

# GCH2023 User Guide

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This user guide outlines the 2023 update to the Geographic Classification for Health (hereby GCH23). Detailed documentation outlining the 2018 development of the Geographic Classification for Health (hereby GCH18) can be found on the website [Geographic Classification for Health](#). The website also includes information on copyright, recommended citations and the wider GCH team. This document therefore focusses on providing a brief overview of key concepts and criteria for developing rurality classifications, restating the purpose of the GCH, and describing the approach used to develop GCH23.

## Key concepts and criteria for developing rurality classifications (see Nixon et al. 2021)

Concept	Key Criteria. The GCH should:	Action or consideration in GCH
<b>1. Objectives and purpose</b>	<p>(1) Have clear objectives and purpose</p> <p>(2) Measure something explicit and meaningful</p>	The GCH is intended to be a 'fit-for-purpose' urban-rural classification for Aotearoa New Zealand health research and policy that accurately monitors rural-urban variations in health outcomes.
<b>2. Framework indicators and data</b>	<p>(3) Be based on a framework or formula relevant to the purpose</p> <p>(4) Use appropriate algorithms, criteria, and thresholds</p> <p>(5) Be based on simplicity including indicators that are as parsimonious as possible</p> <p>(6) Be derived from high-quality data</p> <p>(7) Be based on a replicable process</p> <p>(8) Be stable over time but have the ability to adjust for changes</p>	Quality population data, stability and an ability to update in response to 5-yearly census data are derived from the underlying Statistics New Zealand classifications and geographic building blocks used to create the GCH. A co-design process involving those with an understanding of Aotearoa's rural population and health services determined appropriate criteria and cut-off points for the GCH categories. Reasoning for the criteria, cut-off points and any special cases are outlined. In line with the UA, the input variables are limited to population size, density and travel time.
<b>3. Spatial unit</b>	<p>Be based on a spatial unit that:</p> <p>(9) Is consistent with data availability</p> <p>(10) Enables confidential examination of small area differences</p> <p>(11) Ensures comprehensive coverage and allows for aggregation into broader regions</p>	Statistical Area 1s (SA1s) are the smallest geographic unit for the reporting of Statistics New Zealand population data, and the building blocks of the UA. SA1s are designed for examination of spatial variation while maintaining confidentiality and anonymity. The GCH classifies every administrative unit in NZ as rural or urban, and broader regions of interest can be developed from SA1s.
<b>4. Validity</b>	<p>(12) Have categories that maximise internal homogeneity and external heterogeneity</p> <p>(13) Have on-the-ground validity and align closely with a heuristic sense of what is and is not rural</p>	The internal homogeneity and external heterogeneity of categories with respect to health were quantitatively validated using Primary Health Organization enrolment data. Extensive consultation with key stakeholders has ensured that the GCH reflects 'common-sense' understandings of what is and is not rural.

## **1. Purpose of the GCH**

The five-level GCH, a geographic classification with two urban categories (U1, U2) and three rural categories (R1, R2, R3) was developed for the purpose of accurately monitoring rural–urban differences in health outcomes.

The GCH is not a funding formula. The GCH is not an accessibility index.

## 2. Framework indicators

The GCH framework was developed through extensive review of the available literature, consultation with leading international experts, and engagement and consultation with 'on the ground' rural health practitioners including co-design partners - the Ministry of Health's National Rural Health Advisory Group. This process has previously been described in our publications and technical report. The framework used to develop GCH23 remains relevant and robust and is therefore unchanged from the GCH18 framework.

Geographic Classification for Health					
	Urban 1 U1	Urban 2 U2	Rural 1 R1	Rural 2 R2	Rural 3 R3
Major Urban ≥100,000	≤25 min		>25 to ≤60 min	>60 to ≤90 min	>90 min
Large Urban 30,000-99,999		≤20min	>20 to ≤50 min	>50 to ≤80 min	>80 min
Medium Urban 10,000-29,999			≤25 min	>25 to ≤60 min	>60 min
Small Urban 1,000-9,999				≤25 min	>25 min

### **Additional considerations**

Whakatāne, Blenheim, Tīmaru, and Masterton are considered as Large Urban Areas. Greymouth is considered as a Medium Urban Area. These additional considerations are unchanged from GCH18.

### **The following additional consistency rules were also followed:**

1. **IUR Consistency:**
  - a. All SA1s within StatsNZ IUR boundaries must have the same GCH category.
  - b. When GCH categories are inconsistent, the most common (population weighted) GCH category was applied.
2. **No travel time estimate provided by StatsNZ**
  - a. IUR Consistency rules or surrounding SA1 GCH categories were used to assign GCH to SA1s that were missing drive time estimates.
3. **Islands:**

- a. If travel time data was available, this was used to apply a GCH category based on the GCH framework.
  - b. If travel time data was unavailable a GCH category was applied based on contextual information.
4. **Inlets and water:**
- a. Outside of IUR areas, 'inlet' and 'oceanic' StatsNZ "LANDWATER" categories are given GCH categories of 'inlet' or 'oceanic' respectively.
  - b. If inlets or oceanic SA1s form part of a IUR area that is a Major/Large/Medium/Small/Rural settlement or Other, then a GCH category is applied by using surrounding SA1s and following other consistency rules.

## **Data**

The GCH is developed using data provided by StatsNZ. This includes a mix of publicly available data, and internal datasets produced for the purposes of developing the StatsNZ UA (Urban Accessibility) classification.

*Publicly available datasets include:*

- [2023 Statistical Area 1](#): SA1s are the fundamental building blocks of the GCH classification. The main statistical purpose of the SA1 geography is to provide an output geography that allows the release of more low-level data than is available at the meshblock level. Built by joining meshblocks, SA1s generally have a population of 100–200 residents. Additional information about SA1s is available from StatsNZ ([Ariā – Classifications: SA1](#))
- [Urban Rural 2023](#): Urban Rural is a statistical geography that classifies New Zealand into areas that share common urban or rural characteristics. In the 2025 classification there are: • 7 major urban areas • 13 large urban areas • 23 medium urban areas • 152 small urban areas • 402 rural settlements. Additional information about Urban Rural 2023 is available from StatsNZ ([Ariā - Classifications: Urban Rural](#))

*Internal StatsNZ datasets include:*

- **Drive time estimates:** For each SA1 (the closest address to the address weighted centroid), the shortest drive time was calculated to major, large, medium and small urban area edge points. StatsNZ used the open-source router designed for use with data from the OpenStreetMap project to calculate these drive times. More details can be found in the [StatsNZ Urban accessibility – methodology and classification](#) document.

### 3.Spatial unit

The spatial unit for GCH23 is SA1s and is unchanged from GCH18. However, the StatsNZ SA1 dataset has changed since 2018. According to [StatsNZ](#) "*The update is to ensure SA1s are relevant and meet criteria before each five-yearly population and dwelling census. SA1 2023 contains 3,251 new SA1s. Updates were made to reflect real world changes including new subdivisions and motorways, improve the delineation of urban rural and other statistical areas and to ensure they meet population criteria by reducing the number of SA1s with small or large populations.*"

Our analysis has revealed the following summary of SA1 changes. In 2023 there were 7, 349 new SA1s (not present in 2018), while 4,074 SA1s from 2018 dataset were no longer present in 2023, reflecting geographical boundary changes between the two census years. Of the 25,815 SA1s present in both years, 751 (2.9%) experienced a change in GCH classification.

<i>Analysis</i>	<i>Count</i>
Total SA1s 2023	33,164
Total SA1s 2018	29,889
New SA1s in 2023	7,349
SA1s Removed from 2018	4,074
SA1s Common to both	25,815
<b>Difference (2023 - 2018)</b>	<b>3,275 (9.9%)</b>

## 4.Validity

GCH18 underwent extensive qualitative and quantitative validation, as outlined in Whitehead et al. (2022). The key criteria and concepts including in GCH23 were unchanged (same purpose, same framework, same spatial unit, and same algorithm/methods), and therefore engagement was less extensive than for GCH18. In addition, significant restructuring to the health system since 2020 and the recognition of rural populations as priority populations has meant that the GCH18 co-design partners (MoH's National Rural Health Advisory Group) no longer functions in the same way. However, we have undertaken extensive consultation and engagement on the GCH23 update with Hauora Taiwhenua, New Zealand's National Rural Health Network.

### Numbering

Level 1 code	Level 2 code	Name
<b>1</b>		<b>Urban</b>
	111	U1
	112	U2
<b>2</b>		<b>Rural</b>
	221	R1
	222	R2
	223	R3
<b>3</b>		<b>Water areas</b>
	331	Oceanic
	332	Inlet

### Concordance files

GCH23 was created using SA12023 and this is the recommended spatial unit for analysis. However, it is recognised that the ability to use GCH23 at other spatial units will support a wider range of analysis needs. Therefore, concordance files for additional spatial units have been created using a population weighted approach:

- Meshblock (2023)
- Statistical Area 2 (2023)
- Health Domicile

Additional information on the use of GCH18 and GCH23 SA2, Domicile and Meshblock concordance files:

**Meshblock concordance files:** This file has been designed specifically to add GCH to Ministry of Health (MoH) datasets containing Meshblock codes.

This file includes 2018, 2013, 2006, and 2001 Meshblock codes, but will still work well with data outside those years. Meshblock boundaries from census 2018 fit perfectly and completely within the Statistics New Zealand Statistical Area 1s (SA1) boundaries on which GCH is based. However, longitudinal health data usually contains some older Meshblocks which have been phased out and replaced by multiple smaller Meshblocks. These deprecated Meshblocks may overlap multiple SA1s. Usually, all such SA1s belong to the same GCH category. Occasionally, a Meshblock will overlap more than one GCH category. When this happens, we have assigned the GCH category to which the majority of people living in that Meshblock belong. By necessity, this will allocate a minority of people in those Meshblocks to a GCH category to which they do not belong.

**Domicile Concordance files:** This file has been designed specifically to add GCH to the Ministry of Health (MoH) datasets containing Domicile codes.

Use this file if your dataset contains only Domicile codes. If your dataset also contains Meshblock codes, then use the MoH Meshblock to GCH concordance file. This file includes 2006 and 2013 domicile codes. The 2013 domiciles are still current as of 2022, and this file will still work well with data outside those years. Domicile boundaries do not align well with SA1 boundaries, and longitudinal health data usually contains some older Domiciles which have been phased out and replaced with multiple smaller Domiciles. These deprecated Domiciles may overlap multiple SA1s. Usually, all such SA1s belong to the same GCH category. Occasionally, a Domicile will overlap more than one GCH category. When this happens, we have assigned the GCH category to which the majority of people living in that Domicile belong. By necessity, this will allocate a minority of people in those Domiciles to a GCH category to which they do not belong.

Further information is available in '*Davie G, Whitehead J, Miller R, Atkinson J, Crengle S, de Graaf B, Lawrenson R, Smith M, Nixon G. Accuracy of domicile codes in New Zealand's hospital discharge data and implications for urban-rural analyses. New Zealand Population Review. 2024;50*'

## Major changes from GCH18 to GCH23

The following major differences between GCH18 and GCH23 have been identified, with reasons for these changes provided.

Place	Reason	GCH23	GCH18
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<b>Wānaka</b>	StatsNZ defined Medium Urban Area due to Population increase.	R1	R2
<b>Paraparaumu</b>	Travel time to Porirua. Considered as Major Urban.	U1	R1
<b>Hauraki</b>	Change to drive time estimates.	R1	R2
<b>Waiheke Island (West)</b>	Ferry travel time estimates + small urban area travel time changes.	R2	R1

### Other changes from GCH18 to GCH23

<b>Reason</b>	<b>Explanation</b>	<b>Example</b>
<b>SA1 changes</b>	Changes to the spatial unit (SA12018 to SA12023) including boundary changes, SA1 splits, or new SA1s being created will impact GCH23 categories in some places.	Whale Bay / Te Uku (Raglan: SA1 split); 7029992 (Omahuta Forest-Horeke, Hokianga: SA1 boundary change).
<b>IUR Boundary changes</b>	Changes to the urban boundaries since 2018 will have impacted GCH categories in some places. Following IUR consistency rules means that while some SA1s may be located outside a drive time threshold, they may still be classified according to the population weighted GCH category of the IUR boundary.	Morrinsville North – the addition of a new subdivision has resulted in GCH category changes for some SA1s.
<b>Population change</b>	Some SA1s were close to a population threshold in GCH18 (e.g. having a population of 9,555 – defined as a Small Urban area). In GCH23 some of these SA1s are now on the other side of this threshold (e.g. having a population of 11,922 – defined as a Medium Urban area) which results in a GCH category change (in this example, from R2 to R1).	Wānaka - Population growth has resulted in IUR reclassification to Medium Urban area, impacting GCH category of Wānaka and surrounds.
<b>Drive time estimate change</b>	Some SA1s were close to a drive time threshold in GCH18 (e.g. being 26mins from a Major Urban area). In GCH23 some of these SA1s are now on the other side of this threshold (e.g. 24mins from a Major Urban area) which results in a GCH category change (in this example, from R1 to U1).	Areas surrounding Huntly have changed GCH categories due to the addition of Waikato Expressway reducing travel times to Hamilton.

### References

Nixon, G., Whitehead, J., Davie, G., Fearnley, D., Crengle, S., de Graaf, B., Smith, M., Wakerman, J., & Lawrenson, R. (2021). Developing the Geographic Classification for

Health, a rural-urban classification for New Zealand health research and policy: A research protocol. *Australian Journal of Rural Health*, <https://doi.org/10.1111/ajr.12778>

## **Recommended reading**

GCH23. *The Geographic Classification for Health (2023)*. Centre for Rural Health. University of Otago. <https://www.otago.ac.nz/centre-for-rural-health/research/geographic-classification-for-health>

Fearnley, D., Lawrenson, R., & Nixon, G. (2016). 'Poorly defined': unknown unknowns in New Zealand Rural Health. *The New Zealand Medical Journal*, 129(1439), 77. <https://nzmj.org.nz/media/pages/journal/vol-129-no-1439/table-poorly-defined-unknown-unknowns-in-new-zealand-rural-health/80e5528520-1696473405/table-poorly-defined-unknown-unknowns-in-new-zealand-rural-health.pdf>

Whitehead, J., Davie, G., de Graaf, B., Crengle, S., Fearnley, D., Smith, M., Lawrenson, R., & Nixon, G. (2022). Defining rural in Aotearoa New Zealand: A novel geographic classification for health purposes. *New Zealand Medical Journal*, 135(1559), 22-38. <https://doi.org/10.26635/6965.5495>