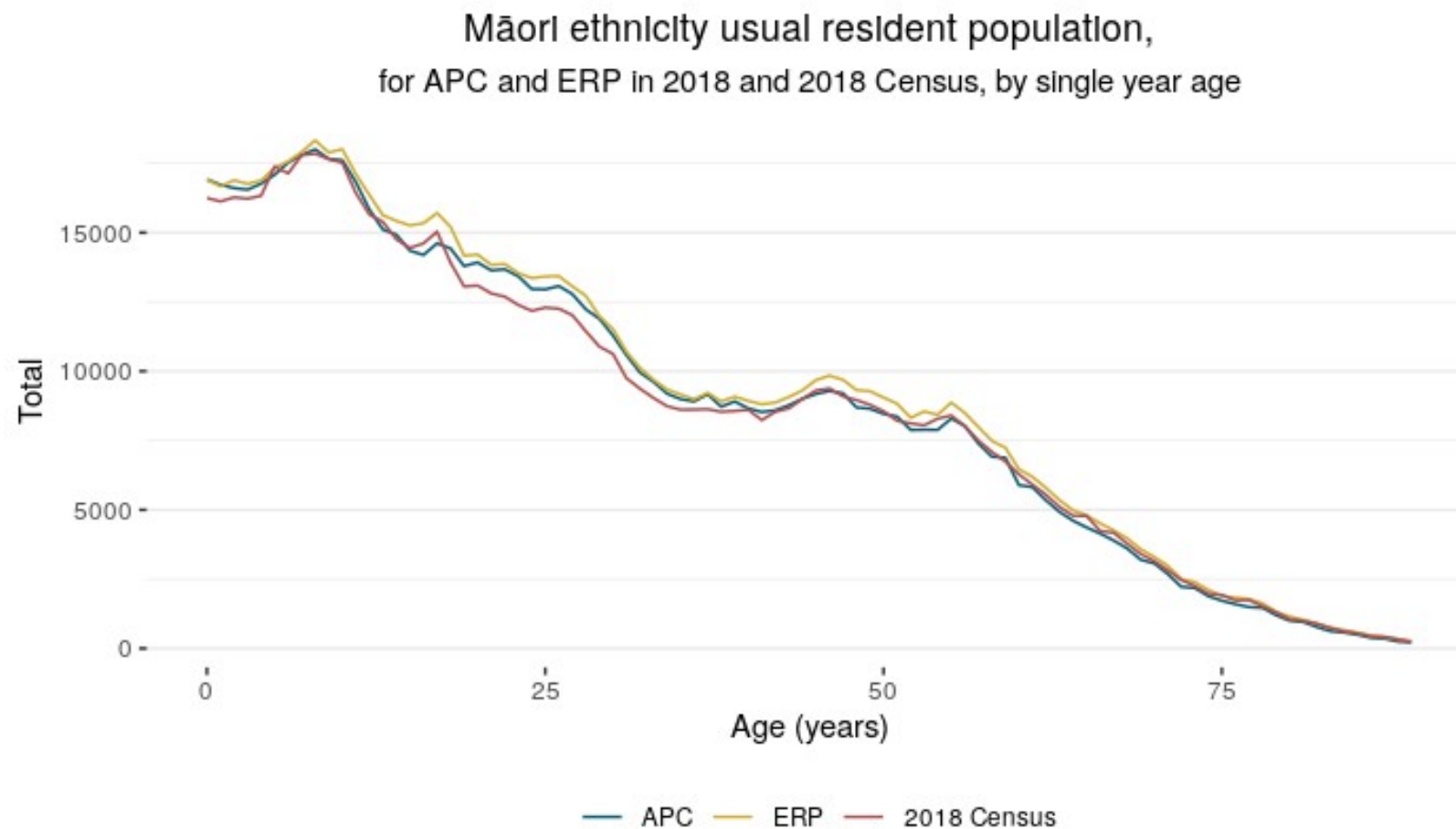
APC uses the source that is most similar to the census first (this is birth registrations).
If there is no ethnicity from birth registrations, we use the next best source, if it is available.
We get an (L2) ethnicity for nearly everyone (99 percent) from the top four sources.



Research ongoing:

- Refining method
- Latent class modelling

What does the data look like?



Source: Stats NZ

Sector of ownership for APC in 2018 and 2018 Census

Sector of ownership	Count		Percent of total stated	
	2018 APC (30 June)	2018 Census (6 March)	2018 APC (30 June)	2018 Census (6 March)
Central Government	258,000	334,017	11.9	13.7
Local Government	49,296	37,230	2.3	1.5
Private	1,886,349	2,073,897	87.0	84.8
Total people stated	2,168,322	2,445,141	100.0	100.0
Missing	543,819	0		
Total people	2,712,141	2,445,141

Note: This data has been randomly rounded to protect confidentiality. Individual figures may not add up to totals, and values for the same data may vary in different tables.

Symbol: ... not applicable

Source: Stats NZ

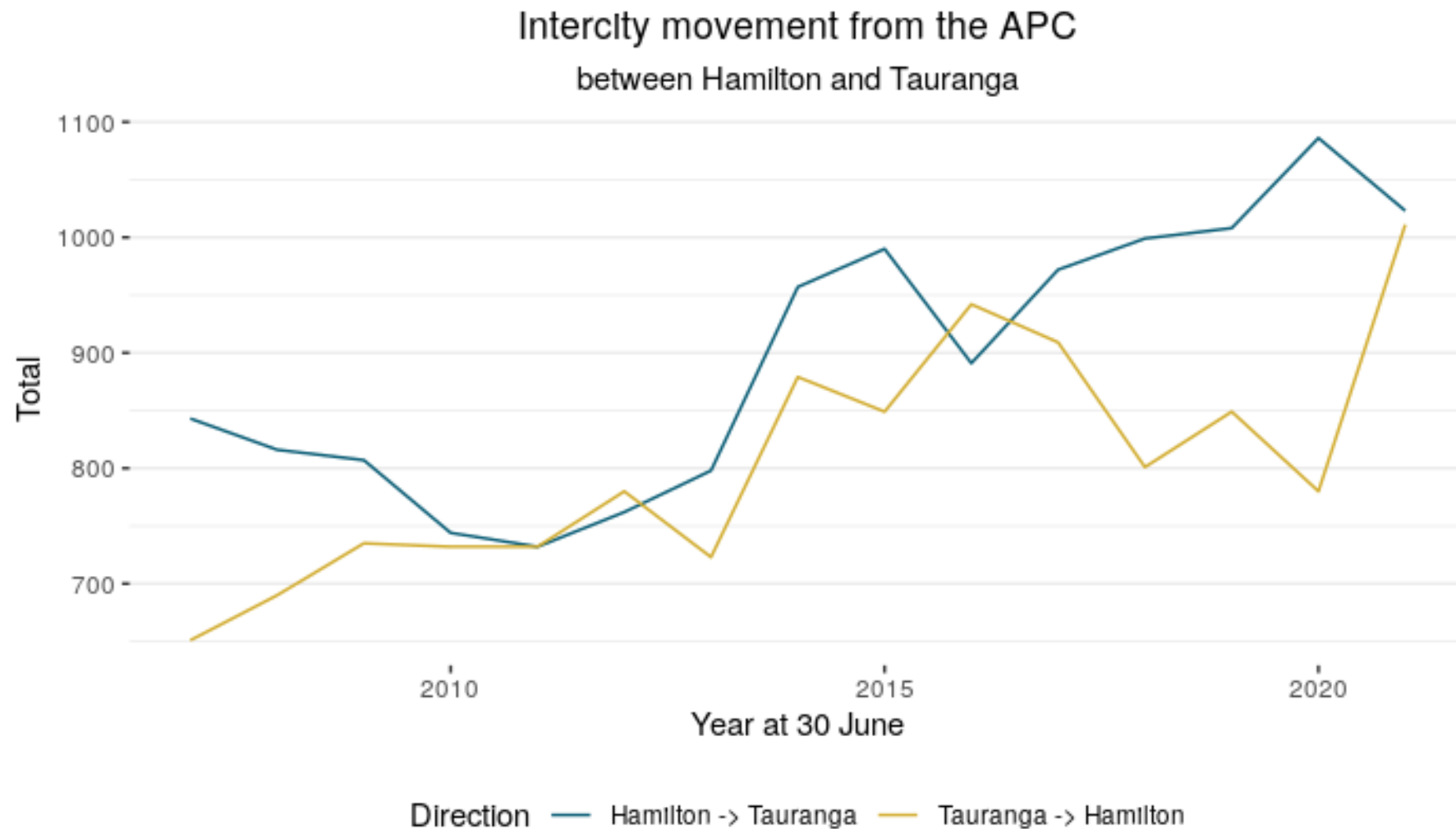
Census concepts not well covered in admin data

- Activity limitations (disability) information that is not captured by the health system
- Iwi affiliation
- Gender and sexual orientation
- Languages spoken
- Religious affiliation
- Some work and labour force information (‘unemployed/nilf’, occupation, unpaid work)

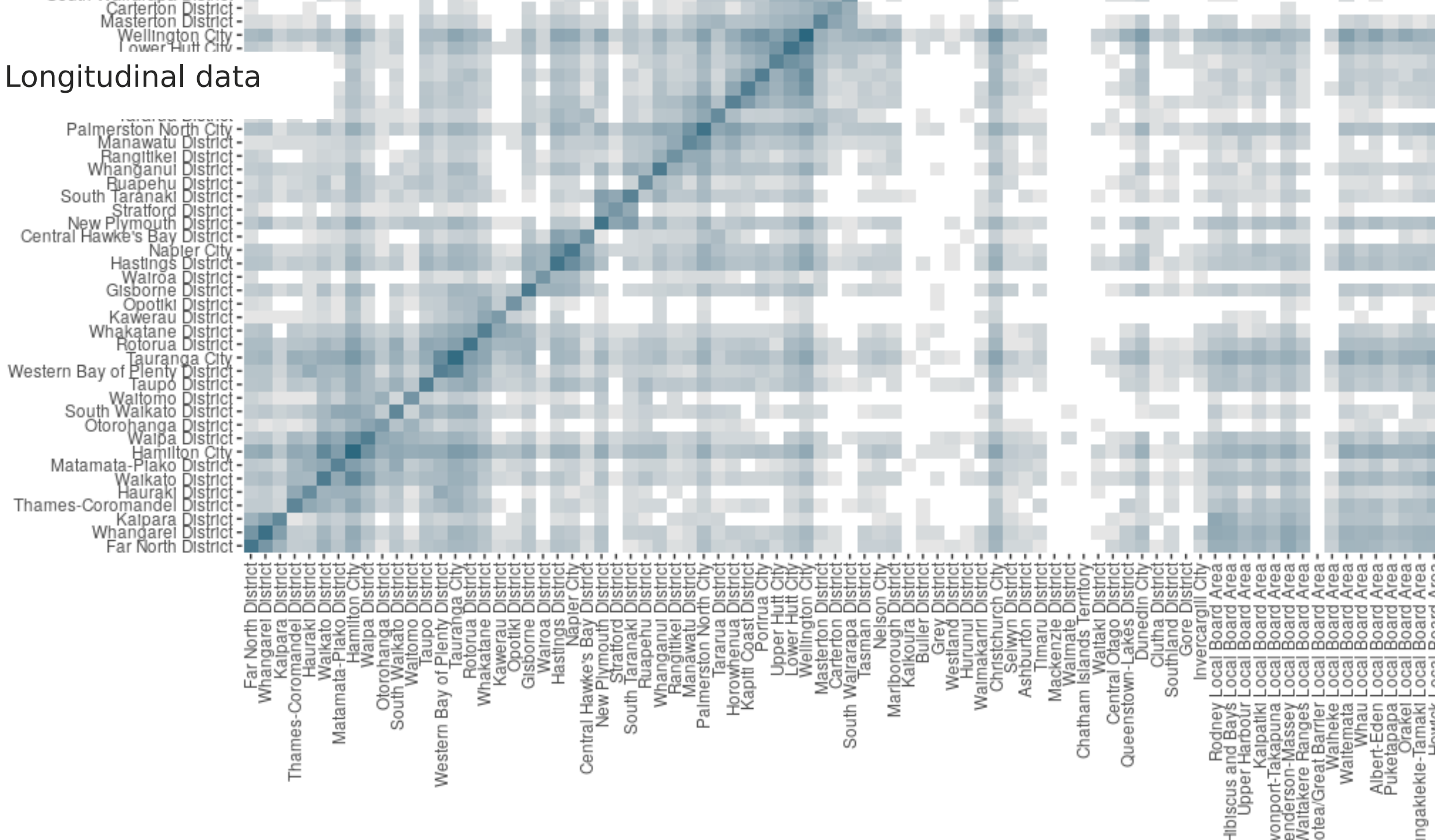
Some strategies to mitigate these limitations:

- *Improved agency collections, and new data sources*
- *Improved methods and statistical mitigations*
- *Combining APC data with hhld surveys or a census attribute survey*

Longitudinal data



Longitudinal data



Scoping ideas for the third iteration

Other R&D projects

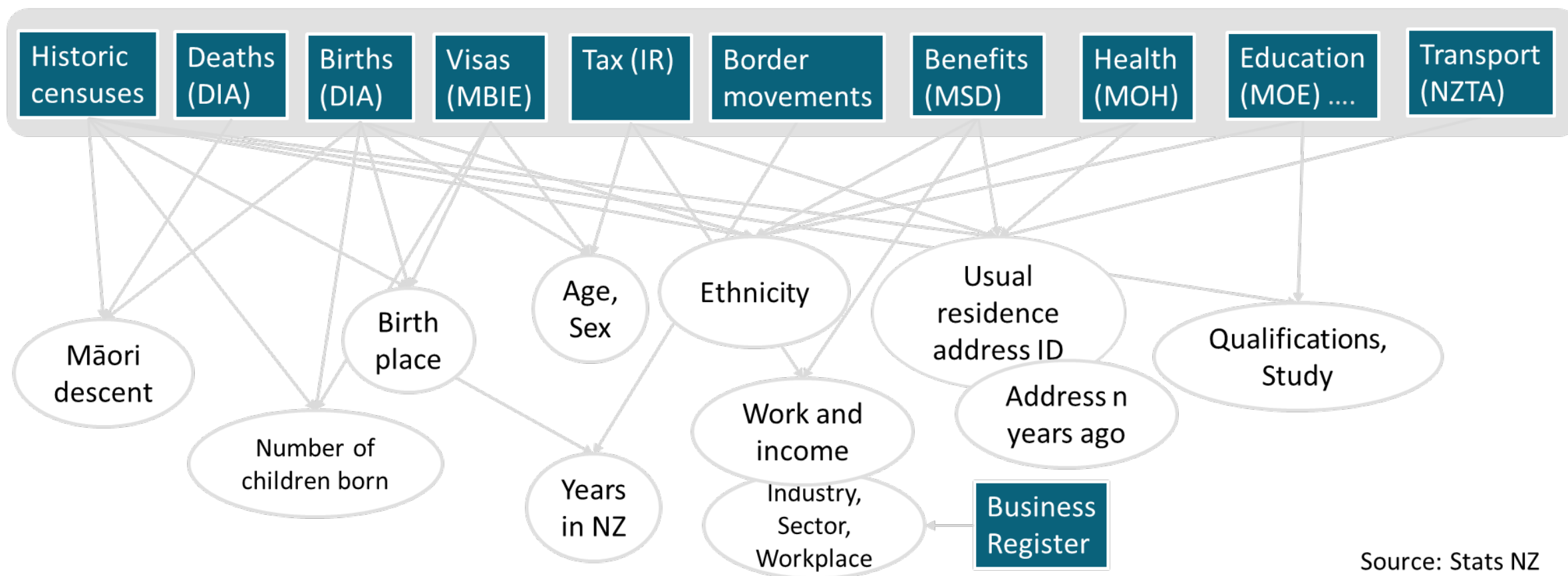
- HHLDs and families from admin data
- Dwellings from admin data
- Iwi affiliation from admin data
- Undercoverage adjustments (DSE)
- Design of a census attribute survey

Planned scope

- More variables and refinements
 - Current research: relationship status, family relationships, years at usual residence
 - Non-census variables: Mother's age at first birth, and years since highest degree attained, Income by income source
 - Activity, ethnicity, and address review
- Statistical Imputation
- More timely data, extended time period
- More detailed public releases
 - Flows data
 - Outputs by L2-ethnicity
 - Crosstabs, non-standard geographies
 - (Even) more information on quality
- Broader engagement with data users/treaty partners/stakeholders

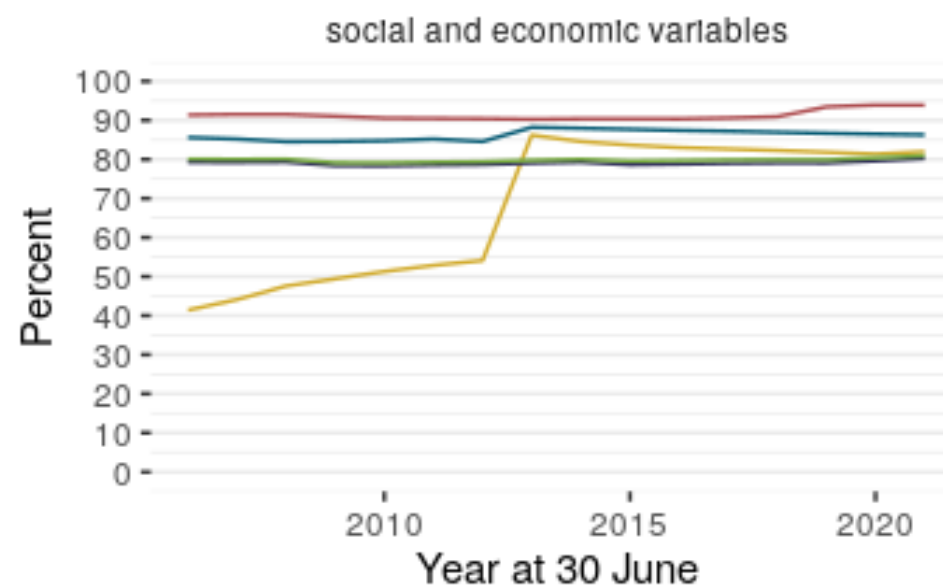
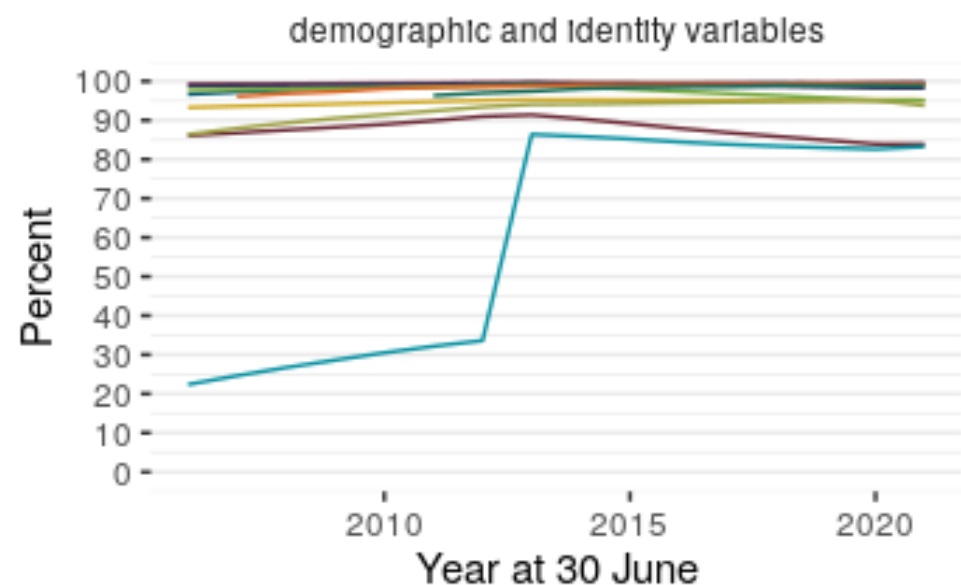
Where does the data come from?

All the data sources are linked in the IDI



Source: Stats NZ

Coverage for each APC variable, 2006 to 2021



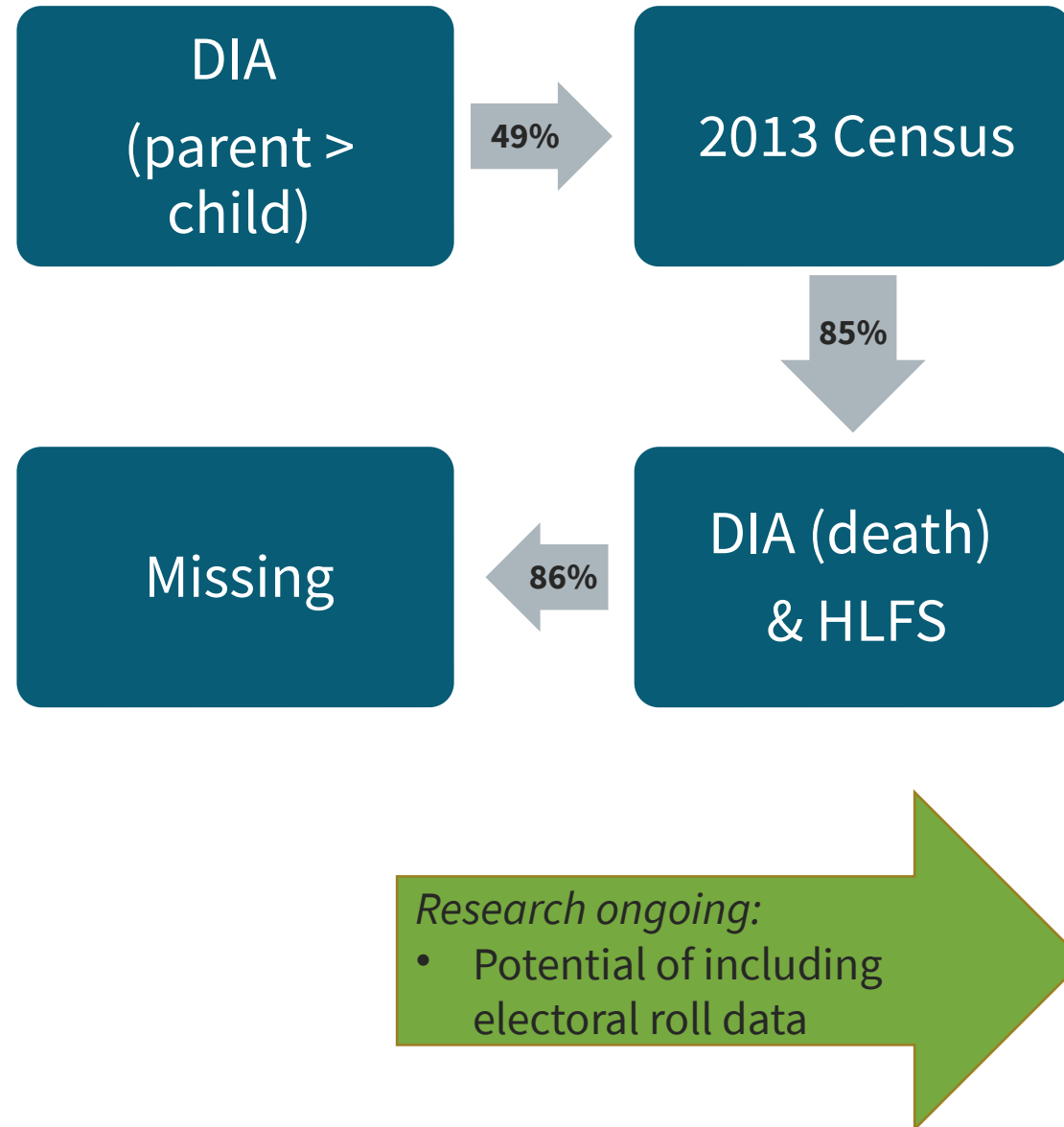
- | | | | | |
|------------------|-------------------------|----------------|-----------------------|---------------------|
| Address (mb) | Ethnicity (L4) | UR 5 years ago | Field of study | Sector of ownership |
| Birthplace | Maori descent | YsAN | Highest qualification | |
| Ethnicity (L1/2) | Number of children born | | Income | |
| Ethnicity (L3) | UR 1 years ago | | Industry | |

How Māori descent is derived

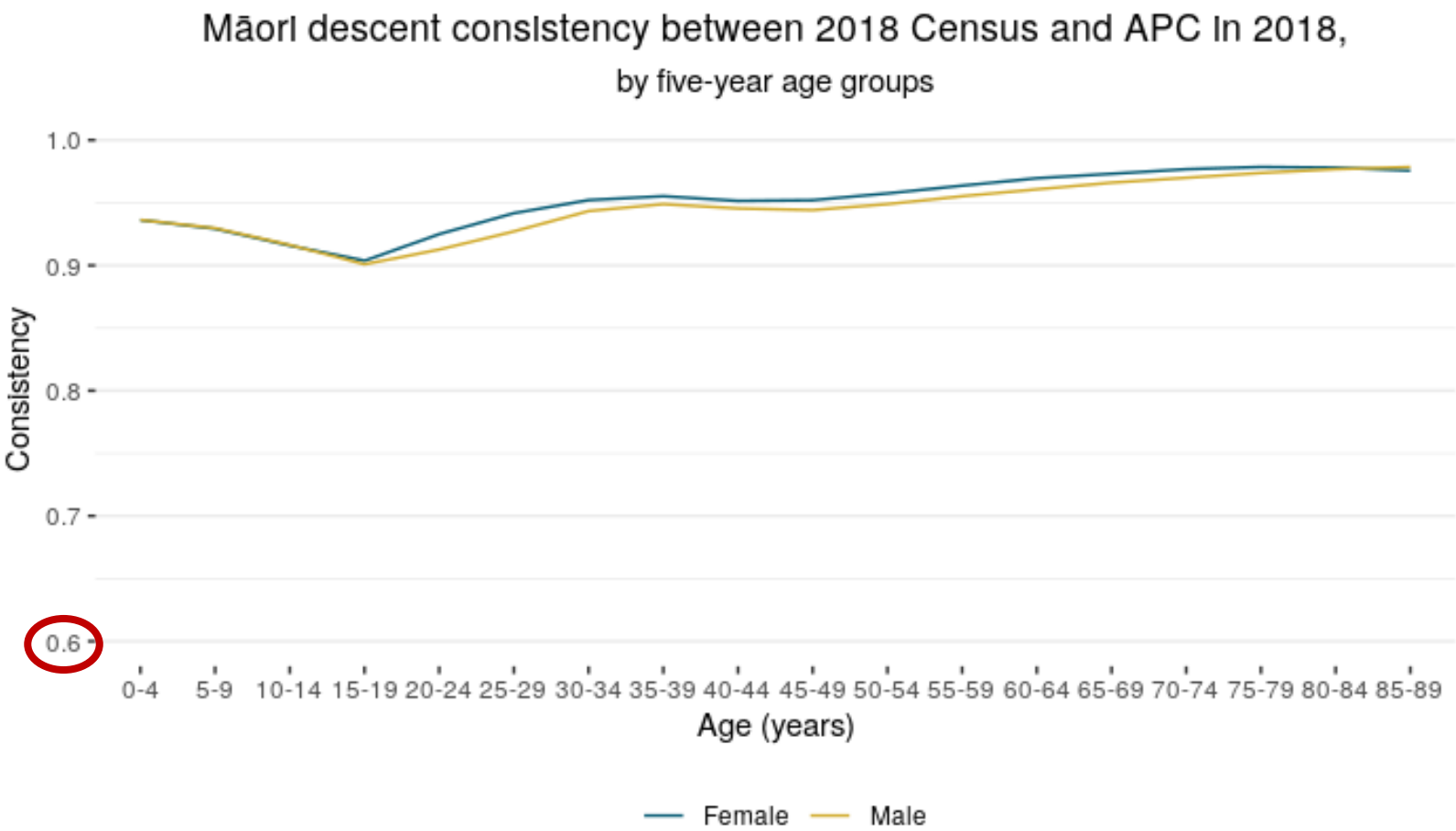
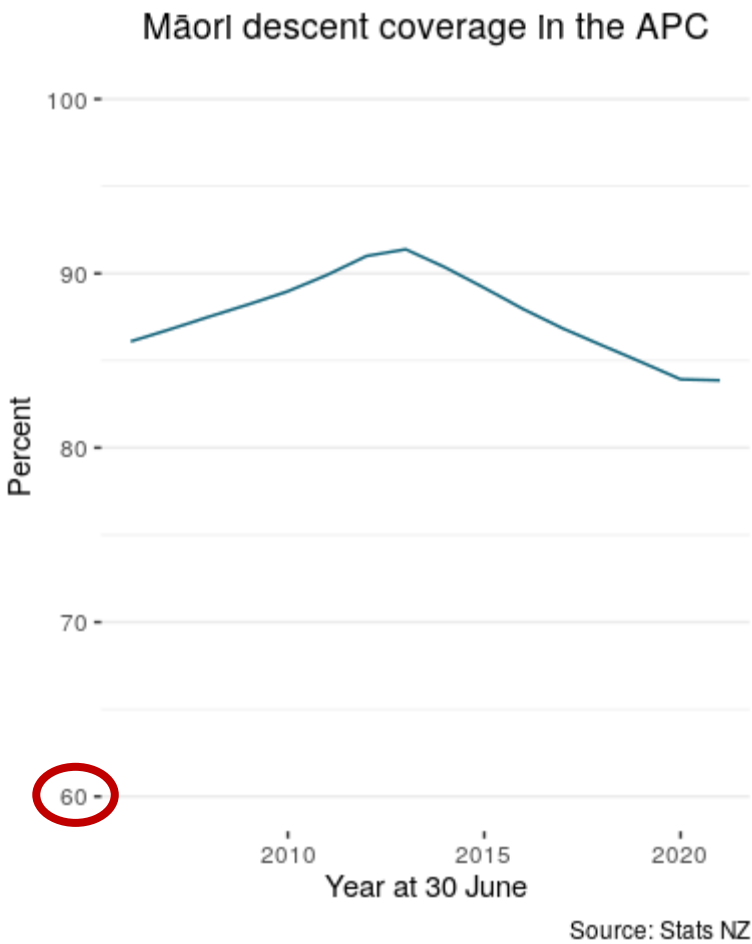
Department of Internal Affairs birth registrations is used first. (The question in its current form has been asked since 1995.)

The 2013 Census: is used for people who are not in the birth registrations data.

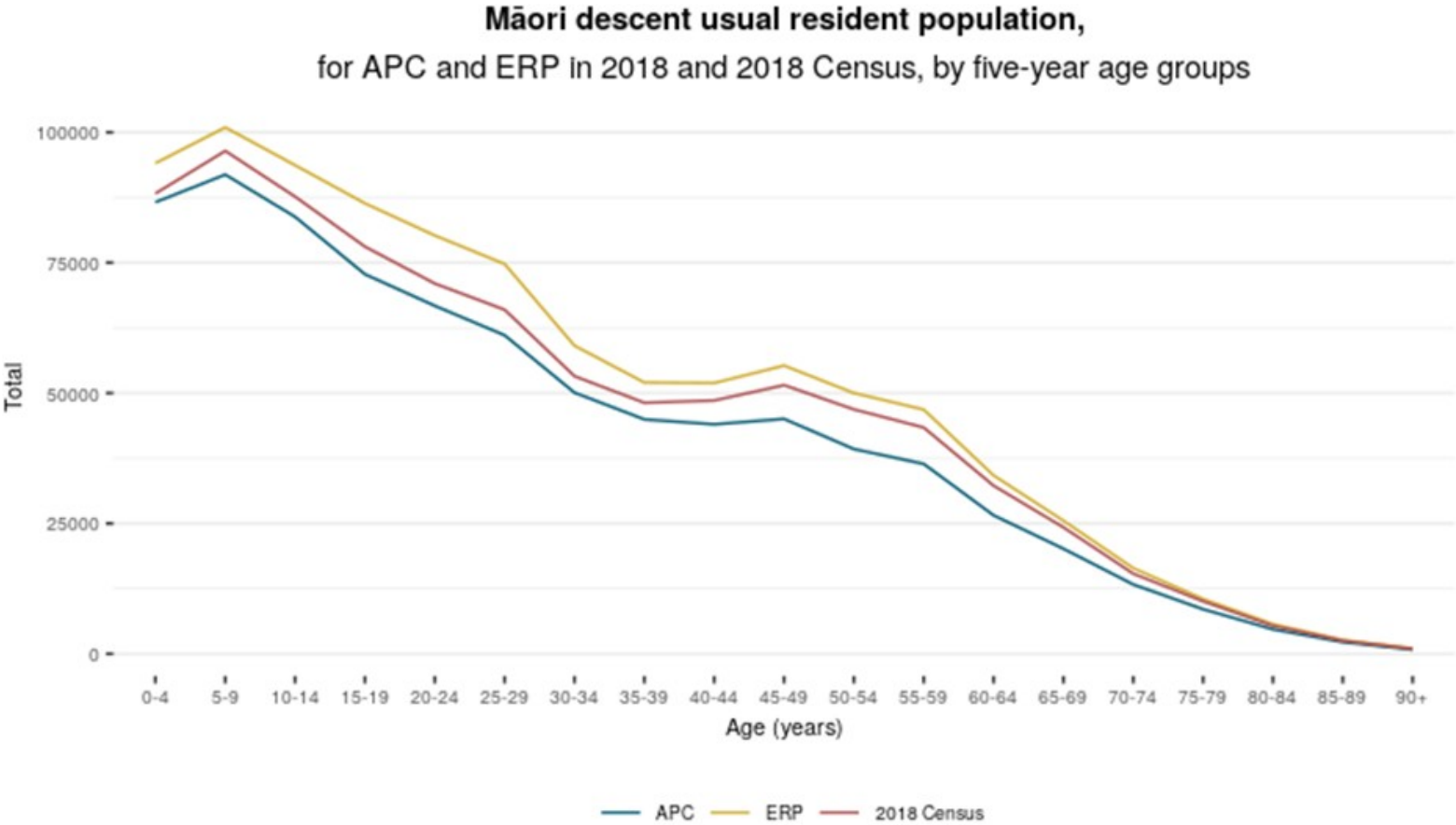
Māori descent from DIA death registrations and the Household Labour Force Survey fills in information for a very small number of people who did not have Māori descent in the other sources.



Quality of Māori descent data

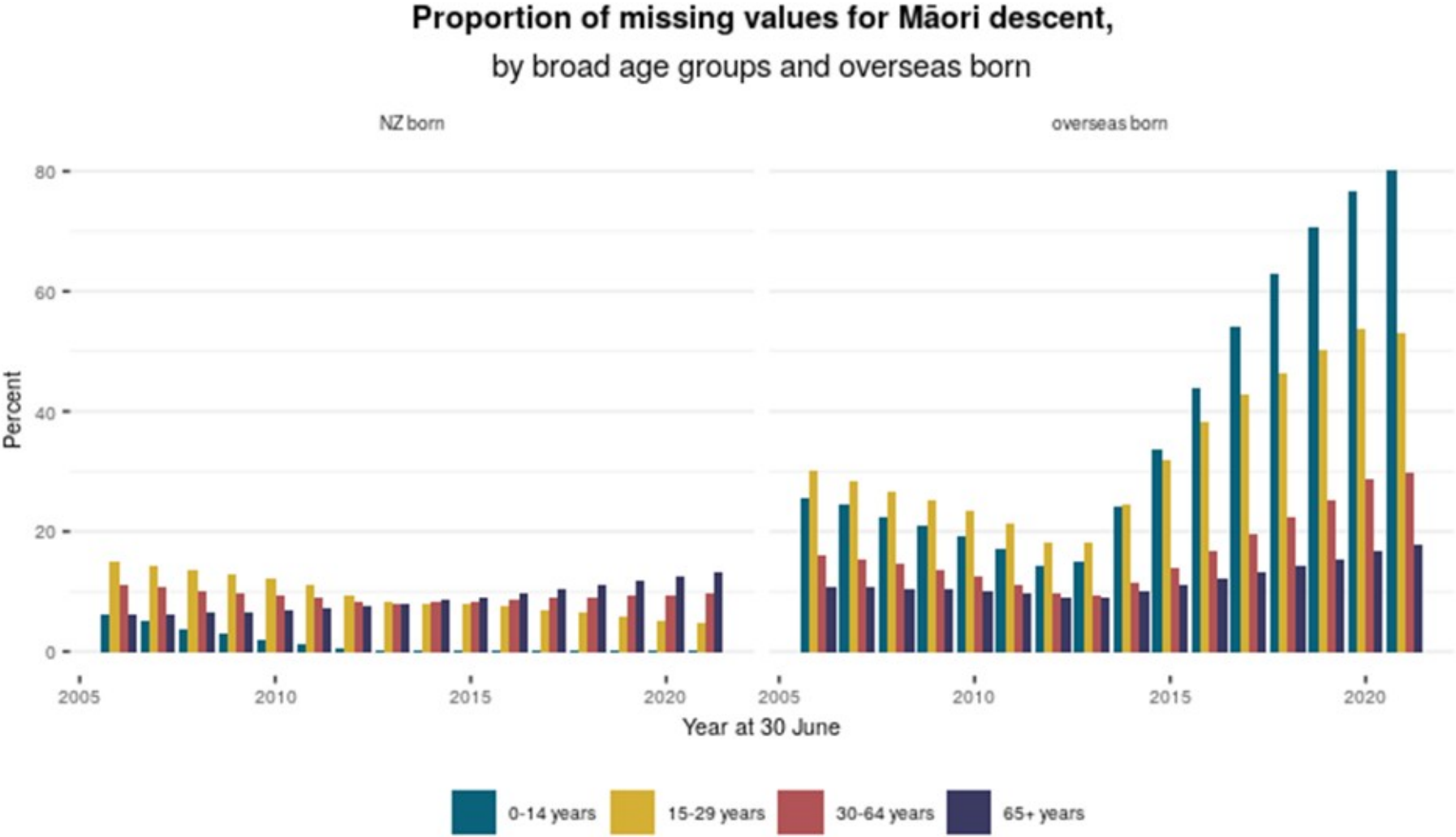


Quality: Māori descent



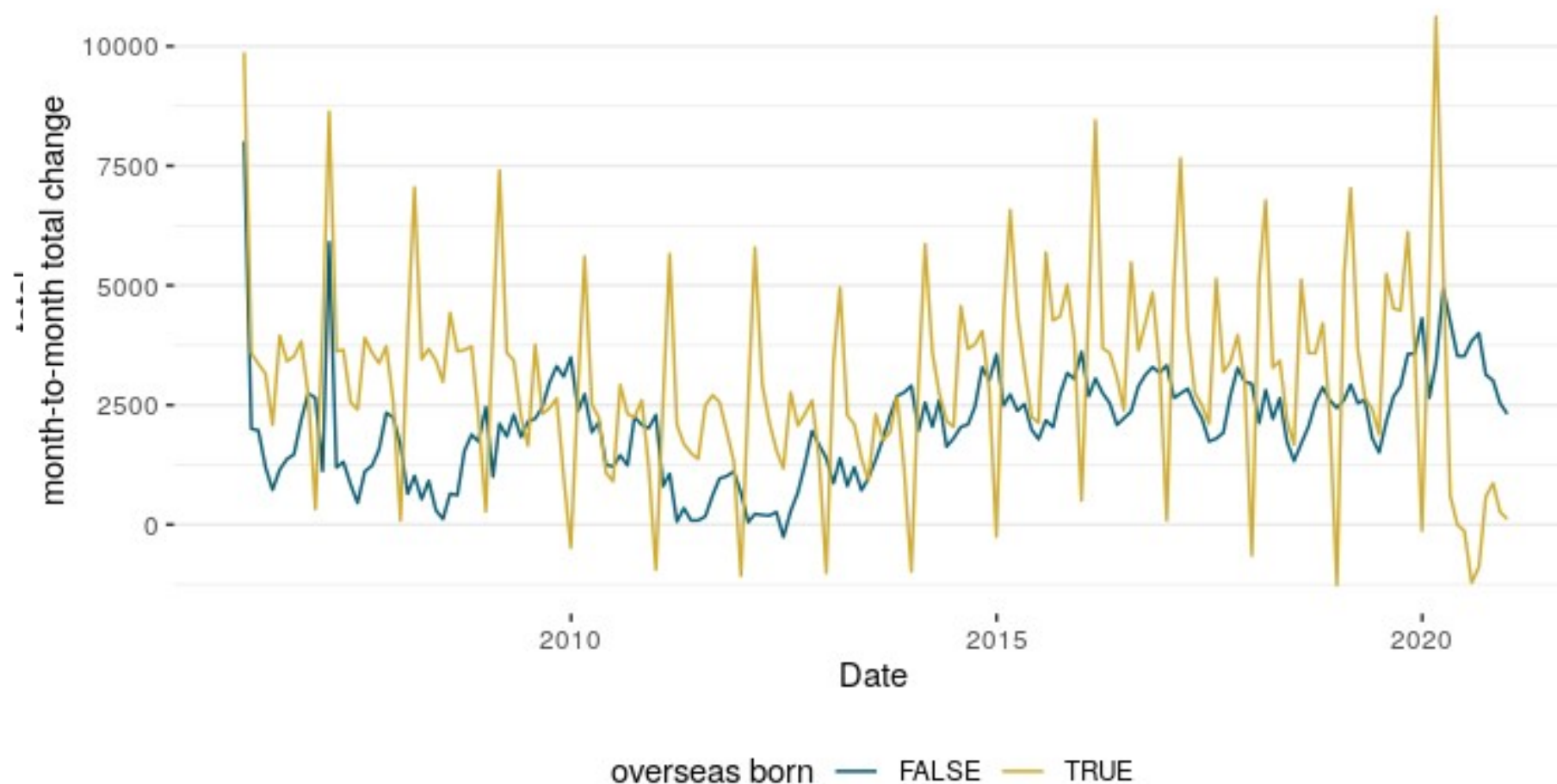
Source: Stats NZ

Quality: Māori descent



More frequent measurements

Monthly admin usual resident population,
for the APC Jan 2006-Dec 2020



Dempster Shafer theory



Compare selected value, with available values in sources (not necessarily the same sources as used.)

- The more sources, the higher the score
- The more agreement, the higher the score
- The more sources disagreeing, the lower the score

These values are added in the unit record data for:

- Māori descent
- Birthplace
- Years since arrival in NZ
- Level 1 ethnicities (all 6)

Scores for any breakdown can be produced simply by averaging the individual scores!

Dempster Shafer theory

Snz_uid	APC	Source 1	Source 2	Source 3	APC QM↓
12345	A	A	A	A	.95
23456	B	-	B	-	.9
34567	C	C	C	A	.7
45678	A	B	-	A	.4
56789	B	A	B	C	.3
...					