History of Administrative Data and the New Zealand census

Stats NZ
Tatauranga Aotearoa

2012 — Census transformation strategy
- Short-medium term: modernise current model
- Long term: investigate census based on administrative data

2015 — Cabinet agreed to actively work towards an admin-based census model supported by surveys

2016, 2017, 2018 — Experimental admin population estimates released
- National age*sex, sub-national, by ethnic group

2018 — 2018 Census, combined model as mitigation
- admin data used directly to include people missed by field collection, and for missing characteristics

2021
- 1st iteration of APC: 7 variables
- Government Data Investment Plan priority "More accurate and frequent measurement of the population"
- Stats NZ Strategic intentions 2021-2025: "Less reliance on direct contact"

2022 — 2nd iteration of APC: 19 variables

What is the experimental Administrative Population Census?

*"A **practical** demonstration of what can be achieved **now** with admin data for census-type information."*

APC's (current) purpose:
- Conversation catalyst
- 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 data needs are met
- Use feedback to direct further development

"Congratulations"

"I can see the APC has great potential and I look forward to using it both outside and inside the IDI"

"with the refinements planned this could become a central component for all NZ population research"

What does the APC include?

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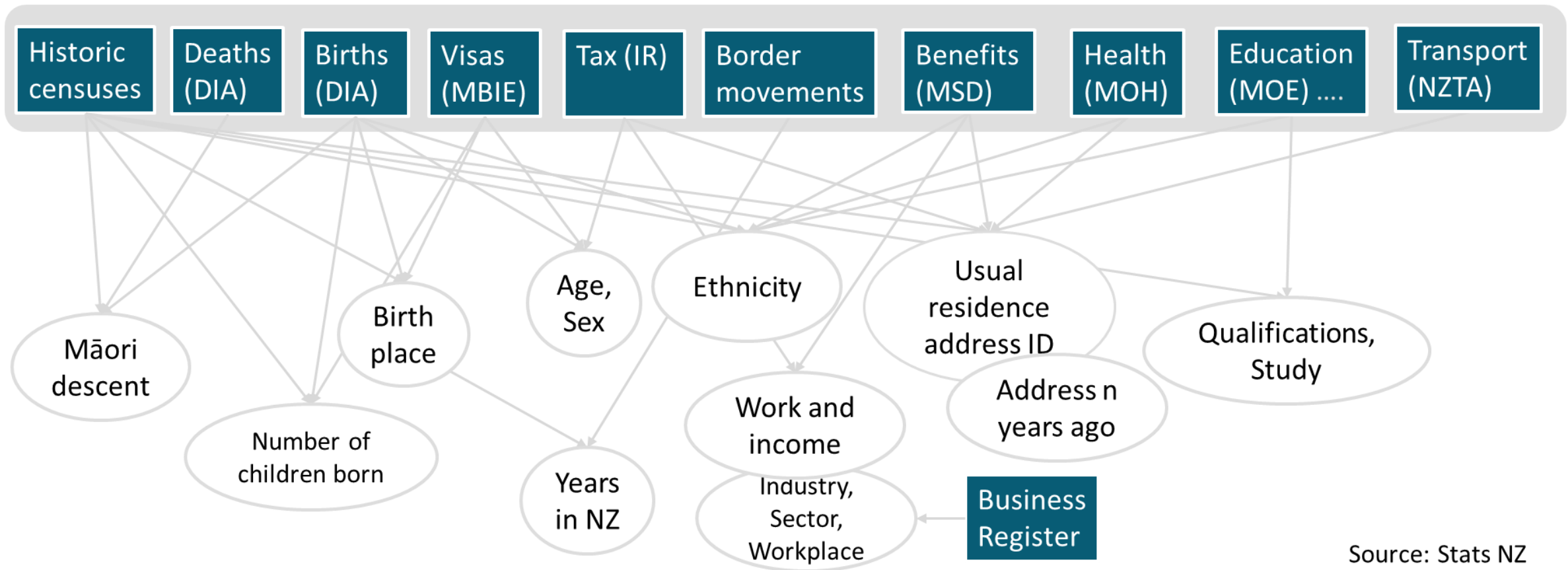Annual time series: 2006 – 2021 (reference date 30th June)

Admin New Zealand resident population

19 census variables in September 2022:

- 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, field of study, study participation

- Work: employment indicator, employment status, industry, sector of ownership

Where does the data come from?

Stats NZ
Tatauranga Aotearoa

All the data sources are linked in the IDI

| Historic censuses | Deaths (DIA) | Births (DIA) | Visas (MBIE) | Tax (IR) | Border movements | Benefits (MSD) | Health (MOH) | Education (MOE) …. | Transport (NZTA) |

Māori descent

Birth place

Age, Sex

Ethnicity

Usual residence address ID

Qualifications, Study

Number of children born

Years in NZ

Work and income

Address n years ago

Industry, Sector, Workplace

Business Register

Source: Stats NZ

An Iterative Design Process

Stats NZ
Tatauranga Aotearoa

	2021	2022	2023 plans
Unit record data	✓	✓	• More variables and refinements • Statistical imputation • Modelled attributes • More timely • Admin dwelling census
Unit record quality scores		✓	
Source code	✓	✓	
Metadata	✓	✓	
Aggregate tables	✓	✓	
Interactive App	✓	✓	
Methodology report	✓	✓	
Information for Māori		✓	

Available to all IDI researchers

Publicly available on stats.govt.nz

iterative design   iterative design   iterative design

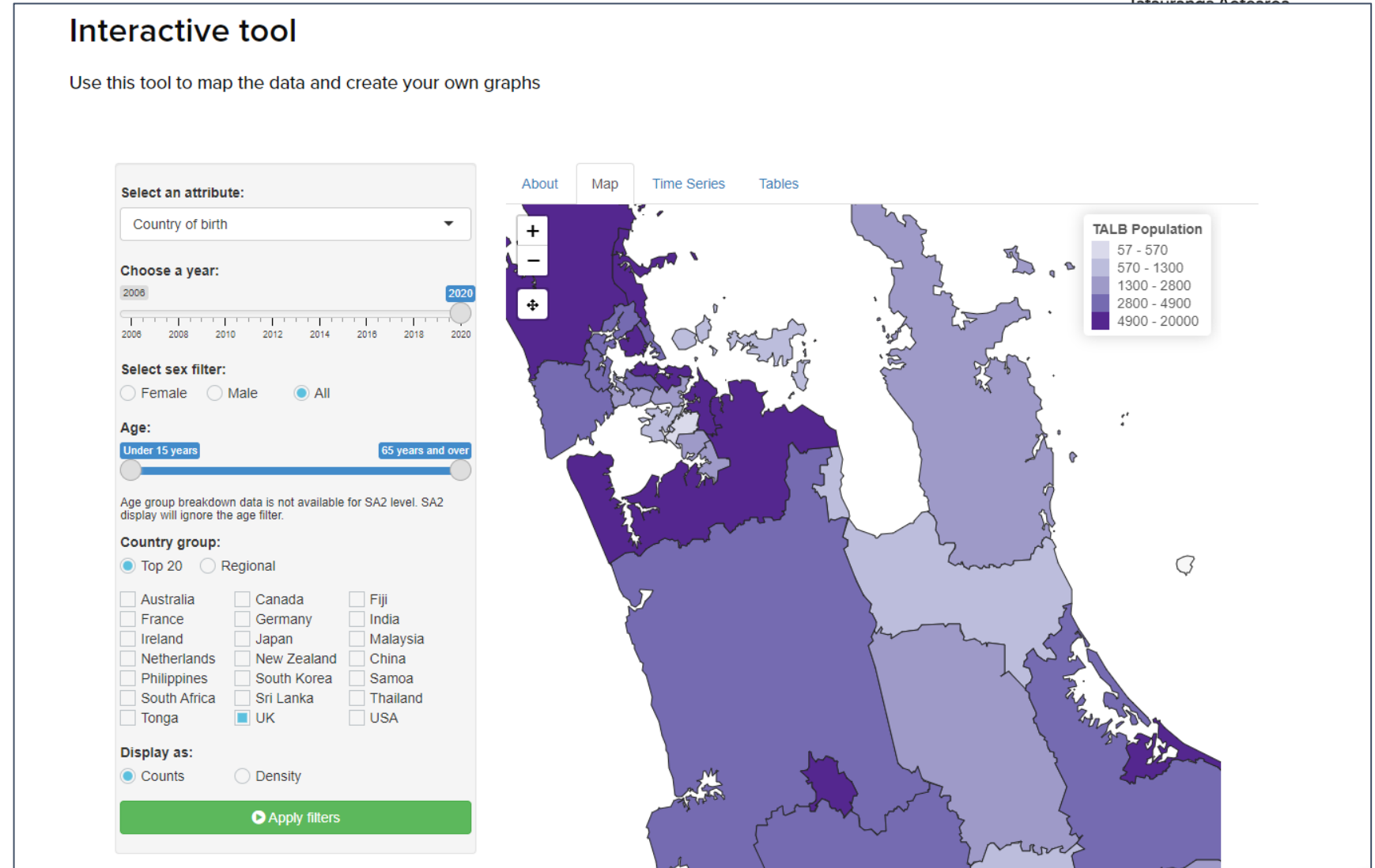Based on engagement, feedback, learnings

Admin Population Census Shiny App
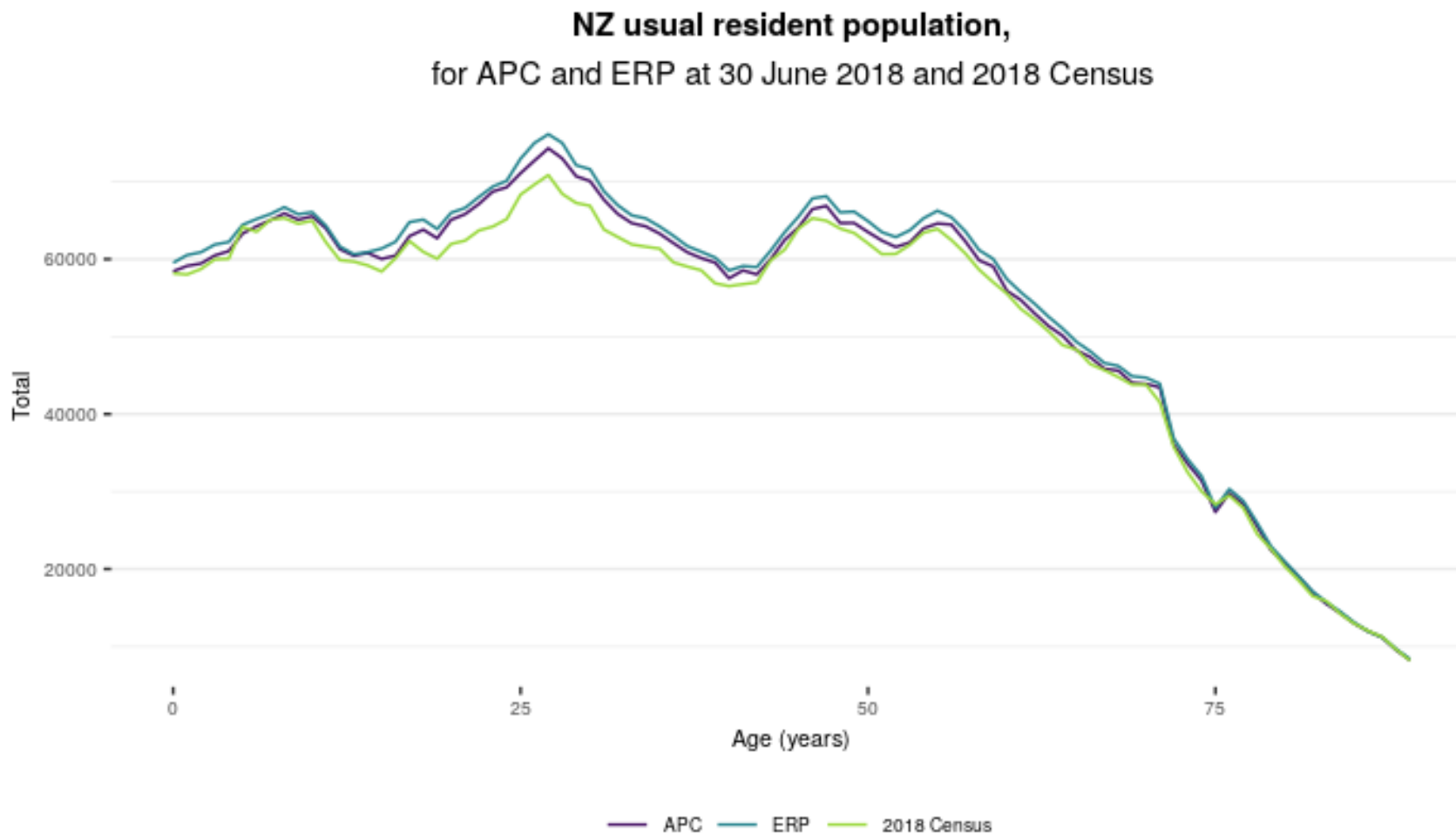
App Allows
- Customised table download
- Limited crosstabs
- Maps to small geography level
- Timeseries

Web App Link

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

What does the admin population look like?

Stats NZ
Tatauranga Aotearoa

NZ usual resident population,

for APC and ERP at 30 June 2018 and 2018 Census

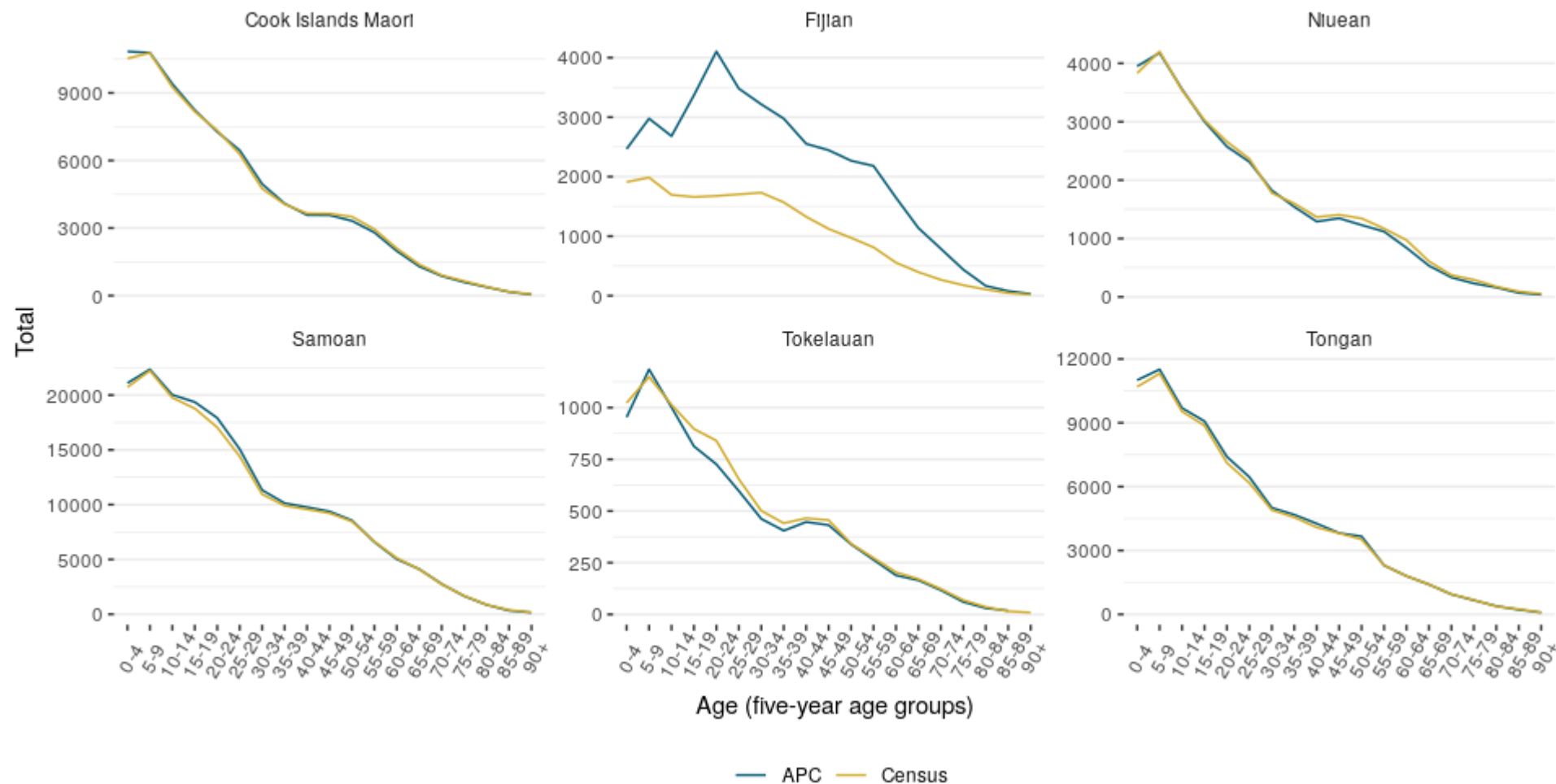**APC is not quite close enough to official estimated resident population (ERP).**

It needs a population estimation adjustment:

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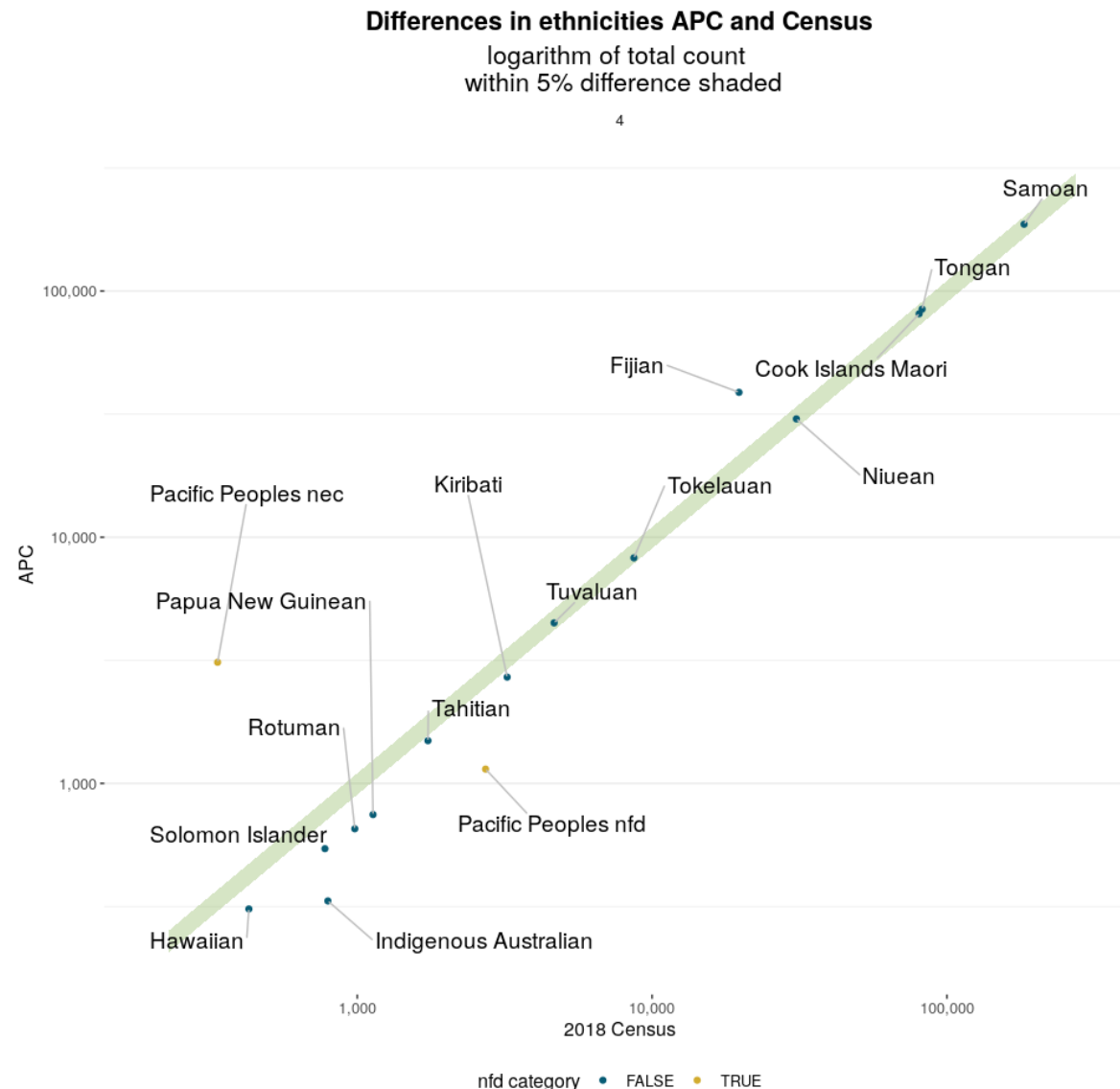- for error bounds

Source: Stats NZ

Age distribution for some Pacific ethnicities

Stats NZ
Tatauranga Aotearoa

Counts of Pacific level 2/3 ethnicities, by five-year age groups

comparison between APC in 2018 and 2018 Census

APC — Census

Source: Stats NZ

Comparing APC and 2018 Census Pacific population totals

- Most APC Pacific ethnicity counts are close to census counts

- There are some issues with agency collections:

- Fijian is higher in admin – sometimes agencies code 'Fijian-Indian' to Fijian

- Some agencies code the smallest (level 4) groups to Pacific Peoples not elsewhere classified (nec)

Differences in ethnicities APC and Census
logarithm of total count
within 5% difference shaded

Source: Stats NZ

Individual form census questions in APC

Stats NZ — Tatauranga Aotearoa

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

Census | Stats NZ

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 28)   month (eg 2)   year (eg 1984)

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

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?
- at the address in 5
- at another address. Print the address as fully as you can:
street number   flat number
street name
suburb or rural locality
city, town or district

8 Which ethnic group do you belong to?
Mark the space or spaces which apply to you.
- New Zealand European
- Māori
- Samoan
- Cook Islands Maori
- Tongan
- Niuean
- Chinese
- Indian
- other, eg DUTCH, JAPANESE, TOKELAUAN. Please state:

9 Which country were you born in?
- New Zealand → go to 11
- other, eg ENGLAND, COOK ISLANDS, UKRAINE. Print the current name of the country:

10 If you live in New Zealand but were not born here, when did you first arrive to live in New Zealand?
month (eg 4)   year (eg 1985)

11 If, in 5 you have given:
- a New Zealand address → go to 12
if not → go to 14

12 Are you descended from Māori (that is, did you have a Māori birth parent, grandparent or great-grandparent, etc)?
- yes
- don't know → go to 13
- no → go to 14

13 Do you know the name(s) of your iwi (tribe or tribes)?
See the Guide Notes for a list of iwi.
- yes
- no → go to 14
- give the name(s) and region(s)/rohe of your iwi:
iwi: / region (rohe): (repeated)

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:

15 In which language(s) could you have a conversation about a lot of everyday things?
Mark the space or spaces which apply to you.
Remember to mark English if you can have a conversation in English.
- English
- Māori
- New Zealand Sign Language
- Samoan
- other language(s), eg GUJARATI, CANTONESE, GREEK. Print the language(s):
- or none, eg too young to talk

16 What is your religion?
Give as much detail as you need to name your religion.
eg PRESBYTERIAN, RĀTANA, SUNNI, SIKHISM
- no religion
- or object to answering

17 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
- my grandparent(s)
- my grandchild(ren)
- my flatmate(s)
- other, eg MOTHER-IN-LAW, STEP-CHILD. Please state:

18 Are you attending, studying or enrolled at school or any other place of education?
- yes – full-time (20 hours or more a week), or
- yes – part-time (less than 20 hours a week) → go to 19
- no – neither of these → go to 21

19 What is the one main way you usually travel to your place of education – that is, the one you use for the greatest distance?
If you don't have a usual method, select the one you used most recently.
- study at home → go to 21
- drive a car, truck or van
- passenger in a car, truck or van
- bicycle
- walk or jog
- school bus
- public bus
- train
- ferry
- or other, eg taxi, motorbike

20 Where are you attending, studying or enrolled?
Give all of the following, if possible:
name of pre-school, school or other place of education
campus and / or suburb
city, town or district

21 If you are answering on behalf of someone who is under 5 years old → go to 23
if not → go to 22

22 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:
• seeing, even if wearing glasses?
- no difficulty
- some difficulty
- a lot of difficulty
- cannot do at all
• hearing, even if using a hearing aid?
- no difficulty
- some difficulty
- a lot of difficulty
- cannot do at all
• walking or climbing steps?
- no difficulty
- some difficulty
- a lot of difficulty
- cannot do at all
• remembering or concentrating?
- no difficulty
- some difficulty
- a lot of difficulty
- cannot do at all
• washing all over or dressing?
- no difficulty
- some difficulty
- a lot of difficulty
- cannot do at all
• communicating using your usual language, for example understanding or being understood by others?
- no difficulty
- some difficulty
- a lot of difficulty
- cannot do at all

23 Do you have a disability, long-term condition, or mental health condition that limits your ability to carry out everyday activities?
- yes
- no
- don't know

24 If you are:
- 15 years or older → go to 25
if not → go to 54

25 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 27
- no

26 Have you ever been a regular smoker of one or more cigarettes a day?
- yes

27 Which one of these statements best describes your current legally registered marital / civil union status?
If you have had more than one legally registered marriage or civil union, answer for your most recent.
- I have never been legally married and I have never been legally registered in a civil union
- I am divorced or my marriage / civil union has been dissolved
- I am a widow / widower or surviving civil union partner
- I am permanently separated from my legal husband / wife / civil union partner
- I am legally married
- I am legally registered in a civil union

28 If your sex at birth was male → go to 29
If your sex at birth was female, answer this question.
How many babies have you given birth to?
- number born
- none

29 Which of the following best describes how you think of yourself?
- heterosexual / straight
- gay or lesbian
- bisexual
- another identity. Please state:
- or prefer not to say

30 Were you born with a variation of sex characteristics (otherwise known as an intersex variation)?
- yes
- no
- don't know
- or prefer not to say

31 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 Bursary / Scholarship, or
  • National Certificate level 3, or
  • NCEA level 3, or
  • NZ Scholarship
- other secondary school qualification gained in New Zealand. Please state:
- other secondary school qualification gained overseas

32 Apart from secondary school qualifications, do you have another completed qualification?
Don't count qualifications that take less than 3 months of full-time study to get.
- yes → go to 33
- no → go to 36

33 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 or Level 7 Qualification
- Bachelor Honours Degree or Postgraduate Certificate / Diploma
- Master's Degree
- PhD or other doctoral degree
- other qualification. Please state:

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

35 Was your highest qualification gained in New Zealand or overseas?
- New Zealand
- overseas

36 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, bonuses, etc, paid by my employer
- self-employment, or business own and work at
- interest, dividends, rent, other investments
- regular payments from ACC or a private work accident insurer
- New Zealand Superannuation or Veteran's Pension
- other superannuation, pensions or annuities (other than NZ Superannuation, Veteran's Pension or war pensions)
- Jobseeker Support
- Sole Parent Support
- Supported Living Payment
- Student Allowance
- other government benefits, government income support payments, war pensions, or paid parental leave
- other sources of income, counting support payments from people who do not live in my household
- or no source of income in that time

37 From all the sources of income you marked in 36, what will the total income be:
• that you yourself got,
• before tax or anything was taken off,
• in the 12 months that will end on 31 March 2022.
- loss
- zero income
- $1 – $10,000
- $10,001 – $15,000
- $15,001 – $20,000
- $20,001 – $25,000
- $25,001 – $30,000
- $30,001 – $35,000
- $35,001 – $40,000
- $40,001 – $50,000
- $50,001 – $60,000
- $60,001 – $70,000
- $70,001 – $100,000
- $100,001 – $150,000
- $150,001 – $200,000
- $200,001 or more

38 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?
- or neither of these, eg renting

39 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?
- I worked for pay, profit or income for an hour or more
- I worked in a family business or family farm without pay → go to 40
- I work in a job, business or farm, but I was not working last week for some reason
- none of these → go to 49

40 How many hours, to the nearest hour, do you usually work each week?
in your main job: hours
in all other jobs for pay, profit or income: hours

41 Answer the next questions (42 – 47) about the job that you worked the most hours in.

42 In that job, which one of these were you?
- a paid employee
- self-employed and not employing others
- an employer of other person(s) in my own business
- working in a family business or family farm without pay

43 In that job, what was your occupation?
eg PRIMARY SCHOOL TEACHER, CIVIL ENGINEER, MOTEL MANAGER

44 Give the full name of the business or employer that you worked for in that job.

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

46 In that job, did you mostly:
- work at home? → go to 52
- work away from home?
Print the full address of the place you mostly worked at. Include, if possible, all of these:
name of building
street number and street name, or name of shopping centre
suburb or rural locality
city, town or district

47 What is the one main way you usually travel to work – that is, the one you use for the greatest distance?
If you don't have a usual method, select the one you used most recently.
- drive a private car, truck or van
- drive a company car, truck or van
- passenger in a car, truck, van or company bus
- public bus
- train
- ferry
- bicycle
- walk or jog
- other, eg taxi, motorbike

48 If you have answered questions about your job → go to 52
if not → go to 49

49 Did you look for paid work in the last 4 weeks?
- yes → go to 50
- no → go to 51

50 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)

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

52 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)
- helped someone who is ill or has a disability (who does not live in my household)
- other help or voluntary work for or through any organisation, group or marae
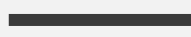- none of these

53 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):

54 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.
X

Thank you for your time and effort

Freephone helpline:
0800 CENSUS (0800 236 787)
www.census.govt.nz

Please place any blank unused forms in your recycling

Census concepts by source

Over half of **individual concepts** are available in Admin Data

*Iwi affiliation from admin data is essential but not yet feasible

Census usual resident population counts are achievable with admin data

Dwelling counts are yet to be proven

Most information about a dwelling is also not available

Household and Family Information is not yet available

Administrative available	Admin not available	Concepts no longer applicable	New concepts available
Age	Gender		
Sex at birth	Variation of sex characteristics		
Number of children born	Cigarette smoking behaviour		Age of mother at first birth
Relationship status	Activity limitations		
Usual residence address	Main means of travel to education	Census Night Address	
Population mobility	Main means of travel to work		
Ethnicity	Languages spoken		
Māori Descent	Religious affiliation		
*Iwi affiliation**	Sexual identity		
Birthplace	Rainbow/LGBTQI+ indicator		
Years since arrival in New Zealand			
Total personal income	Individual home ownership		
Income sources	Unpaid activities		Income by income source
Employed / not employed	Work and labour force status		
Status in employment	Job Search Methods		
Industry	Hours worked in employment per week		
Sector of ownership	Workplace address		
Child dependency status	Occupation		
Qualifications			Years since qualification gained
Study participation			
Educational institution address			

Opportunities

- **Frequency:** Outputs every year (or more often). 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 and cohorts.

Where to next?

We want to hear what you think

- What improvements to APC would be useful for you? E g more tables by ethnicity?

- Should APC become a regular Stats NZ official output? What else would we need to do?

- Thinking about the next census in 2028 – what role could the APC and admin data play?

Current Limitations and Mitigations

Error structures are different from traditional census non-response patterns.

- Multiple sources for the same information: we have methods for choosing best values and resolving conflict, especially usual residence address, ethnicity; next step is to extend to models.

- Historical data (pre-digitisation): we already use 2013 Census.

- Sub-groups: for example, migrants/events occur overseas: look for new sources (for example, visas for overseas qualifications).

- Missing categories:
    - Admin has positive identification only: derive 'No qualifications', 'No children' as default value at 15 yrs.
    - Tax data in Stats NZ excludes 'No income': ask for zero income data.
    - No sources for unpaid work on family farm or business: do not measure?

- Admin collection issues: for example ethnicity coding: work with agencies to improve.

- Remaining missing data: develop statistical imputation methods.