Appendices

Appendix 1: Key concepts and criteria for developing rurality classifications.

Concept	Key criteria. The GCH should:	Action or consideration in GCH
Objectives & purpose	1) Have clear objectives and purpose	The GCH is intended to be a "fit-for-purpose" urban-rural classification for Aotearoa New Zealand health research and policy that accurately monitors urban-rural variations in health outcomes.
	2) Measure something explicit and meaningful	
Framework indicators & data	3) Be based on a framework or formula relevant to the purpose	Quality population data, stability, and an ability to update in response to five-yearly census data is 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 New Zealand'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.
	4) Use appropriate algorithms, criteria, and cut-off points	
	5) Be based on simplicity including parsimonious indicators	
	6) Derived from high quality data	
	7) Be based on a replicable process	
	8) Stable over time but ability to adjust for changes	
Spatial unit	Be based on a spatial unit that: 9) Is consistent with data availability	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 SA1 in NZ as rural or urban, and broader regions of interest can be developed from SA1s.
	10) Enables confidential examination of small area differences	
	11) Ensures comprehensive coverage and aggregation into broader regions	
Validity	12) Have categories that maximise internal homogeneity and external heterogeneity	The internal homogeneity and external heterogeneity of categories with respect to health were quantitatively validated using Primary Health Organisation enrolment data. Extensive consultation with key stakeholders has ensured that the GCH reflects "common-sense" understandings of what is and is not rural.
	13) Have on-the-ground validity and align closely with a heuristic sense of what is and is not rural	

Appendix 2: Border issues and additional considerations.

Modifications and special cases outside of the changes to the population and drive time thresholds outlined above have been avoided as much as possible. However, one important challenge has been that, inside a health discourse, the most meaningful population threshold likely sits within the medium urban area category. Places at the upper end of the population threshold (close to 30,000 residents) tend to be more urban in nature than towns at the smaller end of the scale (closer to 10,000 residents). To maintain consistency with the SSGA18 and UA, we have avoided splitting the medium urban areas category. However, we have identified four places—Timaru, Blenheim, Whakatāne, and Masterton—which are classed in the UR2018 as medium urban areas but have larger populations than other medium urban areas. Furthermore, these centers, for historic reasons, also have substantially different health services to most other medium urban areas, setting these places apart as special cases. On this basis Timaru, Blenheim, Whakatāne, and Masterton are more appropriately included in the U2 category in the GCH. Furthermore, despite being classified as a small urban area in the UR2018, Greymouth has many of the characteristics of a medium urban area and is treated like a medium urban area in the UA. Therefore, we have also classed Greymouth as a medium urban area in the GCH. Finally, the rural settlement of Te Poi in the Matamata-Piako region was originally classed as U2 due to its travel time to the edge of Tauranga. However, we received strong feedback during the consultation process that this was incorrect. The Kaimai ranges present a significant geographic barrier, and commuter data from the Statistics New Zealand (2021) Functional Urban Areas classification indicates that the Te Poi area is not a functional part of Tauranga City. Consistent feedback that we received from NRHAG and stakeholders was that all of these additional considerations and modifications were appropriate changes and produced a better reflection of the "on-the-ground" reality.

Appendix 3: Overlap between the population defined as urban and rural according to the GCH, UA, and UREP.

GCH classification		Total		Overlap between GCH and UA classifications			Overlap between GCH and UREP classifications		
		n	%	Rural	Urban	% Agreement	Rural	Urban	% Agreement
Urban		3,806,307	81%						
	U1	2,961,138	63%	288,714	2,672,424	90%	139,557	2,821,581	95%
	U2	845,169	18%	197,223	647,946	77%	102,852	742,317	88%
Rural		892,881	19%						
	R1	570,147	12%	420,009	150,138	74%	251,382	318,765	44%
	R2	266,928	6%	266,928	0	100%	138,504	128,424	52%
	R3	55,806	1%	55,806	0	100%	52,914	2,892	95%
Total		4,699,188		1,228,680	3,470,508		685,209	4,013,979	

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