



INTEGRATION  
OF IMMIGRANTS  
PROGRAMME

2007 – 2012



Motu

## Immigrant Segregation in Auckland, New Zealand

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# Overview

- Background patterns
  - Auckland/ diversity/ change
- Theories that deal with segregation?
- Summarising location patterns
  - Insights from different global v local measures
- Immigrant settlement and residential patterns

# Auckland is an immigrant city

## The Australasian context

*% of metropolitan population foreign born*

Local Geography	1996	2001	2006	1996-2001	2001-2006
Greater Auckland	28.33	31.86	36.73	3.5	4.9
Sydney	34.09	35.55	36.70	1.5	1.1
Perth	33.62	33.38	34.09	-0.2	0.7
Melbourne	30.68	30.64	31.50	0.0	0.9
Adelaide	25.80	24.85	25.31	-1.0	0.5
Brisbane and Gold Coast	21.87	22.78	24.07	0.9	1.3
<b>Australia</b>	<b>22.81</b>	<b>23.15</b>	<b>23.88</b>	<b>0.3</b>	<b>0.7</b>
Greater Wellington	20.52	21.09	23.26	0.6	2.2
Darwin	24.19	23.29	22.98	-0.9	-0.3
Canberra ACT	23.08	22.62	22.92	-0.5	0.3
<b>New Zealand</b>	<b>17.52</b>	<b>19.46</b>	<b>22.91</b>	<b>1.9</b>	<b>3.4</b>
Greater Christchurch	14.98	16.17	19.47	1.2	3.3
Hobart	13.41	13.37	13.97	0.0	0.6
Other South Australia	12.66	12.64	12.57	0.0	-0.1
Other Northern Territory	11.92	11.77	11.37	-0.2	-0.4

# Auckland is increasingly an Asian city

*Percentage of metropolitan population Asian born*

	1996	2001	2006	Increment 1996-2001	Increment 2001-2006
Greater Auckland	7.0	9.6	13.3	2.6	3.8
Sydney	9.7	10.9	12.6	1.2	1.6
Melbourne	7.1	7.7	9.3	0.6	1.7
Perth	6.3	6.4	7.2	0.2	0.7
<b>New Zealand</b>	<b>3.4</b>	<b>4.6</b>	<b>6.5</b>	<b>1.2</b>	<b>1.9</b>
Canberra ACT	4.7	4.9	6.1	0.3	1.2
Darwin	7.5	5.8	6.0	-1.7	0.2
<b>Australia*</b>	<b>4.5</b>	<b>4.9</b>	<b>5.8</b>	<b>0.4</b>	<b>0.9</b>
Greater Christchurch	3.0	3.9	5.4	0.8	1.6
Greater Wellington	3.4	4.1	5.3	0.6	1.2
Adelaide	3.2	3.3	4.5	0.1	1.2
Brisbane and Gold Coast	3.4	3.6	4.4	0.2	0.8
Hobart	1.5	1.6	2.1	0.1	0.5
Other South Australia	0.6	0.7	0.9	0.1	0.2

# There is residential segregation in Auckland

## Previous research in NZ

Broad findings (by ethnicity):

- Pacific people are the most segregated group from Europeans, followed by Maori
- Segregation among Maori and Pacific people is slightly decreasing, increasing among Asians
- Levels of segregation are relatively low compared to the US

Selected References:

- Crbic D, Ishizawa H and Crothers C (2010) Ethnic residential segregation in New Zealand, 1991-2006. *Social Science Research* 39: 25-38.
- Johnston R, Poulsen M, Forrest J (2002) Rethinking the analysis of ethnic residential patterns: segregation, isolation, or concentration thresholds in Auckland, New Zealand, *Geographical Analysis* 34: 245-261.
- Johnston, R., Poulsen, M., & Forrest, J. (2008). Asians, Pacific Islanders, and ethnoburbs in Auckland, New Zealand. *Geographical Review* 98: 214-241.

# Theories of intra-urban location choice

- Residential clustering is common in all cities
- **Market sorting** (linked to local 'amenities')
  - People with similar tastes live together because they are convenient to local amenities (e.g: Catholics live near Catholic churches)
  - Group members have similar income and choose places they can afford
- **Social Sorting** (could occur anywhere)
  - People like to live near similar people
  - People like to live apart from dissimilar people

## **Economic equilibrium theory**

- Spatial equalisation of utility
  - as function of consumer goods, accessibility, land use, housing, amenities and network externalities
  - subject to income, prices (incl. rents), taxes.
- Population heterogeneity generates sorting/clustering.

# Location choice and migrant settlement

## *Spatial assimilation theory*

- Ethnic residential integration (less clustering) occurs when minority groups acculturate and achieve socio-economic mobility. This depends on
  - Group characteristics
  - Ecological context
- Weigh up the benefits of ‘within-group’ versus broader networks and interactions
- Do patterns reflect dispersion from a fixed set of ‘entry areas’, or diversification of ‘entry areas’ as new entrants follow existing concentrations?

# Measuring segregation

Measure	Type	What does it capture?	Range of values
Segregation/ Dissimilarity	Global, Boundaried	How different is a group's distribution across areas from that of non-group members?	(0,1)
Isolation	Global, Boundaried	Are group members disproportionately exposed to own-group members?	(1,1/p) [or (0,1)]
Moran's I (Spatial Autocorrelation)	Global, Spatial	Do nearby areas have similar composition?	(-1,1)
Getis & Ord's G*	Local, Spatial	Is the group's presence <i>around a particular area</i> higher (or lower) than would be expected by chance?	$\sim N(0,1)$

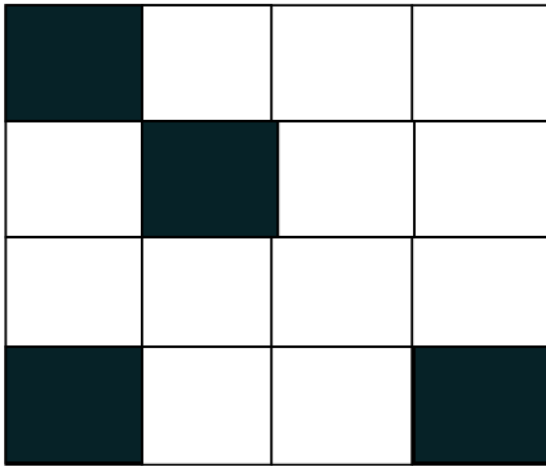


# Formulae

Measure	Formula
Segregation/ Dissimilarity	$S_g = \frac{1}{2} \sum_{a=1}^A \left  \frac{P_{ga}}{P_{g\bullet}} - \frac{(P_{\bullet a} - P_{ga})}{(P_{\bullet\bullet} - P_{g\bullet})} \right $
Isolation	$IR_g = \sum_{a=1}^A \left( \frac{P_{ga}}{P_{g\bullet}} \right) \frac{P_{ga}}{P_{\bullet a}} \quad ; \quad Index_A = \frac{IR_g}{(P_{g\bullet}/P_{\bullet\bullet})}; \quad Index_B = \frac{IR_g - \left( \frac{P_{g\bullet}}{P_{\bullet\bullet}} \right)}{1 - \left( \frac{P_{g\bullet}}{P_{\bullet\bullet}} \right)}$
Moran's I (Spatial Autocorrelation)	$I_g = \frac{\sum_{a=1}^A \left( \frac{P_{ga}}{P_{g\bullet}} - \frac{1}{A} \right) \left( \sum_{n=1}^{N_a} w_{an} \left( \frac{P_{gn}}{P_{g\bullet}} - \frac{1}{A} \right) \right)}{\sum_{a=1}^A \left( \frac{P_{ga}}{P_{g\bullet}} - \frac{1}{A} \right)^2}$ <p style="margin-left: 400px;"> <math>w_{an}</math> = element of row-standardised spatial weight matrix         </p>
Getis & Ord's $G^*$	$G_{ga}^* = \frac{\sum_{n=1}^A w_{an} \left( \frac{P_{gn}}{P_{\bullet n}} - M_g \right)}{\sqrt{\left( \frac{1}{A} \sum_{a=1}^A \left( \frac{P_{ga}}{P_{\bullet a}} \right)^2 - M_g^2 \right)} \sqrt{\frac{A}{A-1} \sum_{n=1}^A w_{an}^2 - 1}}$ <p style="margin-left: 400px;">             where <math>M_g = E_a \left[ \frac{P_{ga}}{P_{\bullet a}} \right]</math> </p>

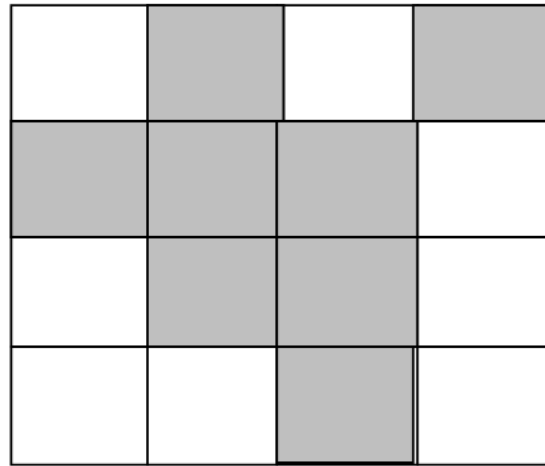
# Global dissimilarity and spatial correlation measures capture different patterns

(a)



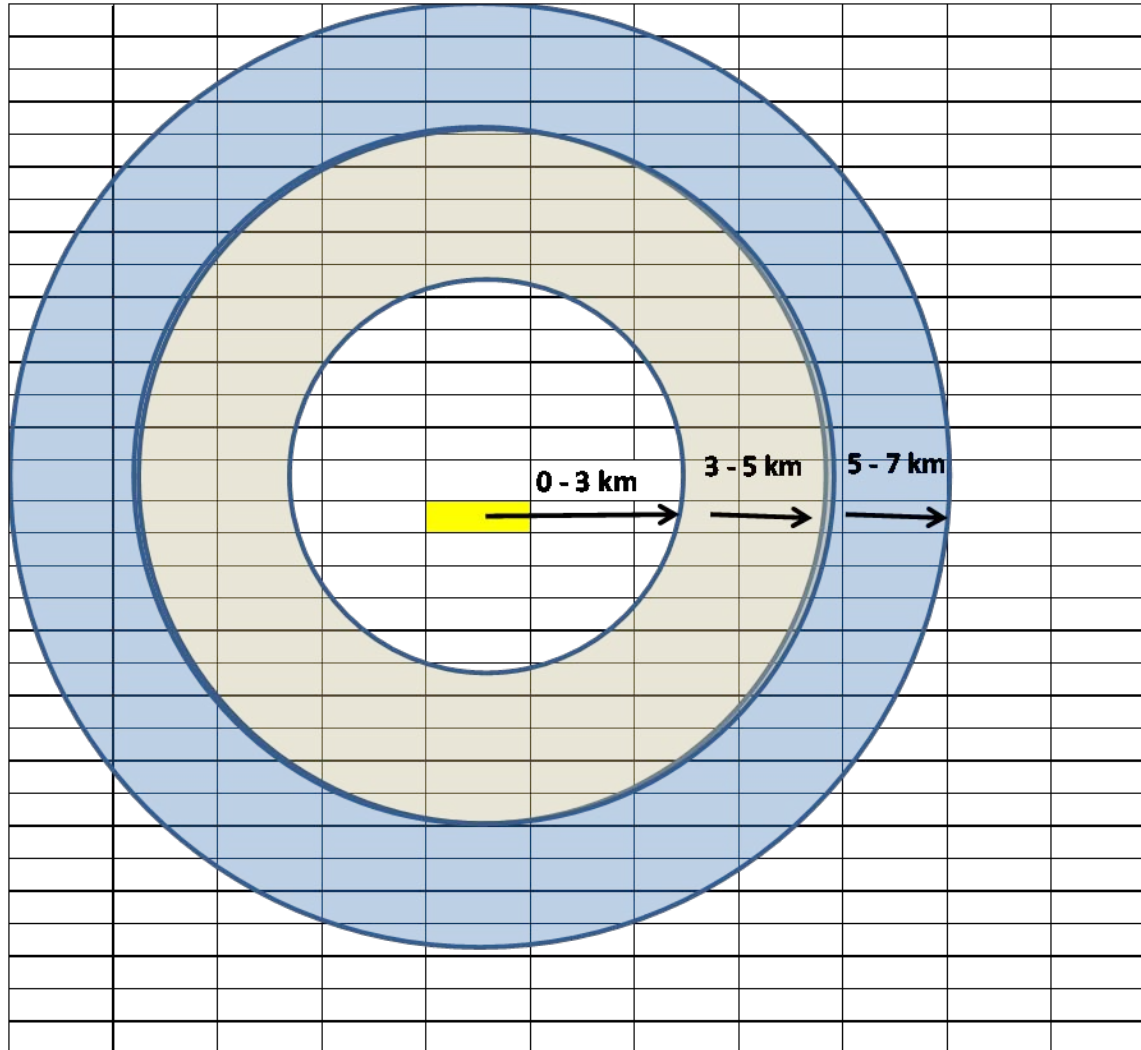
High Segregation,  
Low Spatial autocorrelation

(b)



Low Segregation,  
High Spatial autocorrelation

# Neighbourhoods of Area Units



Spatial weights matrix:  
captures all AUs with  
centroids within  
certain range

Row standardized

Weights proportional  
to AU population

# Data

- 1996, 2001 and 2006 unit record data aggregated to 334 Area Units within Auckland region
- Population aged 25-65
- Immigrant groups

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<b>Country of Birth</b>	<b>1996</b>	<b>2001</b>	<b>2006</b>
NZ Born	66.14%	62.97%	58.03%
UK	10.07%	8.55%	7.67%
China	1.68%	2.69%	4.37%
Korea	0.77%	1.06%	1.55%
India	0.84%	1.37%	2.81%
South Africa	0.56%	1.39%	2.07%

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# Disclaimer

- Access to the micro data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975.
- All frequency counts using Census data are subject to base three rounding in accordance with Statistics New Zealand's release policy for census data.
- The views, opinions, findings and conclusions or recommendations expressed in these papers are strictly those of the authors and do not necessarily represent, and should not be reported as, those of the New Zealand Treasury, Motu Economic and Public Policy Research, and the National Institute of Demographic and Economic Analysis.

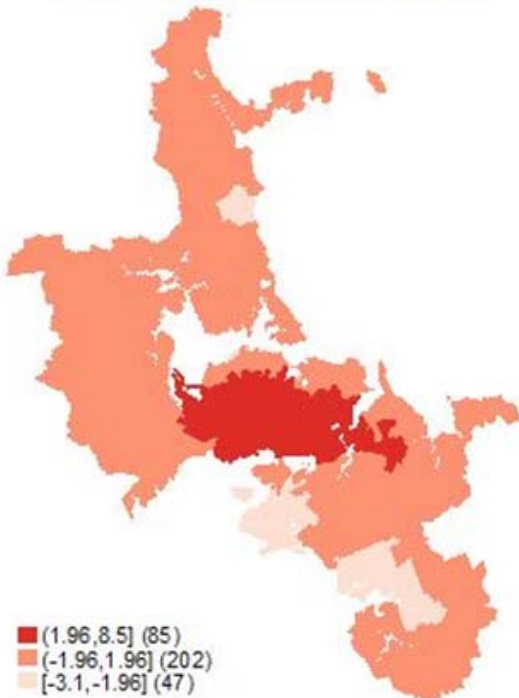
# Results: global indices by country of birth groups

	Segregation Index			Isolation Index			Moran's I		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
NZ Born	0.14	0.18	0.20+	1.01	1.02	1.02	0.52	0.57	0.58+
UK	0.20	0.21	0.25+	1.22	1.26	1.34	0.72	0.72	0.72
China	0.39	0.41	0.41+	2.02	2.14	2.04	0.57	0.55	0.55-
Korea	0.44	0.46	0.48+	2.66	2.87	3.04	0.56	0.50	0.54-
India	0.35	0.39	0.40+	2.06	2.54	2.46	0.54	0.52	0.54
South Africa	0.37	0.39	0.39+	2.04	2.21	2.18	0.69	0.82	0.82+

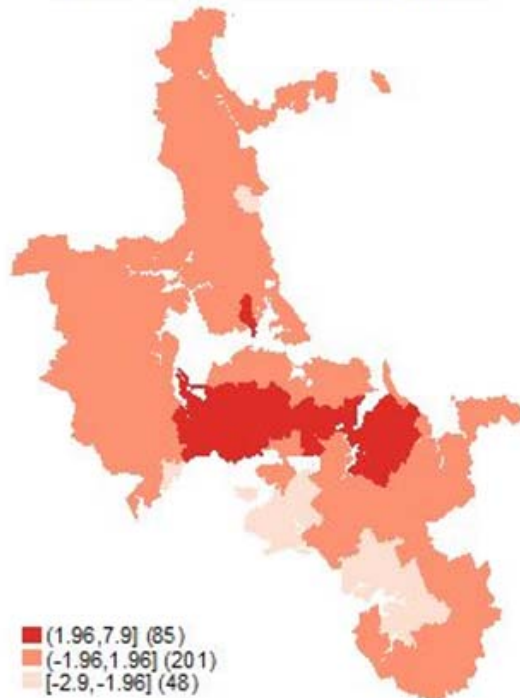
Note: Moran's I calculated for a radius of 3km

# The evolution of local clustering with increasing years of residence: 1991-96 cohort arrivals from PRC

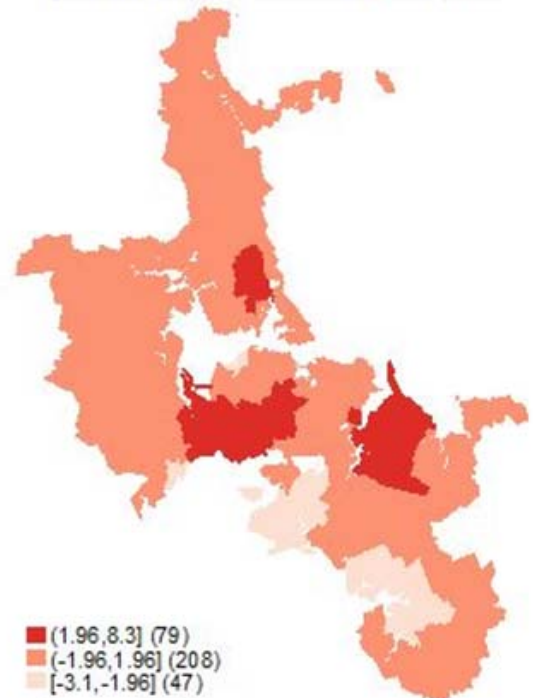
Getis and Ord Measure of Concentration  
1996 China Arrival Cohort (0-4 years in NZ)



Getis and Ord Measure of Concentration  
1996 China Arrival Cohort (5-9 years in NZ)



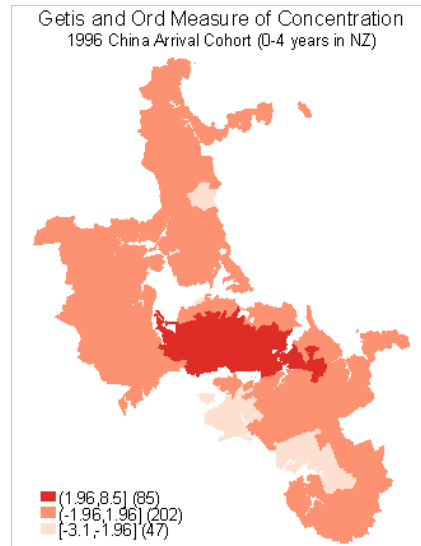
Getis and Ord Measure of Concentration  
1996 China Arrival Cohort (10-14 years in NZ)



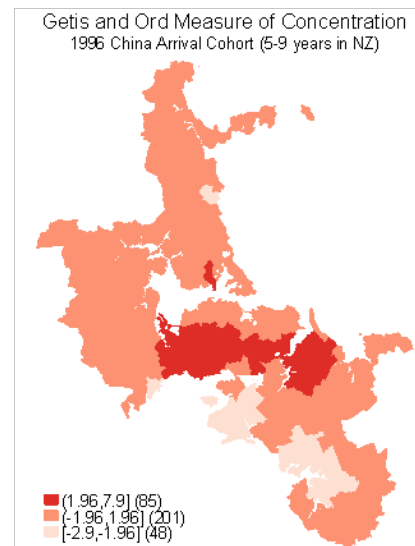
# Arrivals from PRC: Cohort or year effects?

1991-1996  
Arrival Cohort

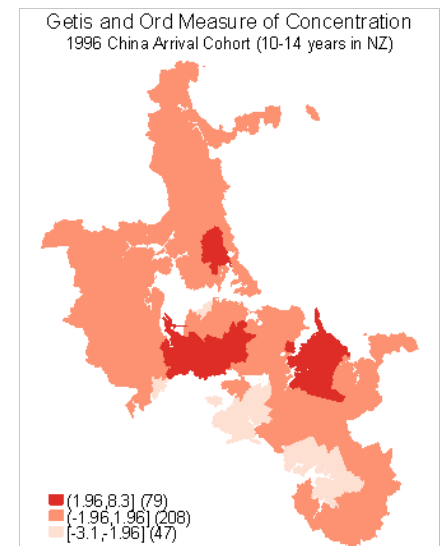
1996



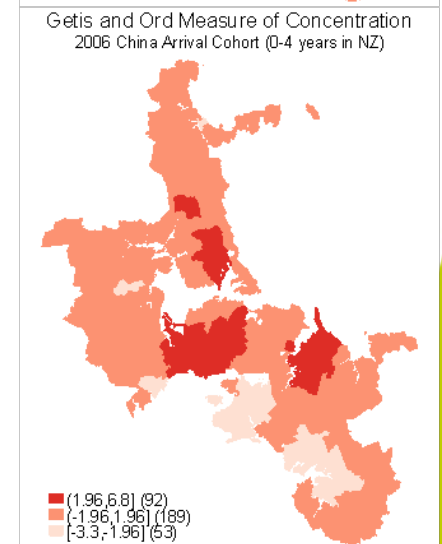
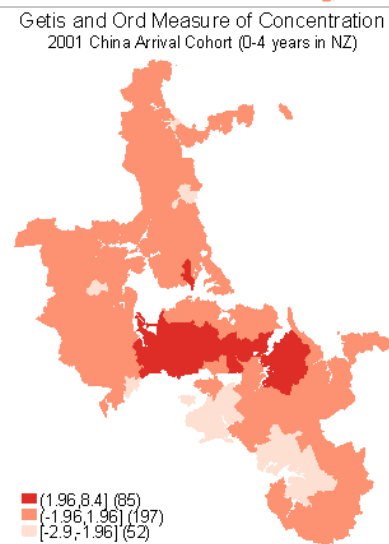
2001



2006



New Arrivals





# Other findings

- Similar patterns for other immigrant groups
  - Increased segregation; in a more diverse set of areas
  - New arrivals follow current group members
- Within country groups, there is (secondary) segregation by income
- Segregation and clustering is evident by 'language groups'

# In related work . . .

## *Population Location regression estimation*

- Entrants into meshblock =

f( Population, turnover,

Land prices,

Observed amenities,

Housing (detached/ rental)

Population composition and density,

Other amenities (proxy=neighbourhood price))

# Conclusions

## Degree of segregation

- Immigrant residential segregation is increasing in Auckland.
- Globally across groups, high segregation and isolation often imply low neighbourhood similarity (Moran's  $I$ ) and vice versa

## Immigrant Assimilation

- Immigrant populations are becoming segregated in a wider range of locations
- Network effects are stronger than 'ports of entry' effects: new immigrants disproportionately locate where previous immigrants already reside.

## Related Segregation dimensions

- Disaggregation by income leads to higher segregation and isolation indices, but lower global spatial correlation.
- There is significant clustering by language groups.

# Where to from here?

- Further descriptive work
  - Other birthplace groups
  - Wellington and Christchurch; or nationwide
  - Cohort analysis over longer timespan
- Locational choice model
  - E.g. Coleman and Maré (2010)
    - Counts data negative binomial model of approx. 8000 Auckland meshblocks, 2001 & 2006
- Impacts analysis
  - Labour market, housing market, amenities

# THANK YOU!



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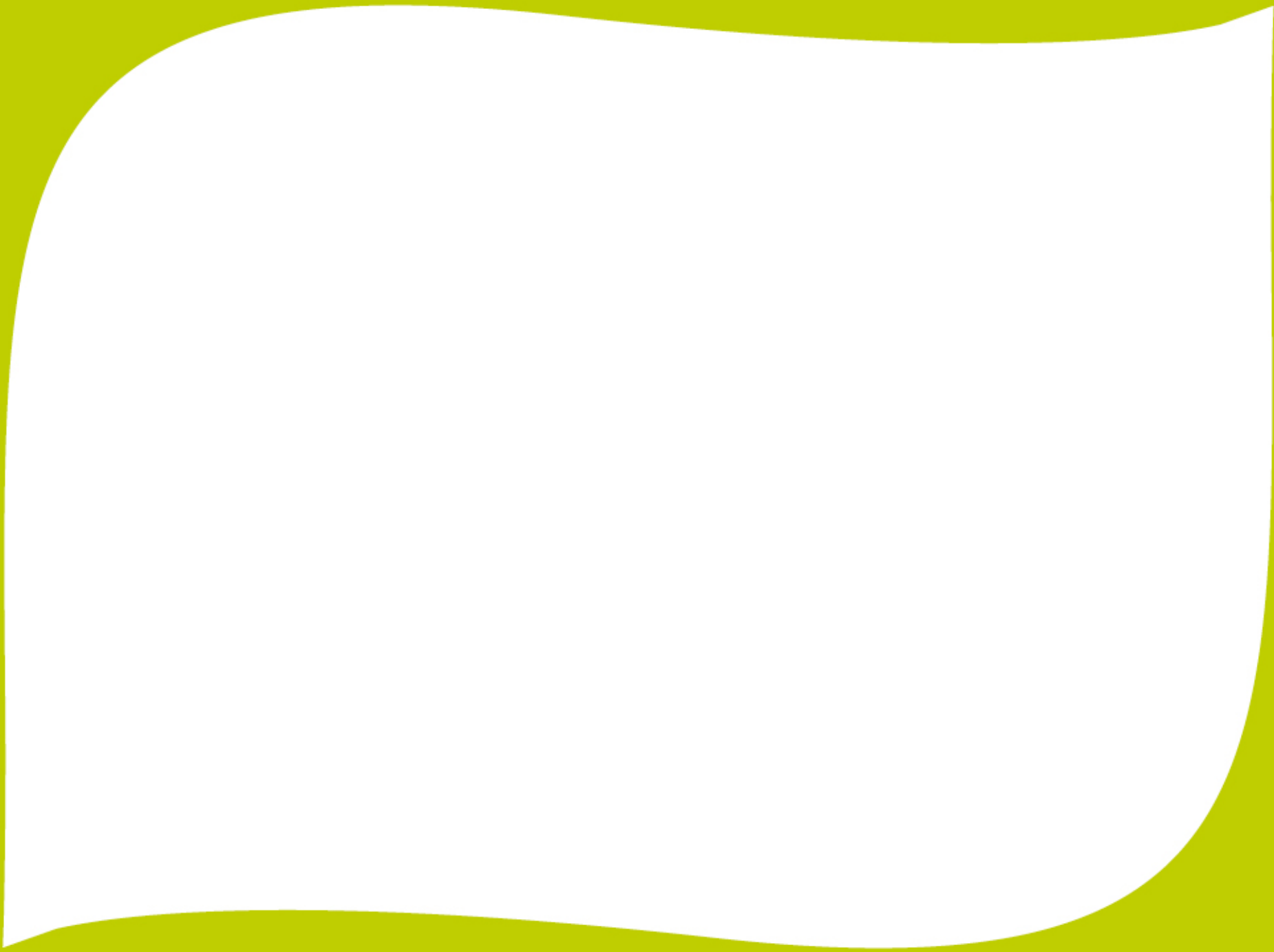
*Te Rūnanga Tātari Tatauranga*



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**MASSEY UNIVERSITY**  
COLLEGE OF HUMANITIES  
AND SOCIAL SCIENCES  
TE KURA PŪKENGĀ TANGATA



# Residential segregation by income group

**Table 5: Segregation Index for high and low income immigrants**

	1996			2001			2006		
	Low	High	Total	Low	High	Total	Low	High	Total
NZ	0.18	0.25	0.14	0.18	0.25	0.18	0.20	0.25	0.20
UK	0.23	0.25	0.20	0.23	0.26	0.21	0.26	0.28	0.25
China	0.42	0.50	0.39	0.42	0.44	0.41	0.41	0.40	0.41
Korea	0.47	0.67	0.44	0.48	0.56	0.46	0.50	0.53	0.48
India	0.45	0.41	0.35	0.48	0.41	0.39	0.44	0.39	0.40
South Africa	0.52	0.46	0.37	0.48	0.41	0.39	0.41	0.41	0.39

**Table 6: Moran's I for high and low income immigrants**

	1996			2001			2006		
	Low	High	Total	Low	High	Total	Low	High	Total
NZ	0.53	0.56	0.52	0.62	0.61	0.57	0.58	0.56	0.58
UK	0.62	0.59	0.72	0.62	0.60	0.72	0.67	0.62	0.72
China	0.52	0.23	0.57	0.49	0.34	0.55	0.48	0.42	0.55
Korea	0.58	0.08	0.56	0.51	0.22	0.50	0.51	0.38	0.54
India	0.48	0.24	0.54	0.48	0.33	0.52	0.44	0.47	0.54
South Africa	0.30	0.54	0.69	0.61	0.72	0.82	0.42	0.79	0.82

# Language clustering: definition of languages

Name	Description
Germanic	Germanic – All 01 codes including Dutch, English, German, Swedish, Danish, Norwegian, Germanic, Scots and Icelandic
Romance	Romance – All 02 codes including French, Spanish, Italian, Romanian, Portuguese, and Catalan
Middle East Eur	Greek/Balto-Slavic/Albanian/Armenian/Turko-Ataic/Uralic/Iranian including Russian, Ukrainian, Bulgarian and Polish
Indo Aryan Drav	Indo-Aryan/Dravidian - Including Hindu, Nepalese and Panjabi
Samoan	Samoan
Tongan	Tongan
Afro Asiatic	Afro Asiatic – including Somali, Assyrian, Arabic, Hebrew, Maltese and Hausa
OCEM Poly	Other central Eastern Malayo Polynesian excluding Samoan, Tongan and Maori
WM Poly	Western Malayo-Polynesian – including Malaysian, Javanese and Bahasa Indonesia
Sino Tibeto Burm	Sino-Tibeto-Burman – Including Yue, Min, Wu, Tieu-Chow, Northern Chinese, Burmese and Tibetan
Asiatic Tai Kadai	Austro-Asiatic/Tai-Kadai – Including Khmer, Vietnamese, Lao, Thai and Shan
Other	Including Welsh, Irish, Gaelic, Niger-Congo, Pidgins and Creoles including Japanese and Korean, language isolates and miscellaneous

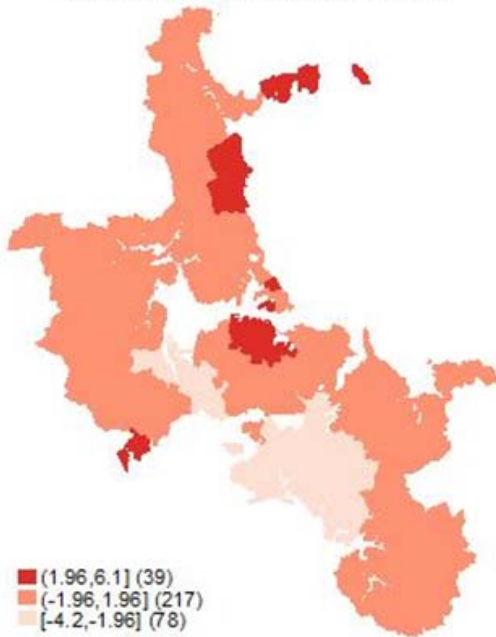


# Segregation by language groups

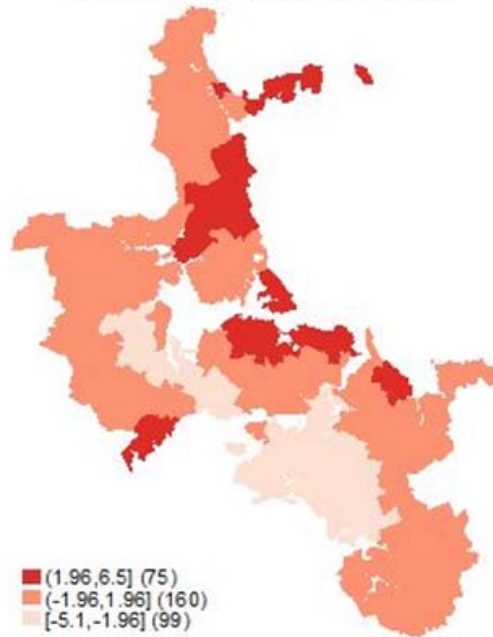
	Segregation Index			Isolation index			Moran's I		
	1996	2001	2006	1996	2001	2006	1996	2001	2006
Germanic	0.24	0.23	0.23	1.01	1.01	1.01	0.46	0.47	0.46
Romance	0.27	0.27	0.27	1.45	1.48	1.45	0.72	0.75	0.77
Middle East Eur	0.28	0.25	0.25	1.57	1.49	1.47	0.58	0.55	0.56
Indo Aryan Drav	0.36	0.37	0.39	2.06	2.17	2.18	0.57	0.59	0.56
Samoan	0.51	0.52	0.53	3.04	3.02	3.02	0.56	0.62	0.62
Tongan	0.56	0.54	0.54	3.51	3.51	3.51	0.53	0.57	0.60
Afro Asiatic	0.33	0.37	0.35	1.90	2.44	2.46	0.25	0.24	0.30
OCEM Poly	0.45	0.45	0.46	2.75	2.63	2.54	0.53	0.59	0.64
WM Poly	0.25	0.28	0.30	1.49	1.63	1.83	0.39	0.36	0.42
Sino Tibeto Burm	0.35	0.37	0.38	2.06	2.02	1.94	0.45	0.52	0.54
Asiatic Tai Kadai	0.46	0.38	0.36	3.08	2.57	2.42	0.46	0.44	0.46
Other	0.30	0.29	0.32	1.72	1.65	1.86	0.55	0.55	0.73

# The evolution of local clustering with increasing years of residence: 1991-96 cohort arrivals from UK

Getis and Ord Measure of Concentration  
1996 UK Arrival Cohort (0-4 years in NZ)



Getis and Ord Measure of Concentration  
1996 UK Arrival Cohort (5-9 years in NZ)



Getis and Ord Measure of Concentration  
1996 UK Arrival Cohort (10-14 years in NZ)

