

Does social inequality matter? Changing ethnic socio-economic disparities and Maori smoking in New Zealand, 1981–1996

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Abstract

This paper builds on an earlier study of the effects of inequality on smoking by explicitly incorporating a temporal dimension. We examine the effects of changing levels of inequality upon ethnic variations in smoking rates in New Zealand for the period 1981 to 1996. This was a period of rapid structural change in New Zealand's economy and welfare state, changes which had a disproportionate effect on Maori. While Maori smoking rates declined during this period, the gap in smoking levels between Maori and Pakeha (persons of European descent) increased. The results suggest that levels of social inequality between Maori and Pakeha have an independent effect on Maori smoking rates and that communities which experienced increased social inequality during both the 1980s and 1990s were more likely to have higher Maori smoking rates. Controlling for confounders, the effect of increased ethnic inequality on smoking was particularly evident for Maori women (net $R^2=0.150$) compared to Maori men (net $R^2=0.079$). Nevertheless, absolute rather than relative socio-economic deprivation remains the most important predictor of smoking.

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Introduction

Investigation of the 'health gaps' between advantaged and disadvantaged populations has been a common theme in health research, with much work indicating that socio-economic and ethnic disparities in health have changed little or widened in recent years (Coburn, 2000). New Zealand is no exception to this trend (Davis, Graham, & Pearce, 1999). Recent research on mortality, for example, has indicated a progressive widening of the gap in survival chances between ethnic groups over the last 20 years (Ministry of Health, 2003a). From 1980 to 1999 mortality rates for Maori and Pacific Island ethnic

groups showed little change, in contrast to a steady decline in mortality for the rest of New Zealand's population. Similar trends are also evident with respect to smoking. While smoking rates have decreased in many countries (Benzeval, Judge, & Whitehead, 1996), this has been less true of New Zealand. Although overall rates of smoking declined during the 1990s, this did not occur for Maori (Durie, 1998; Ministry of Maori Development, 1998, 1999; Ministry of Health, 2002) with the result that ethnic differences in smoking increased.

Recently, research has begun to focus on inequality as a major determinant of differing levels of health status. In what has become a provocative thesis, Wilkinson (1996) has contended that the greater a nation's income inequality, the poorer the average national health status. However, evidence at sub-national spatial scales

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provides variable support for the ‘Wilkinson hypothesis’ (Kennedy, Kawachi, & Prothrow-Stith, 1996; Ross, Wolfson, Dunn, Berthelot, Kaplan, & Lynch, 2000). This contention is particularly significant given the national and global economic and demographic restructuring noted in a number of countries in recent years that have given rise to increased social inequalities (Danziger & Gottschalk, 1995; Morrill, 2000).

The uneven change in social inequality within a number of countries has been suggested as one key explanation for geographical variations in health within a nation (Kawachi & Kennedy, 1997). For example, Shaw, Gordon, Dorling, Mitchell, and Davey Smith (2000) found that increases in income inequality between 1981 and 1997 were paralleled by increased social differences in mortality over the same period. Other work has noted that although overall mortality levels have declined in many countries in recent years, the fall is only small in deprived areas and this has coincided with sharp increases in income inequalities (Pappas, Queen, Hadden, & Fisher, 1993; McCarron, Davey Smith, & Womersley, 1994; Phillimore, Beattie, & Townsend, 1994; Higgs, Senior, & Williams, 1998; Marang-van de Mheen, Davey Smith, Hart, & Gunning-Schepers, 1998). Similar trends have been observed for infant mortality (DiLiberti, 2000; Turrell & Mengerson, 2000) and cause-specific deaths such as heart disease (Burnley, 1998; Lostao, Regidor, Aïach, & Dominguez, 2001).

Whilst much research has focused on the relationship between social inequality and mortality, other studies have noted that increased social inequality has also led to a worsening in self-rated measures of health (Borell, Rue, Pasarin, Rohlf, Ferrando, & Fernandez, 2000; Borg & Kristensen, 2000). For example, Anitua and Esnaola (2000) examined social inequalities in self-reported health in Spain between 1986 and 1992 and demonstrated that the social gradient increased during this period, which they attributed to the labour market restructuring and economic recession that took place at this time. However, a study of self-rated health in east and west Germany since unification found that although there had been an increase in social inequalities throughout the country between 1992 and 1997, an increase in income-related health inequalities was only found in west Germany (Nolte & McKee, 2004).

In New Zealand, the changes in social inequality followed a similar pattern to those noted elsewhere. Between 1986 and 1997 the GINI index (a measure of income dispersion) increased by approximately 27 percent, a rate that is more rapid than other developed economies (O’Dea & Howden-Chapman, 2000). This period coincides with a time when the adoption of neoliberal economic and social policies by successive governments resulted in major structural changes in New Zealand society, including economic deregulation

and the privatisation of state assets especially in forestry, mining and transport, sectors which had traditionally employed many Maori. Such changes were soon followed by a further set of reforms, but this time aimed at the welfare state where similar forms of restructuring, especially in health, housing and education, took place from 1991 onwards (Kelsey, 1995; LeHeron & Pawson, 1996; Boston, Dalziel, & St. John, 1999). Compared to other ethnic groups, Maori were disproportionately affected by these changes (Brown, 1999; Chapple, 2000). For example, Maori unemployment rates rose from 8.5 percent to 20.6 percent between 1986 and 1990 compared to an increase from 3 percent to 6.5 percent among non-Maori during the same period (Statistics New Zealand, 1990). Despite absolute and relative improvements in socio-economic well-being for much of this century, the narrowing of ethnic gaps between Maori and non-Maori slowed in the 1990s, and in some cases reversed (Te Puni Kokiri, 2000). By the mid-1990s levels of social inequality in New Zealand were the highest in the OECD.

The effect of New Zealand’s adoption of a neoliberal agenda and the accompanying growth in social inequality on health is less clear. Davis et al. (1999) noted widened socio-economic and health differentials with respect to self-reported measures of health. Similarly, O’Dea and Howden-Chapman (2000) found that income inequality had an effect on mortality that was independent of average income. However, in their study of 1.4 million New Zealand respondents, Blakely, Atkinson, and O’Dea (2003) found no association between income inequality and adult mortality. Despite the strong focus on the relationships between social inequality with mortality and morbidity, little attention has been given to the effects of changing patterns of inequality on health-related behaviours, such as smoking.

The study presented here builds on previous work that extended the testing of the Wilkinson hypothesis to the area of health-related behaviour. A cross-sectional analysis of ethnic variations in smoking in 1996 showed that the level of social inequality between Maori and Pakeha (persons of European descent) in New Zealand had an independent effect on Maori smoking rates (Barnett, Moon, & Kearns, 2004). Pakeha smoking rates, by contrast, were more sensitive to variations in absolute rather than relative deprivation. The results also showed that the effects of inequality were greatest for Maori women, especially among urban residents. The present research extends these findings by investigating the effects of changes in ethnic socio-economic disparities (1981–1996) on Maori smoking rates. Examining such issues and their health significance is timely especially in view of increased social inequality in New Zealand (Mowbray, 2001). Few studies in the health inequalities literature (e.g. Daly, Duncan, Kaplan, & Lynch, 1998; Regidor, Calle, Navarro, & Dominguez,

2003) and none in the smoking literature, have specifically examined the effects of changing ethnic socio-economic disparities on health. If Wilkinson's ideas have merit, then we would hypothesise that the impact of relative deprivation on smoking should become more significant over time.

Methods

This study is based on an analysis of unpublished 1981 and 1996 Census data on smoking for the 73 territorial local authorities (TLAs) in New Zealand which form the main units of local government at the sub-national scale. Because of local government restructuring in 1989, the 1981 data were reconfigured to the 1996 boundaries of the 73 TLAs so that the data were consistent over the whole time period. Since data are published only for the total population of smokers, a special request was made to Statistics New Zealand to obtain disaggregated smoking data broken down by ethnicity and gender. This enabled the calculation of standardised smoking rates for Maori and Pakeha, the two main ethnic groups.

Given that the aim of the analysis was to explore the impact of absolute versus relative deprivation upon Maori and Pakeha smoking rates, nine separate indicators of absolute and relative deprivation were computed for 1981 and 1996. The measures of absolute deprivation included; proportions of the adult population with a bachelors degree or higher educational qualification, with no educational qualifications, with incomes less than the median household income and less than the median personal income, those who owned their own home, who lived in central government-owned social housing, who were unemployed, who received the domestic purposes benefit (DPB). In addition, we also included a measure of dependency (children 0–14 as percent of the adult population). Nine measures of relative deprivation were also computed. Relative deprivation was defined as the (rate) difference between the Maori and Pakeha percentages for each of the above indicators; the wider the difference the greater the degree of ethnic inequality. We also computed an indicator of the extent to which ethnic inequality changed over time. This was defined as the difference between the 1981 and 1996 'ethnic gaps' for each of the above measures. Negative scores indicated communities where ethnic socio-economic disparities had lessened, while positive scores were typical of communities where the socio-economic gap between Maori and Pakeha widened over time. Thus it was possible to explore the extent to which changes in ethnic inequality affected changes in smoking levels between 1981 and 1996 as well as the incidence of smoking at the end of that period.

Partial correlation and stepwise regression analyses were used in order to calculate the significance of relative deprivation upon smoking rates. In addition to controls for age (% adult population 20–29 and % aged 60 and over) and sex (males per 100 females), controls were also made for absolute deprivation when seeking to determine the extent to which relative deprivation had an independent effect on smoking rates. The analyses are limited to examining the effects of absolute and relative deprivation upon the incidence of regular smokers and, following an examination of overall ethnic differences, are restricted to observing trends in only the Maori population disaggregated by gender and urban–rural location. An urban–rural breakdown is included given evidence that the effects of inequality are often context specific (Chapple, 2000; Blakely, Lochner, & Kawachi, 2002; Barnett et al., 2004).

Results

Ethnic inequalities in smoking

In 1996, Maori smoking rates, on average, exceeded European rates by 21.2%. Ethnic differences in smoking rates were greater for females (25.9%), than for males (16.2%) (Table 1). Maori, and particularly Maori women, despite substantial decreases in smoking levels since 1981, continue to have one of the highest smoking rates in the world. The downward trend in Maori smoking rates has not equalled that of Pakeha and the focus on census years hides the fact that there has been virtually no change in levels of Maori smoking since 1991 (Ministry of Health, 2002). Indeed, ethnic gaps have widened not reduced with Maori, and particularly Maori women, being more than twice as likely to be regular smokers than Pakeha in 1996, a gap that has increased substantially since 1981. Despite greater decreases in smoking prevalence among both urban Maori and Pakeha, the ethnic gap in smoking rates remains greatest in the cities, although in 1996 smoking rates were slightly higher in rural areas. The urban ethnic gap in smoking rates was particularly marked among urban women, with Maori women being 2.38 times more likely to smoke than their Pakeha counterparts. It is among these two groups where the ethnic difference in smoking has become most pronounced (Table 1).

Increased ethnic differences in smoking rates have been accompanied by widening ethnic socio-economic differentials (Table 2). The position of Maori relative to Pakeha declined for all social indicators except those relating to a lack of educational qualifications, levels of homeownership and a dependence on social housing. By contrast, the greatest increases in ethnic socio-economic disparities occurred in unemployment and benefit levels

Table 1
Ethnic differences in smoking in New Zealand 1981–1996

	Regular smokers (%) ^a		% Change 1981–1996
	1981	1996	
<i>New Zealand</i>			
Maori			
Males	51.5	37.6	–27.0
Females	56.3	45.0	–20.1
Total	53.9	41.4	–23.2
Pakeha			
Males	32.6	21.4	–34.4
Females	27.2	19.1	–29.8
Total	29.8	20.2	–32.2
<i>Ratio Maori:Pakeha</i>			
Males	1.58	1.76	0.18
Females	2.07	2.36	0.29
Total	1.81	2.05	0.24
<i>Urban</i>			
Maori			
Males	51.7	37.0	–28.4
Females	56.9	44.7	–21.4
Total	54.4	41.0	–24.6
Pakeha			
Males	32.5	20.9	–35.7
Females	27.5	18.8	–31.6
Total	29.9	19.8	–33.8
<i>Ratio Maori:Pakeha</i>			
Males	1.59	1.77	0.18
Females	2.07	2.38	0.31
Total	1.82	2.07	0.25
<i>Rural</i>			
Maori			
Males	51.2	38.8	–24.2
Females	54.9	45.6	–16.9
Total	53.0	42.3	–20.2
Pakeha			
Males	32.8	22.6	–31.1
Females	26.3	19.8	–24.7
Total	29.6	21.2	–28.4
<i>Ratio Maori:Pakeha</i>			
Males	1.56	1.72	0.16
Females	2.09	2.30	0.21
Total	1.79	2.00	0.21

Source: New Zealand Census, Unpublished data, 1981 and 1996.

^aRegular smokers as % adult population.

and, to a lesser extent, in levels of dependency and median personal income.

Absolute and relative deprivation and smoking

The following analyses focus first on the importance of absolute and relative deprivation measures as

predictors of smoking in both 1981 and 1996, before turning to an analysis of the pattern of change. Table 3 indicates partial correlations between smoking rates by ethnicity and the eight measures of absolute and relative deprivation in 1981 and 1996, controlling for age and sex. For both Maori and Pakeha, the effects of absolute deprivation on smoking generally increase between 1981 and 1996 and, in 1996, are greatest for the Maori population. Measures of educational performance, in particular the proportion of the population with no educational qualifications, proved to be a stronger correlate of smoking than either of the two income variables and this was especially true for Maori. The effects of housing status on smoking are generally modest in comparison to the other measures of absolute deprivation, while levels of dependency were related to Maori but not Pakeha smoking rates.

With respect to the influence of ethnic socio-economic disparities on smoking, the remaining columns in Table 3 indicate partial correlations between the proportion of regular smokers, by ethnicity, and the rate differences after controlling for age and sex. Again it is evident that variations in Maori smoking rates are more likely to be significantly related to measures of relative inequality than those of Pakeha especially in 1996. Generally, a larger socio-economic gap tended to increase Maori smoking rates but had little or no effect on Pakeha ones. This was particularly true for ethnic differences in benefit status (the respective partial correlations for Maori and Pakeha being 0.63 versus 0.24), unemployment (0.55 versus 0.17), no educational qualifications (0.54 versus –0.05) and median personal income (0.52 versus –0.02). Also significant was the much stronger effect of relative deprivation upon levels of Maori smoking in 1996 compared to 1981.

Stepwise multiple regression analyses were undertaken to examine the relative significance of absolute and relative measures of deprivation on smoking when modelled separately. Table 4 indicates R^2 values for the net effects of indicators of absolute and relative deprivation upon Maori and Pakeha smoking rates in 1981 and 1996 after controlling for age and sex. A number of features are of interest. First, measures of absolute deprivation proved a better predictor of smoking in 1981 and 1996 for Maori as well as Pakeha. Second, for both ethnic groups, the effects of absolute and relative inequality on the prevalence of smoking were greater in 1996 than 1981. Third, and most important, is that the effects of relative deprivation on smoking were more important for Maori than Pakeha in both time periods, but especially in 1996. In 1981, the difference in R^2 was 0.045 (0.136 for Maori versus 0.091 for Pakeha) but by 1996 this had increased to 0.286 (0.345 for Maori versus 0.059 for Pakeha).

Table 2
Changes in ethnic socioeconomic differentials, New Zealand 1981–1996

Ethnic socioeconomic characteristic (%)	1981			1996			Change in rate difference 1981–1996 ^a
	Maori	Pakeha	Rate difference	Maori	Pakeha	Rate difference	
Bachelors degree	0.3	3.9	–3.6	2.6	8.9	–6.3	2.7
No educational qualifications	66.2	44.7	21.5	47.1	31.1	16.0	–5.5
Median household income ^b	62.2	52.8	9.4	65.3	55.6	9.7	0.3
Median personal income ^b	60.2	53.1	7.1	54.4	44.2	10.2	3.1
Home ownership	44.9	73.4	–28.5	47.0	74.1	–27.1	–1.4
Social housing	17.7	4.5	13.2	12.7	2.4	10.3	–2.9
Unemployment	7.4	2.0	5.4	18.0	6.2	11.8	6.4
Domestic Purposes Benefit (DPB)	4.7	1.6	3.1	11.2	2.7	8.5	5.4
Dependency ^c	66.6	33.5	33.1	60.1	23.9	36.2	3.1

^aRate difference (1996)–rate difference (1981).

^b% adult population earning less than the median income.

^cChildren 0–14 as % of the adult population.

Table 3
Partial correlations between smoking rates and absolute and relative deprivation by ethnicity, controlling for age and sex

Rate difference (Maori–Pakeha)	Absolute deprivation				Relative deprivation			
	Maori smoking		Pakeha smoking		Maori smoking		Pakeha smoking	
	1981	1996	1981	1996	1981	1996	1981	1996
Bachelors degree	–0.27*	–0.60**	–0.02	–0.36**	0.01	0.20	–0.04	0.24*
No educational qualifications	0.09	0.85**	–0.07	0.47**	0.07	0.54**	0.03	–0.05
Median household income	0.48**	0.43**	–0.15	0.38**	0.43**	0.36**	–0.13	–0.09
Median personal income	0.10	0.48**	–0.27*	0.31**	–0.05	0.52**	–0.02	–0.02
Home ownership	–0.17	–0.22	–0.37**	–0.02	–0.17	–0.11	0.12	0.08
Social housing	–0.12	0.27*	0.36**	0.27*	–0.09	0.31**	0.04	0.03
Unemployment	0.09	0.46**	0.01	0.44**	0.15	0.55**	–0.26*	0.17
DPB	0.14	0.64**	0.35**	0.58**	–0.11	0.63**	0.03	0.24
Dependency	–0.26*	0.45**	0.05	0.23	–0.28*	0.33**	0.24*	0.44**

* $p < 0.05$, ** $p < 0.01$.

Effects of relative deprivation upon Maori smokers

While both absolute and relative deprivation are clearly related to smoking, the confounding effects of the former need to be accounted for in assessing whether there are any independent effects of relative inequality upon Maori smoking rates. Table 5 indicates partial correlations between the proportion of Maori smokers, disaggregated by gender and urban–rural residence, and measures of relative deprivation controlling for each related measure of absolute deprivation. For New Zealand as a whole it is evident that controls for absolute deprivation do not wholly eliminate the

significance of relative inequality upon smoking rates. Ethnic gaps in income and unemployment remain significant even after controlling for the effects of age, sex, and absolute levels of median income and the proportion unemployed. The independent effects of relative inequality are strongest in the case of Maori women, but only in 1996. For Maori men, smoking rates are significantly related only to ethnic differences in median personal income, again only for 1996.

The effects of inequality upon smoking are most evident in urban TLAs. As for the total population, urban–rural differences in the effects of inequality upon smoking became more pronounced over time. This was

Table 4
Changes in the contribution of absolute and relative deprivation predictors of Maori smoking rates, controlling for age and sex, New Zealand, 1981–1996

	1981	1996	Change
<i>Absolute deprivation</i>			
Maori	0.184	0.618	0.434
Pakeha	0.239	0.364	0.125
Difference	-0.055	0.254	0.309
<i>Relative deprivation</i>			
Maori	0.136	0.481	0.345
Pakeha	0.091	0.150	0.059
Difference	0.045	0.331	0.286

particularly evident in the case of Maori women where the correlations between ethnic social disparities in education, income, housing status and unemployment were all much stronger than in rural areas. For instance, for the Maori population as a whole, the presence of ethnic disparities in adult populations with no educational qualifications in 1996 was unrelated to smoking in rural New Zealand ($r = -0.04$) compared to a strong relationship ($r = 0.54$; $p < 0.01$) in the more urban TLAs. However, the effects of ethnic inequality on smoking were not absent in rural areas. Maori women were more likely to smoke in areas with larger ethnic disparities in unemployment, while Maori males were less likely to smoke in TLAs with the largest ethnic differences in dependency, once absolute levels of dependency were controlled for.

Table 5
Partial correlations between Maori smoking rates and relative deprivation, controlling for absolute deprivation, age and sex^a

Rate difference (Maori–Pakeha)	Total Maori		Maori women		Maori men	
	1981	1996	1981	1996	1981	1996
<i>New Zealand</i>						
Bachelors degree	-0.04	0.23	-0.14	-0.33**	-0.04	-0.19
No educational qualifications	0.02	0.17	-0.01	0.30*	0.10	0.01
Median household income	0.05	0.23	0.17	0.24*	-0.09	0.19
Median personal income	-0.22	0.35**	-0.07	0.34**	-0.23	0.28*
Home ownership	-0.07	0.07	-0.09	0.01	-0.11	0.07
Social housing	0.11	0.20	0.15	0.23*	0.04	0.20
Unemployment	0.33**	0.33**	0.17	0.42**	0.26*	0.20
DPB	0.13	0.10	0.14	0.12	-0.04	-0.02
Dependency	-0.10	-0.16	0.02	0.02	-0.03	-0.22
<i>Urban</i>						
Bachelors degree	-0.12	-0.15	-0.18	-0.42*	0.14	-0.19
No educational qualifications	0.22	0.54**	0.24	0.48*	-0.03	0.36
Median household income	0.04	0.28	0.08	0.48*	-0.09	0.31
Median personal income	0.01	0.18	0.06	0.32	-0.10	0.26
Home ownership	-0.34	-0.26	-0.30	-0.30	-0.18	-0.31
Social housing	0.18	0.37	0.08	0.26	0.23	0.40*
Unemployment	0.24	0.46*	0.26	0.51*	0.22	0.51*
DPB	0.11	0.46*	0.16	0.11	-0.06	0.09
Dependency	0.23	-0.13	0.20	0.04	0.22	-0.01
<i>Rural</i>						
Bachelors degree	-0.05	0.03	-0.20	-0.03	0.23	0.05
No educational qualifications	0.11	0.04	-0.01	0.09	0.14	-0.15
Median household income	0.01	0.14	0.14	0.16	-0.14	0.10
Median personal income	-0.25	0.27	-0.09	0.28	-0.24	0.18
Home ownership	-0.15	0.13	0.05	0.07	-0.10	0.15
Social housing	0.16	-0.03	0.24	0.02	-0.15	-0.09
Unemployment	0.27	0.23	0.19	0.33*	0.14	0.07
DPB	-0.04	-0.08	0.11	0.01	-0.14	0.12
Dependency	0.14	-0.22	0.02	-0.07	0.09	-0.34*

* $p < 0.05$, ** $p < 0.01$.

^aControls for age and sex for the total Maori population only.

Effects of changing levels of inequality on smoking

The extent to which changes in ethnic social disparities affected changes in smoking rates was explored in two ways; first, by examining the relationship between changes in the size of the 'ethnic gap' between 1981 and 1996 and changes in smoking rates (Table 6); and second, by examining the extent to which smoking rates in 1996 were related to the pattern of change in inequality over the preceding 15 years (Table 7).

Table 6 reports standardised regression (beta) coefficients for statistically significant predictors of increased smoking rates after controlling for changes in age and sex. For comparison, changes in Pakeha smoking rates are also included. Communities which experienced the greatest increases in inequality had the largest increases/smallest decreases in smoking rates between 1981 and 1996. For the Maori population as a whole, changes in ethnic gaps in unemployment, home ownership and in median household incomes emerge as the most significant predictors. For the Pakeha population, the effects of increased inequality are less important, with only widening differences in higher educational attainment being related to decreased smoking rates. For Maori, increased ethnic gaps in unemployment rates is the most consistent predictor of the changing incidence of smoking, being important for both males and females and for rural Maori of both genders.

As in the cross-sectional analysis of 1996 data, the effects of changes in inequality on smoking were greatest in the more urbanised TLAs, an effect which was most marked with respect to Maori women. The additional R^2 of 0.696, net of demographic controls, was much higher than the combined effects of increased inequality upon urban Maori men ($R^2=0.493$). Among urban Maori women increased ethnic gaps in the lack of educational qualifications and in homeownership were the most important predictors, whereas changes in benefit status was the most important factor affecting changing smoking rates among urban Maori men. Gender differences were less marked in more rural TLAs where the net effects of increasing inequality were similar for both Maori women and men ($R^2=0.206$ and 0.331 , respectively). Not surprisingly, changing smoking levels were sensitive to increasing ethnic gaps in labour force participation although increased ethnic differences in rural household incomes emerged as the most significant factor affecting changes smoking rates among rural Maori men.

Finally, we explored the extent to which smoking rates in 1996 were related to changes in the pattern of inequality over the preceding 15 years with an additional control for absolute deprivation in 1996. Although one must be extremely cautious in interpreting patterns of change, Table 7 suggests that the effects of increasing

ethnic gaps were greater on the prevalence of smoking rates among Maori women than was the case for men. Also of interest was that the effects of increased inequality on smoking in 1996 were most marked in urban TLAs, especially where the ethnic gaps in levels of homeownership, benefit and dependency status had increased the most. In the case of the latter the changed incidence of smoking, especially among Maori women, was *negatively* correlated with increased ethnic differences in dependency levels. This can be explained by the fact that increased ethnic differences in dependency levels were related to levels of Maori homeownership in 1996 ($r=0.46$; $p<0.01$). Thus, because of an association with higher rates of Maori homeownership, widening ethnic gaps in dependency tended to decrease rather than increase the incidence of smoking among Maori.

Because of multicollinearity between the indicators of change we also undertook stepwise regression analyses in order to isolate the key 'change in gap' predictors of Maori smoking rates in 1996 (Table 8). Rather than controlling for each individual indicator of absolute deprivation, we instead used the New Zealand Deprivation Index (NZDep96) (Crampton, Salmond, & Sutton, 1998) as an overall control for relative deprivation, in addition to controlling for age and sex. In this way, we are able to obtain an overall estimate of the separate effects of demographic, absolute inequality and change in relative inequality variables upon Maori smoking in 1996. Table 8 indicates that, for both the total Maori and female Maori populations, increased ethnic inequalities in benefit and dependency status were the key predictors of smoking in 1996 (the respective R^2 values being 0.639 and 0.579). For Maori males, changes in ethnic gaps in benefit and homeownership status had the most influence on smoking ($R^2=0.492$). However, the independent effects of increased inequality were most evident for Maori females, the net R^2 being twice that of Maori males (0.150 versus 0.079). Nevertheless, absolute deprivation, as measured by NZDep96, was still the most important predictor of smoking.

Discussion

Within the international literature there is very little research on the links between inequality and smoking and this is especially true with respect to ethnic inequality. This study provides some partial added support for the Wilkinson thesis on the effects of inequality upon health. A number of conclusions may be drawn. First, there is a link between ethnic inequality and smoking which persists after controlling for absolute deprivation. These findings must be seen in the context of other research which indicates that ethnic differences in smoking rates cannot simply be attributed

Table 6

Standardised regression coefficients for changes in % adults who were regular smokers 1981–1996, and changes in the size of the ethnic socio-economic gap, controlling for changes in age and sex^a

	Maori total	Pakeha total	Maori female	Maori male	Maori urban	Maori rural	Maori urban female	Maori urban male	Maori rural female	Maori rural male
<i>Controls</i>										
Change young	−0.001	−0.558	−0.191	−0.008	−0.053	−0.088	0.032	0.088	−0.187	0.055
Change old	−0.277	−0.328	−0.398	−0.306	−0.065	−0.365	−0.020	−0.061	−0.458	−0.376
Change sex ratio	−0.040	0.322			−0.208	0.127				
<i>Change in rate difference (Maori–Pakeha) 1981–1996</i>										
Bachelors degree		−0.568								
No qualifications				0.229			0.568		−0.258	
Household income	0.294			0.340		0.339				0.428
Home ownership	0.349				0.453		0.489			
Unemployment	0.384		0.294	0.377		0.479			0.412	0.410
DPB			0.559		0.489			0.739		
Constant	−14.7	−31.0	−35.0	−27.0	−33.2	−28.5	−11.6	−37.8	−33.3	−28.3
R ²	0.561	0.476	0.409	0.446	0.736	0.542	0.778	0.510	0.411	0.483
R ² (excluding controls)	0.407	0.301	0.237	0.436	0.657	0.316	0.696	0.493	0.206	0.331

^aAll controls were entered into the regression equation whether significant or not. For the rate difference variables only statistically significant ($p < 0.05$) coefficients are shown.

Table 7
Partial correlations between % Maori adults who were regular smokers, and changes in the size of the ethnic socio-economic gap, controlling for absolute deprivation 1996, age and sex

Change in the rate difference (Maori–Pakeha) 1981–1996 for:	Regular smokers (%) 1996		
	Total Maori	Maori female	Maori male
<i>New Zealand</i>			
Bachelors degree	0.09	0.19	0.11
No educational qualifications	−0.06	−0.02	0.11
Median household income	−0.10	−0.09	−0.01
Median personal income	−0.08	−0.09	−0.18
Home ownership	0.25**	0.36**	0.15
Social housing	0.23	0.29*	0.10
Unemployment	0.01	0.16	−0.15
DPB	0.29*	0.25*	0.28*
Dependency	−0.37**	−0.45**	−0.24*
<i>Urban</i>			
Bachelors degree	−0.06	0.22	0.25
No educational qualifications	0.19	0.25	0.23
Median household income	−0.03	0.08	−0.06
Median personal income	0.05	0.07	−0.12
Home ownership	0.31	0.38*	0.41*
Social housing	0.17	0.24	0.23
Unemployment	−0.07	0.08	0.02
DPB	0.44*	0.47*	0.46*
Dependency	−0.56**	−0.52**	−0.62**
<i>Rural</i>			
Bachelors degree	−0.14	−0.10	−0.14
No educational qualifications	−0.18	−0.20	−0.15
Median household income	−0.07	−0.13	−0.06
Median personal income	−0.23	−0.20	−0.24
Home ownership	0.22	0.34*	0.27
Social housing	0.18	0.25	0.18
Unemployment	−0.09	0.09	−0.06
DPB	0.10	0.02	0.08
Dependency	−0.35*	−0.42**	−0.37*

* $p < 0.05$, ** $p < 0.01$.

to group differences in socio-economic status (Barnett, 2000; Crampton, Salmond, Woodward, & Reid, 2000).

Second, it is evident that the effects of ethnic inequality on smoking increase over time. Communities which experienced increasing inequality were more likely to have been characterised by increased, or smaller decreases in, smoking rates. Moreover, communities with the highest rates of Maori smoking in 1996 were also those that had experienced the greatest increases in ethnic inequality over the preceding 15 years. These findings give added weight to the validity of the

Wilkinson thesis, especially given critiques of previous studies which have often ignored the temporal element when exploring the inequality–health relationship. In this respect our findings agree with other research, for example, by Regidor et al. (2003) who found that life expectancy in Spain between 1980 and 1990 became more dissociated from average income level and more associated with income inequality.

Third, our findings suggest that Maori were more affected by increasing levels of social inequality than Pakeha. This is to be expected given that the socio-economic position of Maori, relative to Pakeha, markedly deteriorated during the 1980s and 1990s as the implementation of a neoliberal agenda resulted in cuts in welfare benefits and the loss of a large number of state jobs, particularly in forestry and transport, two trends which disproportionately affected Maori (LeHeron & Pawson, 1996). At the same time ethnic identity on the part of Maori increased, partly as a response to the formation of the Waitangi Tribunal in 1985, which attempted to deal with past grievances especially those relating to the confiscation of Maori land by the state during the 19th century (Kelsey, 1995). If there was a time when ethnic consciousness and feelings of relative deprivation were likely to increase then it was over this period of rapid structural change. In this respect our findings are similar to Diez-Roux, Link, and Northridge (2000), who found that the effects of income inequality on smoking were greatest upon the most disadvantaged groups. Within Maori society it has been suggested that inequality has exacerbated levels of depression, isolation and insecurity, as mentioned by Wilkinson, and hence Maori may look at smoking as a release from these pressures (Ministry of Women's Affairs, 1990).

Fourth, we found as did Diez-Roux et al. (2000), a clear gender difference in the effects of inequality. Among Maori, women are far more influenced by inequality than men. However, this effect was only evident in 1996 and not in 1981. In 1996, Maori women, in contrast to Maori men, were more likely to smoke if they lived in communities characterised by strong ethnic differences in education, income and labour force participation. Differences in housing status were also important. Smoking rates among Maori women were higher in TLAs where Maori, relative to Pakeha, were more likely to be concentrated in social housing owned by the state provider, Housing New Zealand. Also during the study period Maori smoking rates, and particularly those of Maori women, were less likely to decline in areas which experienced widening ethnic gaps in home ownership. This perhaps is not surprising given that the 1990s were a time when the newly corporatised state agency introduced market rents which increased levels of poverty and stress among its tenants (Murphy, 1999), many of whom were beneficiaries and solo-parents. We also suggest that this increasing gender bias

Table 8

The effects of changing ethnic socio-economic disparities upon Maori smoking in 1996, controlling for deprivation, age and sex

	Maori total		Maori female		Maori male	
	Beta	Cum R^2	Beta	Cum R^2	Beta	Cum R^2
<i>Controls</i>						
Young	-0.32		-0.42		-0.21	
Old	-0.42		-0.37	0.039	-0.41	0.178
Sex ratio	0.21	0.160				
NZDep96	0.41	0.489	0.38	0.429	0.39	0.413
<i>Change in rate difference (Maori–Pakeha) 1981–1996</i>						
Home ownership					-0.24	0.461
DPB	0.47	0.602	0.41	0.549		
Dependency	-0.24	0.639	-0.20	0.579	0.40	0.492
Constant	40.5		51.9		41.6	
Total R^2		0.639		0.579		0.492
Additional R^2 contributed by change in rate difference		0.150		0.150		0.079

in smoking possibly reflects the combined effects of lower rates of labour force participation and residential segregation in producing a more localistic stance and heightened feelings of psychosocial and material deprivation on the part of disadvantaged Maori women. As we have argued elsewhere (Barnett et al., 2004), the presence of a strong gender effect of inequality on smoking is consistent with psychosocial interpretations of health inequality and the findings of writers such as Wilson (1987), Ellaway and Macintyre (2001) and Stead et al. (2001) on the effects of residential isolation on disadvantaged groups.

However, while our findings provide some qualified support for the effects of ethnic inequality on smoking, a number of caveats are necessary. First, our study is based on ecological and not individual data or some combination of the two. While we can measure the effects of community inequality upon smoking, we are unable to discern the extent to which smoking is an outcome of psychosocial or other causes. Second, our analyses indicate that the effects of inequality on smoking are partial. That is, they were more important with respect to certain groups and contexts than others. For example, the effect of inequality on smoking, while becoming more important, was far more evident among Maori women than Maori men. Also, while relative deprivation appears to be a more significant determinant of Maori smoking rates, it needs to be remembered that absolute poverty also became more important and remains the dominant factor affecting Maori smoking for both women and men.

Furthermore, while in contrast to many other countries (Pearce, Boyle, & Flowerdew, 2003), New

Zealand is relatively unique in that it is one of the few places where questions on smoking are asked as part of the national census approximately every 10–15 years, two difficulties with New Zealand census data must be noted with respect to the concerns of this paper. First, the smoking data from the census is based upon self-reports which underestimate the prevalence of smoking (Hedges, 1996) particularly among young people (Walker, O'Brien, Traynor, Fox, Goddard, & Foster, 2001). Second, there are definitional issues regarding the use of the term Maori. Maori are not an ethnically homogeneous mass. Currently, Statistics New Zealand defines Maori as persons who have identified themselves ethnically as Maori and Maori only, as well as persons who considered themselves to be Maori but who also identified with another ethnic group. Furthermore, the 1996 Census also reveals that 56,343 people, who indicated on the census form that they had Maori ancestry, chose not to identify themselves ethnically as Maori (Chapple, 2000).

Conclusion

Although the incidence of increased poverty and inequality has attracted much comment in New Zealand, we suggest that more attention needs to be paid to the effects of inequality on health and how patterns of individual smoking behaviour are shaped by place. Important here is a greater understanding of how contextual factors of inequality shape people's perceptions of their identity and the links between identity and health behaviour (Kearns & Moon, 2002). As we have

suggested, too much of the literature in the inequality-health debate has focused on issues of mortality, or at best, measures of self-rated health, and not enough on the links between inequality and behavioural outcomes. Only by studying the latter can greater insights be made into untangling what Macintyre, Ellaway, and Cummins (2002) have called the “black box” of place.

In a similar vein, in New Zealand we note that recent policy documents on Maori smoking and cessation programmes, while emphasising increased economic disincentives (Wilson & Thomson, 2000) or culturally appropriate smoking cessation programmes (Ministry of Health, 2003b), have simply paid lip service to the influence of contextual influences such as the level of ethnic inequality. For instance, the recent *Aukati Kai Paipa* quit programme for Maori women, which was implemented in a variety of (undocumented) urban and rural locations around New Zealand, achieved a significantly higher quit rate for Maori women smokers. However it is unlikely to reduce smoking significantly among Maori women in the long term. While the programme was developed in culturally appropriate ways that enhanced its acceptability to Maori (e.g. it was delivered by Maori health providers and eliminated financial barriers associated with the adoption of nicotine replacement therapy), it could be argued that more attention should have been paid to evaluating the extent to which the success of the programme depended on local contextual factors, some of which we have examined here.

Health promotion messages and advice on smoking cessation often focus upon the negative aspects of continuing to smoke and contrast these with the benefits of giving up. However, given that smoking itself is often associated with a number of benefits in deprived communities, such as socialising with others (McKie, 2003), a way of relieving stress (Graham, 1993), or a part of community identity (Stead et al., 2001), then the perceived benefits of cessation may be less in such communities. Current policies aimed at promoting the benefits of cessation thus need to be not only more culturally aware, but also more cognisant of the geographical contexts within which they are operating. In this way, the chances of reducing persistent health inequalities, such as smoking, are more likely to become a reality.

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