

Dynamics of Spatial Differentiation among Ethnic Groups in New Zealand

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Abstract

New Zealand has experienced a marked increase in immigration since the early 1990s, which has fostered greater ethnic diversity. However, studies have yet to fully explore the changing patterns of spatial differentiation among ethnic groups. Using the New Zealand Census data from 1991 to 2006, we first examine the patterns of ethnic residential segregation for the Asian, Maori, and Pacific people from the majority European population. We then assess the effects of geographic and group level characteristics on the levels of segregation. The results reveal that Pacific people are the most segregated group from Europeans. The levels of segregation have declined only slightly for Maori and Pacific people, but increased gradually over time for Asians. Regression results for 2006 show two common factors influencing residential segregation for all three groups: the percent of minority group increases segregation while the closer the mean income to that of European decreases segregation.

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Introduction

During the later part of the 20th century, New Zealand became an increasingly multiethnic society partly attributable to the growth of immigration from various countries. In 1956, 94 percent of the population was New Zealand European, 6 percent was Maori (the founding people of New Zealand), and less than .1 percent were other ethnicities (McLintock 1966). By 2006, 65 percent of the population was European, 14 percent was Maori, 11 percent was ‘New Zealander’ ethnicity, 9 percent was Asian, and 7 percent were Pacific people¹ (Statistic New Zealand 2008). Recent studies have therefore begun to explore the levels of urban residential concentration of minority ethnic groups (e.g., Friesen, Murphy, and Kearns 2005; Johnston, Poulsen, and Forrest 2005). However, studies have yet to explore the factors associated with levels of segregation between ethnic groups. Since ethnic residential patterns reveal the nature of social distance among groups, our goal is to build on these studies by examining the patterns of ethnic residential segregation in New Zealand from 1991 to 2006, the period in which immigration dramatically increased, particularly from Asia.

Our first aim is to examine the patterns of segregation of the three largest minority ethnic groups (Asian, Maori, and Pacific people) from the majority European population in territorial authorities, which are comparable to the U.S. metropolitan areas, using the 1991, 1996, 2001, and 2006 New Zealand census data. In order to better understand factors influencing minority ethnic group segregation, our second aim is to examine the effects of geographic and group level characteristics on residential segregation.

¹ ‘Pacific people’ is one of the ethnic categories that Statistics New Zealand uses to refer to peoples from the Pacific Island countries.

In the following section, we provide a brief history of the ethnic composition of New Zealand's population. We then outline the theoretical approaches and formulate hypotheses by following the theories that have been developed in the field of residential segregation in Canada and the U.S. An explanation of the data and methods, and an examination of the trends in residential segregation over time at the national and region (territorial authority) levels follow. Finally, regression results for 2006 show what factors influence residential segregation for each of the three ethnic groups.

History of New Zealand Population

Before the Europeans migrated during the later part of the 19th century, the various Maori iwi (tribes) had occupied New Zealand for hundreds of years (Fleras and Spoonley 1999). In 1840, the British Crown signed the Treaty of Waitangi, which guaranteed Maori absolute protection of natural resources in exchange for British authority. However, the colonial settler authority soon began seizing Maori land in order to make way for the British settler population (Durie 1998). In 1858, the population ratio of European to Maori was close to 1:1, and by 1901 the ratio became 17:1 due to the rapid growth of immigration mainly from Britain (McLintock 1966).

The urbanization of the Maori population began rapidly from the 1930s due to both the lack of opportunities in agriculture and the demand for labor in the expanding manufacturing and construction industries in the cities (Bedford and Heenan 1987; Gibson 1973; Pool 1991). In 1936, only 7 percent of the Maori population resided in urban areas (cities and boroughs) compared to 60 percent of the non-Maori population. By 1961, the percent of Maori living in urban areas had increased to 33, and by 1981 this

percent matched that for the non-Maori population at approximately 80 percent (Bedford and Heenan 1987). A consequence of both urbanization and a state project of cultural assimilation meant that numerous urban Maori youth lost the ability to speak Maori and were no longer able to identify with their cultural background. Fleras and Spoonley (1999) described the period from 1860 to 1960 as ‘a century of assimilation.’

A shift in policies from assimilation to integration of the Maori population took place in the 1960s and the gradual institutionalization of biculturalism began from the late 1980s. However, to many Maori leaders, the shift in policies still meant the creation a uniform society with a unified set of political and social values (Durie 1998; Fleras and Spoonley 1999). Despite the changes in policies, economic inequalities between Maori and European persist. For instance, in 2001, 70 percent of Maori earned 20,000 dollars or less, 95 percent did not have a university education, 35 percent aged 15 and older had occupations in secondary industries (trade workers, plant and machine operators and assemblers, and elementary occupations), and 11 percent aged 15 and older were unemployed. For European, these figures were 50, 88, 22, and 4 percent, respectively (Statistics New Zealand 2008).

While the first wave of immigrants comprised British settlers, a second smaller wave of Chinese immigrants arrived in New Zealand in the late 1860s to take advantage of the opportunities in the gold-mining fields of the South Island (Ip 2003). By 1881, the Chinese population peaked at 5,000. However, from 1881, the passing of anti-Chinese laws ensured their limited arrival. The origins of immigrants did not diversify until the arrival of peoples from the Pacific Islands, mainly from Samoa and Tonga, in the late

1960s and 1970s, and from Northeast Asia, mainly from China, Taiwan, and South Korea, in the late 1980s and throughout 1990s (Fleras and Spoonley 1999).

In the 1950s, immigration policy was directed at filling labor shortages in expanding, low-wage, urban industries (Bedford et al. 2002; Gibson 1983; Ongley and Pearson 1995; Spoonley 2006). As a result, Pacific people increased from around 8,000 in 1956 to around 66,000 twenty years later (Bedford and Heenan 1987:139-141; Cook, Didham, and Khawaja 1999; Gibson 1983). The majority of the Pacific people concentrated in the largest urban area of Auckland. By the late 1980s, the native-born population had begun to outnumber the foreign-born. In 2001, 59 percent of the 230,000 Pacific people were native-born. The population of Pacific people continues to grow and remains more youthful than the national population. The median age of Pacific people in 1996 was 20 years while that of the total New Zealand population was 33 years (Cook et al. 1999).

Furthermore, from the 1990s the native-born Pacific people had experience noticeable upward mobility as indicated by average wage earnings and a greater proportion being employed in the retail, wholesale, and finance sectors compared to the foreign-born (Fleras and Spoonley 1999:203-208). However, overall, the inequalities between Pacific people and European are noticeable. In 2001, 82 percent of Pacific people earned 20,000 dollars or less, 94 percent did not have a university education, 41 percent had occupations in secondary industries, and 11 percent were unemployed (Statistics New Zealand 2008). Studies have shown how communities of the Pacific people, largely located in Manukau city, serve to integrate its members through churches and community halls and ensure the maintenance of Pacific Island languages and ethnic identity (Macpherson 1997; Melenaite et al. 2002). Although there has been upward social mobility among native-

born, we still do not know the extent to which nativity and socioeconomic status is associated with residential dispersion and integration across New Zealand.

As a result of immigration reforms in 1986, there was another shift in the countries of origin of immigrants. In 1991, as a percentage of the total foreign-born, the combination of UK, Ireland and other traditional sources (i.e., Australia and Continental Europe) was 64 percent, but only 49 percent by 2001. On the other hand, the percentage of foreign-born from Northeast Asia gradually increased from just 4 percent in 1991 to 13 percent by 2001. By 2006, 79 percentage of the Asian population in New Zealand was foreign-born (Bedford et al. 2002; Bedford, Ho, and Lidgard 2002).

The shift in the patterns of immigration had an impact on public sentiments about immigration. This recent wave of new immigrants has challenged existing conceptions of national identity, which has heightened anti-immigrant sentiments among both Europeans and Maori (Fleras and Spoonley 1999; Ip 2003). As with the Pacific people, New Zealand's Asian population is an incredibly heterogeneous group, consisting of those whose descendents arrived before the 20th century, and the now numerically larger recent immigrants (Ip 2003). Although 80 percent of Asians earned 20,000 dollars or less in 2001, which is comparable to incomes figures for Maori and the Pacific people, only 77 percent did not have a university education, only 20 percent had occupations in secondary industries, and 7 percent were unemployed (Statistics New Zealand 2008). Although we are unable to provide a more detailed description of the socio-demographics of this population by subgroup and nativity due to limited data access, it should be noted that there are likely important variations within the pan-ethnic Asian as well as Pacific people categories.

The changes in immigration patterns to New Zealand during the later part of 20th century resulted in changes in ethnic composition. As the most recent census in 2006 showed, about two-thirds of population was European, and the remaining population were Maori, Asian, Pacific people, and other ethnicities (Statistic New Zealand 2008).

Theoretical Framework

Previous research by Timms (1971:77-78) on the patterns of spatial differentiation by in the Auckland urban area in 1966 showed that the segregation of Maori and the Pacific people was “closely associated with their disadvantaged position in the stratification hierarchy.” More recent studies of ethnic residential segregation in New Zealand have largely focused on the spatial concentration of minority groups (e.g., Johnston, Poulsen, and Forrest 2002; Johnston et al. 2005; Poulsen, Johnston, and Forrest 2000). This valuable research finds substantial concentrations of Pacific people, little concentration of the Asian population, and moderate levels of concentration of Maori. In our study, however, we examine the residential segregation of minority groups from the majority European group. In doing so, we frame our study with the theoretical approaches used to explain race/ethnic residential segregation in Canada and the U.S. (Charles 2003; Fong and Shibuya 2005).

Patterns of segregation have been informed by two approaches, both rooted in the Chicago School’s ecological perspective (Park, Burgess, and McKenzie 1925). The first approach is the model of spatial assimilation and the second focuses on the effects of the urban ecological context (e.g., Fong and Wilkes 2003; Iceland 2004; Iceland and Scopilliti 2008; Timberlake and Iceland 2007; White, Fong, and Cai 2003). The model of

spatial assimilation (Massey 1985; Massey and Denton 1988) argues that residential location reflects the levels of acculturation and socioeconomic mobility, and highlights two opposing spatial forces, concentration and dispersion, which produce ethnic residential segregation and spatial assimilation. A process of dispersion, or residential integration, occurs as minority groups acculturate and achieve socioeconomic mobility.

The spatial assimilation approach emphasizes group level characteristics in explaining patterns of residential segregation. For example, the higher the minority group's income, or the lower the percentage of the minority group who are foreign born, the minority group is likely to experience lower levels of residential segregation from the majority group (Fong and Wilkes 2003; Logan, Stults, and Farley 2004; Timberlake and Iceland 2007). In the context of New Zealand, given that almost four in five individuals of the Asian population are foreign-born, we suspect that the percent foreign born is associated with higher levels of Asian-European segregation. As for socio-economic status, Timms (1971) found that in Auckland lower socio-economic characteristics were associated with the spatial differentiation of Maori and Pacific people in 1966.

The second approach examines the effect of ecological characteristics on the patterns of segregation. Studies have shown how structural and demographic factors across geographic units shape the extent of segregation among racial/ethnic groups (Logan et al. 2004; Timberlake and Iceland 2007; White et al. 2003). In some studies, structural characteristics refer to employment profile, or 'functional specialization,' and the percentage of new housing. As mentioned above, low wage manufacturing and construction industries have employed a greater percentage of Maori and Pacific people.

The economic base of a territorial authority can create significant structural barriers that constrain residential integration.

Regarding housing, findings for Canada and the U.S. show that new residential development, as measured by the percentage of new housing built within the decade, is associated with lower levels of, for example, black-white segregation. Studies of the relationship between housing policy and ethnic inequalities in New Zealand have examined the decreasing affordability of state-owned housing designed to assist the low-income population, particularly for Maori and Pacific people (Cheer, Kearns, and Murphy 2002; Morrison 1995; Thorns 2000). Significant changes to housing policy over the 1990s were brought about by economic reforms aimed at privatizing many public sector resources. Cheer et al. (2002:502) note that the spatial clustering of low-income state-owned housing, the financial costs of moving, and the disruption to community social networks meant that tenants faced significant constraints on their residential mobility. We suspect that the percentage of state-owned rental dwellings is associated with higher levels of Maori-European and Pacific people-European segregation.

As for the demographic aspects of the ecological context, the size of the population, the percentage of the minority population, and growth rate of the minority population have been shown to shape residential segregation. Research on Canada and the U.S. has shown how the absolute population size of a metropolitan area is positively associated with the segregation of minority groups from whites. This is because areas with larger populations tend to create greater structural differentiation (White et al. 2003). Also, the percentage of minority population has been found to affect the level of segregation. Farley and Frey (1994) showed that the percentage of non-black population lowers the

level of black-white segregation. Thus, for example, the higher percentage of Maori could be associated with lower levels of Pacific people-European segregation, which would suggest that Maori serve as a buffer between the two groups. However, it could also be the case that the higher percentage of Maori is associated with higher levels of Pacific people-European segregation, given the extent to which Maori and Pacific people have been found to concentrate together in residential space (e.g., Johnston et al. 2005). Finally, the growth rate of a minority group relative to that of the majority group has been hypothesized to increase levels of segregation (Logan et al. 2004). Given the high growth rate of the Asian and Pacific people over the 1990s, this association may be particularly relevant for the New Zealand context.

Aside from the two major theoretical approaches outlined above, an ethnic disadvantage approach (Bean, Stevens, and Wierzbicki 2003), also referred to as place stratification theory in the residential segregation literature (Iceland and Scopilliti 2008), considers prejudice and discrimination at the individual and institutional level. In the U.S., for example, blacks receive less ‘return’ from their socioeconomic achievement compared to other minority groups regarding residential mobility (Freeman 2002). Urban housing and school zoning policies that reinforce economic disadvantages and limit the spatial mobility of members of a minority ethnic group (Morrison 1995; Thrupp 2007) may also influence the level of residential segregation in New Zealand.

Data and Methods

We use the 1991, 1996, 2001, and 2006 New Zealand Census of Population and Dwellings data. These data are available from Statistics New Zealand (SNZ) online Table

Builder program (Statistic New Zealand 2008). The patterns of residential segregation in *territorial authorities* (N=73)² are examined for three ethnic groups, Asian, Maori, and Pacific people, from the majority European ethnic group. The territorial authority is comparable to the metropolitan area unit in the U.S. census. The population of each territorial authority ranges from an average of 47,000 to 57,000 across the four years. While the population size for each territorial authority is relatively small, the data is a complete count of the entire population of New Zealand.

To examine the distribution of ethnic groups across geographic units within territorial authorities, we use *area units* (N=1870).³ Area units contain an average of between 1,800 and 2,200 people. For all four years, each territorial authority contained on average of 26 area units, where the minimum was 1 and the maximum was 125. We first excluded territorial authorities with less than five area units, which reduced the number of territorial authorities to 68. For each ethnic group, we then choose territorial authorities where the minority group's population size was least 10 times the number of area units within the territorial authority. For example, if a territorial authority has five area units, then the minimum population size for an ethnic group should be at least 50. Following this criterion, Table 1 shows the number of territorial authorities included in the analysis for each group by year.

We examine residential segregation using the index of dissimilarity, which measures the segregation of one group from another across a territorial authority (Massey and Denton 1988; Massey, White, and Phua 1996). The index of dissimilarity is calculated as follows:

² This number excludes the category 'area outside territorial authority.'

³ This number excludes the 49 area units classified as belong to 'area outside territorial authority.'

$$D = 1/2 \left(\sum_{j=1}^J \left| \frac{x_j}{X} - \frac{y_j}{Y} \right| \right) 100$$

where x_j is the number of a minority ethnic group in an area unit j , y_j is the number of European in an area unit j , X is the total number of a minority ethnic group in a territorial authority, Y is the total number of European in a territorial authority, and J is the number of area units in a territorial authority.

The value is interpreted as the percentage of a group that would have to move from one area unit to another in order to produce an even distribution of two groups within a territorial authority. When the value of the dissimilarity index for a territorial authority equals zero, all area units in a territorial authority would have the same composition of the two groups. For example, in a territorial authority where 15 percent are Asian and 85 percent are European, then the Asian-European index of dissimilarity will be 0 if all area units within the territorial authority are also 15 percent Asian and 85 percent European. If, however, the two groups are unevenly distributed across the area units and the dissimilarity equals, for example, 35, then 35 percent of either group would have to transfer from one area unit to another in order to produce an even distribution across all area units.

In the U.S., scholars have begun to pay careful attention to multiple-race responses as a result of recent federal policy mandating multiple-race responses in federal data collection (Iceland and Scopilliti 2008; Iceland, Weinberg, and Steinmetz 2002; Liebler and Halpern-Manners 2008; Perlmann and Waters 2002). Researchers face similar issues in using New Zealand census data, which has been collecting multiple-ethnicity responses. Unfortunately, however, the data that are available through Table Builder do

not permit us to separate individuals of single ethnicity (e.g., Maori only) from those of multiple ethnicities (e.g., European and Maori) at area unit level for 1991, 1996, and 2001 with the exception of 2006. Therefore, we calculated the index of dissimilarity in two different ways: (1) for all years, we used non-mutually exclusive ethnic categories, and (2) for 2006 we used mutually exclusive ethnic category for European while allowing minority groups to be non-mutually exclusive. The second method follows Iceland and Scopilliti (2008), whereby we measure the dissimilarity scores using non-mutually exclusive minority group categories (e.g., an individual who claimed Asian and Maori ethnicities are included in both groups) with a mutually exclusive European category (i.e., individuals who stated they were only European).

We use ordinary least squares (OLS) regression to examine territorial authority-level and group-level factors that will help explain minority ethnic residential segregation. At the territorial authority-level we include the following variables.

North Island: This is a dummy variable for the North Island (1) versus South Island (0).

Functional specialization: The type of industry specialization was found to influence the levels of residential segregation (Fong and Wilkes 2003; Logan et al. 2004). Industry data is based on the 17 aggregate Australian and New Zealand Standard Industrial Classifications. We include one variable for the percentage employed in manufacturing and construction (27 percent of the total population), and another for the percent employed in retail and wholesale (18 percent of the total population).

Housing: A direct measure for the percentage of new housing built over time was unavailable. Instead, we used the percentage of rented occupied dwellings that were state-

owned. This included dwellings owned by Housing Corporation of New Zealand, a local authority or city council, or some other state-owned housing entity or government ministry.

Population size: This is the log of population size.

Multi-ethnicities: This is the percentage of individuals who have two or more ethnic affiliations. We suspect that the higher the percentage of multi-ethnics in a territorial authority, the lower the residential segregation, particularly for Maori.

Minority representation: We include the size of the minority group measured as a percentage of the total population in a territorial authority.

At the minority group-level we include the following variables.

Nativity: According to spatial assimilation theory, more recent immigrants share neighborhoods with those from the same country of origin. For Asians and Pacific people, we include the percentage of group members who were foreign born.

Population growth: It is possible that minority ethnic groups experiencing high population growth relative to the European population are more residentially segregated. For each city we calculate the growth of the minority group rate from one census to the next (e.g., $[2006 \text{ Asian population} - 2001 \text{ Asian population}] / 2001 \text{ Asian population} \times 100$) and subtract this from the growth rate of the European population.

Group income: Differences in income are likely to explain residential segregation. The relative income of a minority group measured as the ratio of the group's mean household income to European's mean household income.

Findings

Table 1 shows the ethnic composition of the New Zealand population from 1991 to 2006. As described above, individuals are allowed to choose multiple ethnicities, and therefore the first four columns show the percentages for non-mutually exclusive ethnic groups. Therefore, the total percent of the population exceeds 100 percent. A unique aspect of the New Zealand context is the relatively higher percentage of individuals claiming multiple ethnicities. Those claiming multiple ethnicities increased from 4 percent to 10 percent during the 15-year period. In other words, one in ten individuals were multi-ethnics in 2006. In fact, almost one in two Maori and one in three Pacific people claim at least one additional ethnic affiliation (Bascand 2007; Kukutai 2007).⁴ In comparison, for the U.S., only one in forty claimed multiple ethnicities in 2000 (Lee and Bean 2004).

The proportions of all minority ethnic groups have increased while the proportion of the European population has declined. The dramatic drop of the European population between 2001 and 2006 is partly attributable to the addition of a new ethnic category, New Zealander. This ethnicity is not a separate category in any census questionnaires, but instead was created from write-in responses of those who claimed to be either a 'New Zealander' or a 'Kiwi.' In previous censuses before 2006, these write-in responses were aggregated into New Zealand European due to the small number of responses (e.g., 2.4 percent in 2001) (Bascand 2007). However, in 2006, 11 percent are 'New Zealander,'

⁴ Of those people who claimed Maori ethnicity (N=565,326), 37 percent (N=207,912) claimed European ethnicity, 3.4 percent (N=19,044) claimed Pacific people ethnicity, and 3.1 percent (N=17,715) claimed both European and Pacific people ethnicities. Of those who claimed Pacific people ethnicity (N=265,974), 12 percent (N=31,482) claimed European ethnicity, 7.2 percent (N=19,044) claimed Maori ethnicity, and 6.7 percent (N=17,715) claim both Maori and European ethnicity. Of those who claimed Asian ethnicity (N=354,552), 9.1 percent (N=13,056) claimed European ethnicity.

largely due to a public debate over having ‘New Zealander’ as separate ethnic category in the census.

-- Table 1 about here --

The levels of minority group-European segregation over time are presented in Table 2.⁵ Again, the first four columns show the dissimilarity indices using ethnic categories that are non-mutually exclusive. Focusing on these four columns, the most segregated group from European is Pacific people, which had a dissimilarity score above 45 between 1991 and 2006. The Maori dissimilarity score declined slightly from 30 to 27 between 1991 and 1996 and then remained at roughly 27 for the following decade. For the Asian population, on the other hand, the level of segregation increased by 6 percentage points, or grew by 25 percent, from 24 in 1991 to 30 in 2006. However, these levels of segregation are relatively low for all three groups if compared to the levels of segregation in the U.S. In the U.S., the dissimilarity indices for black-white, Hispanic-white, and Asian-white segregation in 2000 were 65, 52, and 42 respectively (Logan et al. 2004). However, the levels of New Zealand’s minority-majority group segregation are roughly comparable to that in Canada where the dissimilarity indices for black-white and Asian-white segregation in 1986 were 37 and 32 respectively (Fong 1996).

-- Table 2 about here --

Since the 2006 census data created a separate ‘New Zealander’ ethnic group, we also calculated the New Zealander-European segregation. The dissimilarity score for New Zealander was just 6.0 with a standard deviation of 1.54 (minimum = 2.58 and maximum

⁵ We also replicated the results using the H (entropy) index (see Iceland 2004). The correlation coefficients between the two indices, D and H, for 2006 were .92 for Asians, .95 for Maori, and .92 for Pacific people. We also found that the regression results using the H index did not differ significantly from those represented. All results are available from the authors upon request.

= 12.04).⁶ This very low level of segregation from the European population suggests that the vast majority of these individuals are European New Zealanders (Bascand 2007).

In Table 2, we also present the dissimilarity scores that were created by using the mutually exclusive definition of the European ethnicity ('European alone') for the 2006 data. Not surprisingly, the levels of segregation are higher for all groups. The same pattern was also observed using the 2000 U.S. census data, which allowed multiple-race responses for the first time (Iceland et al. 2002). The dissimilarity score increases by 3.1 points for Maori, 1 point for Asians, and 4.1 points for Pacific people.⁷ The dissimilarity score decreases by .3 points for the New Zealander group.⁸ Given that there is little difference between the two methods, we use the latter indices for the OLS regression analyses.

Tables 3, 4, and 5 show for each group the levels of segregation for the 20 largest territorial authorities and how those levels have changed over time. For over time comparability, we present indices of dissimilarities using non-mutually exclusive ethnic categories. Table 3 shows that Maori-European segregation declined for all but two of the 20 authorities from 1991 to 2006. These declines occurred between 1991 and 1996. Authorities with the highest levels of segregation include Manukau and Auckland, two of

⁶ It should be noted that due the unavailability of the number of 'New Zealanders' at the area unit-level, the New Zealander-European dissimilarity score was calculated using Statistics New Zealand's 'other ethnicity.' However, of the 430,881 people categorized at 'other ethnicity,' a total of 429,427, or 99.7 percent were New Zealander.

⁷ We also calculated dissimilarity scores where all ethnic groups were mutually exclusive using 2006 data. As expected, these scores were the highest for all groups. The score was 36.7 (67 territorial authorities) for Maori-European segregation, 58.4 (37 territorial authorities) for Pacific people-European segregation, and 32.5 (56 territorial authorities) for Asian-European segregation. Also, the dissimilarity score for Maori-European-European segregation was 20.2 across 68 territorial authorities.

⁸ Of the 429,427 'New Zealanders,' 87.1% (374,061) choose no other ethnic group. Thus, 9.3 percent of the total population was New Zealander-only (see Table 1).

the largest population areas, as well as Lower Hutt (part of the Wellington City urban area), and the Hastings and Far North Districts. The Asian group (Table 4) experienced increases in segregation for 14 of the 20 authorities, particularly in Auckland where the dissimilarity score increased by 12 points, or grew by 51 percent, from 1991 to 2006. Also notable is the increase in segregation in the two largest South Island cities, Christchurch and Dunedin, where the dissimilarity score increased by 9.4 points and 8.0 points respectively.

The Pacific people (Table 5) experienced a 6 percentage point increase in segregation in the largest city, Auckland, where the dissimilarity score increased from 44.8 in 1991 to 50.9 by 2006. Although segregation over the 15-year period decreased by 3.1 percentage points in Manukau, which neighbors Auckland to the South, this territorial authority had the highest dissimilarity score at 61.7 in 2006. A score over 60 is considered extreme segregation between any two groups (Charles 2003; Massey and Denton 1988).

-- Tables 3, 4, and 5 about here --

Table 6 presents the OLS regression results for the 2006 data. The dependent variable is the index of dissimilarity that uses mutually exclusive ethnic category for European while allowing minority groups to be non-mutually exclusive. In these models, cases were weighted by the size of the minority group population. Due to multi-collinearity, the variable percent Pacific people was dropped for the Asian model, and the variable percent Asian was dropped for the Pacific people model. A regression diagnostic revealed high correlations among percent Asian, percent Pacific people, and percent foreign-born.

The strongest influence on the levels of segregation for all three groups was the minority group's income relative to that of Europeans and the presence of the minority

group. For all three groups, we found that the closer the mean income to that of Europeans, the lower the levels of segregation. This finding is consistent with the model of spatial assimilation, whereby an improvement in socioeconomic status is associated with a decline in segregation from the majority (European) group. In other words, this finding suggests that an improvement in economic resources translates into greater residential mobility. This effect appears to be strongest for Pacific people, since a .1 increase in the income ratio results in a 10.2 point decrease in the Pacific people-European dissimilarity score, while a .1 increase in the income ratio results a 5.6 and 3.3 point decrease in the dissimilarity scores for Maori and Asians respectively.

For all three minority groups, the higher the percent of the minority group in a territorial authority, the higher the levels of segregation. As for the presence of other minority groups, we find that the greater the presence of Maori (Pacific people), the greater the segregation of Pacific people (Maori) from Europeans. Therefore, these two groups do not function as a 'buffer' to each other in reducing segregation from the European population. The percent of multi-ethnics decreased the level of segregation for these two groups. If the percentage of multi-ethnics increased from 10 to 20 percent, then there is a 5.7 point decline Maori-European segregation and a 17.4 point decline in Pacific people-European segregation.

On the other hand, for Maori, the presence of the Asian population decreases levels of segregation. This suggests that the Asian population serves as a 'buffer' in integrating Maori with the European group. For the Asian population, residing in the North Island and the percent of individuals employed in retail and wholesale sectors are both associated with lower levels Asian-European segregation.

For both Maori and Pacific people, segregation is lower, rather than higher, in territorial authorities where their respective populations grew more than the European population. This suggests that the relative growth for these two groups was associated with residential dispersion rather than concentration. This finding mirrors that of Logan et al. (2004) for black-white segregation in the U.S.

The percent of renters who occupied state-owned housing had no association with the levels of segregation for all three groups. However, for Pacific people, the effect of this variable is diminished due to a positive correlation between this variable and the percent of Pacific people (.53, $p < .05$). When the latter is removed from the model, the percent of renters who are occupied in state-owned housing has a significant association with higher levels of Pacific people-European segregation. This suggests that in territorial authorities with a higher percentage of Pacific people there are also more individuals who occupy state-owned housing.

Conclusion

This study examined the patterns of segregation of the three largest minority ethnic groups, Asian, Maori, and Pacific people, from the majority European group between 1991 and 2006, and analyzed the geographic and ethnic group characteristics influencing these patterns of segregation in 2006. Our results show that Pacific people continue to experience the highest levels of segregation from Europeans among the three ethnic groups, particularly in Manukau city, which is the southern portion of the Auckland urban area. The level of segregation decreased only slightly for Maori and Pacific people, but has gradually increased for the Asian population from 1991 to 2006. The gradual

increase of the national average dissimilarity score for the Asian population was attributable to greater increases in the levels of segregation in the larger urban areas, such as the Auckland urban area (Auckland, Manukau, North Shore, and Waitakere) in the North Island and Christchurch city in the South Island.

The OLS regression results show the strong influence of minority group average income relative to that of Europeans in shaping the levels of segregation. For all three groups, we found that the closer the average income to that of Europeans, the lower the levels of segregation. This result suggests that comparable economic resources translate into residential integration with Europeans. Similar results have been observed for Canada and the U.S. for black-white, Hispanic-white, and Asian-white segregation (e.g., Farley and Frey 1994; Fong and Wilkes 2003; Logan et al. 2004). We also found the population growth rate for Maori and Pacific people minus the rate for European was associated with lower levels of segregation. Thus, contrary to the hypotheses that the rate of population growth would increase segregation, we find that the relative growth was associated with residential dispersion, therefore decreasing segregation.

The strong ecological factor shaping segregation is the percent of the minority group. This is also consistent with findings for minority group-white segregation in Canada and the U.S. We found that for Maori and Pacific people, the presence of those individuals claiming two or more ethnic affiliations was associated with lower levels of segregation from Europeans. However, the effect being strongest for Pacific people among three ethnic groups was likely due to the fact that almost one in two Maori claim another ethnic affiliation and that there exists a significant overlap in the residential location of these two groups (Johntson et al. 2005). For the Maori population, there were lower levels of

segregation from Europeans where there was a higher percent of the Asian population. This finding shows that the Asian population serves as a buffer for the residential integration of Maori and European. Further exploration of this pattern would shed more light on the nature of the social distances among these groups.

This study presents the first systematic examination of inter-group residential segregation in New Zealand's multi-ethnic context, adding to existing studies that have explored patterns of spatial concentration among ethnic groups. There are a variety of research questions that future studies should pursue. First, while this study focused on minority-majority group segregation, the patterns of, for example, Maori-Asian segregation would add to our understandings of the social distances among ethnic groups. Second, examining the patterns of segregation among specific Asian ethnic groups, such as Chinese and South Koreans, would provide a clearer picture of residential segregation within this pan-ethnic category (White et al. 2003). Third, the multi-ethnic nature of New Zealand's urban areas can allow us to explore the effect of an increase in ethnic diversity on residential integration among multiple groups (Iceland 2004). Fourth, given the availability of longitudinal census data, an analysis of changes over time should be explored (Fischer 2008; Friedman forthcoming; Friesen et al. 2005; Logan et al. 2004). For instance, research could examine the extent to which the declines in segregation for the Maori population between 1991 and 1996 the result of changes in the measurement of Maori identity between censuses (Callister 2004; Kukutai 2004, 2007).

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Table 1: Ethnic Composition in New Zealand, 1991 to 2006

	<i>Non-mutually exclusive</i>				<i>Mutually exclusive</i>
	1991	1996	2001	2006	2006
European	82.49	79.57	76.83	64.79	56.75
Maori	12.89	14.46	14.08	14.04	7.41
Asian	2.96	4.80	6.37	8.80	8.01
Pacific people	4.95	5.59	6.20	6.60	4.63
New Zealander	n/a	n/a	n/a	10.66	9.30
Other	.20	.43	.66	.90	.73
No response	.84	4.19	4.03	4.17	4.17
Maori-European					5.16
Maori-Pacific people					.47
Pacific people-European					.78
Asian-European					.32
Maori- Pacific people-European					.44
All other combinations					1.83
Multiple ethnicities as percent of population	4.31	9.05	8.19	9.95	
Total (%)	104.31	109.05	108.19	109.95	100.00
Total population	3,373,929	3,618,300	3,737,277	4,027,947	4,027,947

Note: The category ‘New Zealander’ was only included in the 2006 census. For the ‘non-mutually exclusive’ columns, all ethnic groups are not mutually exclusive (e.g., an individual with Asian and European ethnicities are counted in both categories). For the ‘mutually exclusive’ column, the minority groups are not mutually exclusive but the European category includes those who say they are European only.

Table 2: Average Dissimilarity Index (weighted by group size) in New Zealand, 1991 to 2006

	<i>Non-mutually exclusive</i>				<i>Mutually exclusive</i>
	1991	1996	2001	2006	2006
<i>Dissimilarity index</i>					
Maori	30.2	26.6	27.6	26.6	29.7
Asian	23.8	24.7	27.3	29.8	30.8
Pacific people	48.1	45.4	47.7	46.9	51.0
New Zealander	n/a	n/a	n/a	6.0	5.7
<i>Number of Territorial Authorities</i>					
Maori	68	68	68	68	68
Asian	46	57	58	61	61
Pacific people	43	53	53	58	58
New Zealander	n/a	n/a	n/a	68	68

Note: The category ‘New Zealander’ was only included in the 2006 census. For the ‘non-mutually exclusive’ columns, all ethnic groups are not mutually exclusive (e.g., an individual with Asian and European ethnicities are counted in both categories). For the ‘mutually exclusive’ column, the minority groups are not mutually exclusive but the European category includes those who say they are European only.

Table 3: Maori/European Dissimilarity Index for the 20 Largest Territorial Authorities, 1991 to 2006

	Population (1,000s)	1991	1996	2001	2006	1991 to 1996	1996 to 2001	2001 to 2006	1991 to 2006
Auckland City	382,545	34.8	30.7	32.7	31.4	-4.1	2.0	-1.4	-3.5
Christchurch City	338,769	27.9	23.2	22.8	21.9	-4.7	-0.4	-0.9	-6.0
Manukau City	310,338	49.3	44.8	46.9	46.8	-4.6	2.1	-0.1	-2.6
North Shore City	200,094	25.8	21.6	24.4	24.5	-4.3	2.8	0.2	-1.3
Waitakere City	175,308	23.4	20.2	20.8	20.8	-3.2	0.6	0.1	-2.6
Wellington City	172,974	22.2	20.3	19.8	17.9	-2.0	-0.5	-1.9	-4.3
Hamilton City	123,384	25.5	23.2	23.4	22.4	-2.3	0.2	-1.0	-3.1
Dunedin City	114,891	17.3	14.2	14.8	14.8	-3.1	0.6	0.0	-2.5
Tauranga District	100,479	25.9	21.8	20.9	18.9	-4.1	-0.9	-2.0	-7.0
Lower Hutt City	95,415	32.2	30.0	31.7	29.7	-2.3	1.8	-2.0	-2.5
Rodney District	85,845	25.7	20.1	19.0	16.9	-5.6	-1.1	-2.1	-8.8
Palmerston North City	73,551	25.1	21.3	20.5	19.8	-3.7	-0.8	-0.7	-5.3
Whangarei District	69,849	28.4	25.7	24.9	24.7	-2.7	-0.8	-0.2	-3.7
Hastings District	68,079	36.4	33.0	34.6	34.8	-3.4	1.6	0.2	-1.6
New Plymouth District	66,519	28.6	24.6	24.6	24.5	-4.1	0.0	-0.1	-4.2
Rotorua District	62,529	32.1	30.7	29.7	27.1	-1.4	-0.9	-2.6	-4.9
Franklin District	55,500	30.3	27.1	27.6	25.2	-3.3	0.6	-2.4	-5.1
Napier City	53,967	28.1	24.6	28.0	29.3	-3.5	3.4	1.3	1.2
Far North District	50,313	30.4	28.9	32.1	32.5	-1.4	3.2	0.4	2.1
Invercargill City	48,855	27.1	22.7	23.4	22.1	-4.4	0.7	-1.3	-5.1

Note: Dissimilarity scores are calculated using non-mutually exclusive categories.

Table 4: Asian/European Dissimilarity Index for the 20 Largest Territorial Authorities, 1991 to 2006

	2006 Population (1,000s)	1991	1996	2001	2006	1991 to 1996	1996 to 2001	2001 to 2006	1991 to 2006
Auckland City	382,545	23.0	25.6	30.8	34.8	2.5	5.2	4.0	11.7
Christchurch City	338,769	24.1	29.3	32.1	33.4	5.3	2.7	1.4	9.4
Manukau City	310,338	24.6	26.3	27.6	30.2	1.7	1.3	2.6	5.6
North Shore City	200,094	24.9	22.5	26.8	30.9	-2.4	4.3	4.1	6.0
Waitakere City	175,308	23.1	23.1	26.9	29.2	0.0	3.8	2.3	6.0
Wellington City	172,974	22.7	23.2	24.0	23.5	0.5	0.8	-0.5	0.8
Hamilton City	123,384	17.0	20.2	19.7	23.9	3.3	-0.6	4.2	6.9
Dunedin City	114,891	28.9	34.6	34.3	36.9	5.6	-0.3	2.6	8.0
Tauranga District	100,479	19.3	13.4	14.9	16.5	-5.9	1.5	1.6	-2.7
Lower Hutt City	95,415	22.7	21.1	21.4	21.4	-1.6	0.3	0.0	-1.3
Rodney District	85,845	24.7	19.5	19.3	17.0	-5.2	-0.2	-2.2	-7.7
Palmerston North City	73,551	16.4	18.0	17.8	20.6	1.6	-0.2	2.8	4.2
Whangarei District	69,849	23.5	21.3	25.0	25.8	-2.2	3.7	0.8	2.4
Hastings District	68,079	22.6	19.7	25.2	31.1	-2.9	5.5	5.9	8.5
New Plymouth District	66,519	22.3	22.9	26.3	26.2	0.6	3.5	-0.2	3.9
Rotorua District	62,529	20.7	19.2	25.2	25.3	-1.5	6.0	0.1	4.5
Franklin District	55,500	41.4	36.8	33.0	29.0	-4.6	-3.8	-4.0	-12.4
Napier City	53,967	18.2	12.5	13.6	11.8	-5.7	1.1	-1.8	-6.4
Far North District	50,313	27.1	19.2	20.6	21.3	-7.9	1.4	0.8	-5.8
Invercargill City	48,855	21.9	17.1	18.4	22.3	-4.8	1.3	3.9	0.3

Note: Dissimilarity scores are calculated using non-mutually exclusive categories.

Table 5: Pacific people/European Dissimilarity Index for the 20 Largest Territorial Authorities, 1991 to 2006

	Population (1,000s)	1991	1996	2001	2006	1991 to 1996	1996 to 2001	2001 to 2006	1991 to 2006
Auckland City	382,545	44.8	45.9	49.4	50.9	1.0	3.6	1.4	6.0
Christchurch City	338,769	40.6	37.2	35.9	37.0	-3.4	-1.3	1.1	-3.6
Manukau City	310,338	64.8	61.7	62.9	61.7	-3.1	1.2	-1.2	-3.1
North Shore City	200,094	38.3	34.1	37.9	38.7	-4.3	3.8	0.8	0.3
Waitakere City	175,308	33.7	31.5	32.3	31.3	-2.2	0.8	-1.0	-2.4
Wellington City	172,974	37.4	37.1	35.1	33.7	-0.3	-2.0	-1.4	-3.7
Hamilton City	123,384	26.7	27.1	28.1	26.3	0.4	1.0	-1.8	-0.4
Dunedin City	114,891	34.5	30.2	30.9	29.7	-4.3	0.8	-1.2	-4.8
Tauranga District	100,479	26.4	20.3	20.3	21.3	-6.2	0.0	1.0	-5.1
Lower Hutt City	95,415	39.4	38.6	40.1	37.6	-0.8	1.6	-2.5	-1.7
Rodney District	85,845	30.6	19.2	19.2	20.1	-11.4	0.0	0.9	-10.5
Palmerston North City	73,551	28.7	27.0	26.5	26.3	-1.8	-0.5	-0.2	-2.4
Whangarei District	69,849	27.3	22.5	22.5	25.8	-4.8	0.1	3.2	-1.5
Hastings District	68,079	48.4	46.4	50.2	51.1	-2.0	3.8	0.9	2.7
New Plymouth District	66,519	25.3	24.3	26.3	28.6	-0.9	2.0	2.2	3.3
Rotorua District	62,529	33.7	33.8	34.1	32.5	0.0	0.4	-1.6	-1.2
Franklin District	55,500	22.6	19.8	27.9	27.4	-2.7	8.1	-0.5	4.8
Napier City	53,967	29.0	38.8	37.4	40.7	9.9	-1.4	3.3	11.8
Far North District	50,313	29.2	24.1	32.1	33.1	-5.2	8.0	1.0	3.9
Invercargill City	48,855	39.8	36.1	35.3	30.6	-3.8	-0.8	-4.7	-9.3

Note: Dissimilarity scores are calculated using non-mutually exclusive categories.

Table 6: Geographic Characteristics Associated with Segregation of Minority groups from European, 2006

	Asian		Maori		Pacific people	
	β	se	β	se	β	se
<i>Ecological context</i>						
North Island	-8.82***	2.96	-1.01	2.42	-9.90***	3.39
% employed in manufacturing and construction	0.38	0.31	-0.12	0.25	-0.10	0.39
% employed in retail and wholesale	-1.00*	0.57	0.35	0.43	-0.21	0.63
% of rental dwellings that are state-owned	0.04	0.11	0.03	0.13	-0.16	0.17
Population size (log)	-1.25	1.41	4.46***	1.42	-0.64	1.89
% claiming multiple ethnicities	0.32	0.27	-0.57*	0.33	-1.74***	0.32
% Maori	0.00	0.19	0.64***	0.17	1.05***	0.23
% Pacific people	--	--	1.42***	0.25	2.21***	0.23
% Asian	0.76***	0.21	-0.83***	0.24	--	--
<i>Group-level characteristics</i>						
% minority foreign born	0.12	0.19	--	--	-0.41	0.25
% growth rate of minority less the European rate, 2001-2006	-0.03	0.07	-0.41***	0.14	-0.10*	0.06
Minority-European ratio personal income	-32.53**	12.79	-55.88**	27.17	-101.94***	18.60
Constant	63.75**	24.24	25.44	27.32	153.94***	27.23
Adjusted R^2		.694		.799		.934
N		61		68		58

Note: Results are weighted by ethnic group size. Due to multi-collinearity, the variable ‘% Pacific people’ was excluded for the Asian model, and the variable ‘% Asian’ was excluded for the Pacific people model.

* $p < .10$, ** $p < .05$, *** $p < .01$.