ORIGINAL SCIENTIFIC PAPER

QUANTITATIVE RESEARCH

The distribution and frequency of blood lipid testing by sociodemographic status among adults in Auckland, New Zealand

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ABSTRACT

INTRODUCTION: National cardiovascular disease (CVD) guidelines recommend that adults have cholesterol levels monitored regularly. However, little is known about the extent and equity of cholesterol testing in New Zealand.

AIM: To investigate the distribution and frequency of blood lipid testing by sociodemographic status in Auckland, New Zealand.

METHODS: We anonymously linked five national health datasets (primary care enrolment, laboratory tests, pharmaceuticals, hospitalisations and mortality) to identify adults aged ≥25 years without CVD or diabetes who had their lipids tested in 2006–2010, by age, gender, ethnicity and area of residence and deprivation. Multivariate logistic regression was used to estimate the likelihood of testing associated with these factors.

RESULTS: Of the 627 907 eligible adults, 66.3% had at least one test between 2006 and 2010. Annual testing increased from 24.7% in 2006 to 35.1% in 2010. Testing increased with age similarly for men and women. Indian people were 87% more likely than New Zealand European and Others (NZEO) to be tested, Pacific people 8% more likely, but rates for Māori were similar to NZEO. There was marked variation within the region, with residents of the most deprived areas less likely to be tested than residents in least deprived areas.

DISCUSSION: Understanding differences within and between population groups supports the development of targeted strategies for better service utilisation. While lipid testing has increased, sociodemographic variations persist by place of residence, and deprivation. Of the high CVD risk populations, lipid testing for Māori and Pacific is not being conducted according to need.

KEYWORDS: Cardiovascular disease; healthcare disparities; lipids; socioeconomic status

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Introduction

Cardiovascular disease (CVD) is a leading cause of preventable mortality, both globally and in New Zealand.[1,2] with dyslipidaemia being one of the major modifiable risk factors. New Zealand CVD risk management guidelines recommend that men over 45 years and women over 55 years undergo a CVD risk assessment, including blood lipid measurements, at least every 5–10 years.[3,4] This assessment is recommended 10 years earlier for some ethnic groups considered to be at high CVD risk (Māori, Pacific and those from the Indian subcontinent) and all others with known CVD risk factors. Evidence from New Zealand[5,6] and abroad[7–9] demonstrates that some ethnic groups may be less likely to undergo risk assessment for CVD; however, the extent and equity of lipid testing in New Zealand by sociodemographic determinants is currently unknown.

From a public health perspective, it is important to understand differences in lipid testing both within and between groups in the Auckland Region, in order to establish targets and address any apparent inequities in laboratory service utilisation.

This paper aims to describe the variation in lipid testing for those without known CVD or diabetes, stratified by key sociodemographic determinants (including age, gender, ethnicity, area deprivation index and place of residence) among adults residing in the Auckland Region of New Zealand.

WHAT GAP THIS FILLS

What we already know: Testing for cholesterol and other lipid fractions is recommended for cardiovascular disease (CVD) risk screening and ongoing management. Māori, Pacific and people from the Indian subcontinent experience a disproportionate CVD burden. There has been no previous New Zealand research on the extent and equity of lipid testing by sociodemographic determinants.

What this study adds: The study found significant variations in lipid test utilisation by ethnicity, residence and deprivation. Primary care and public health interventions need to focus on improving lipid testing practice among the populations most at risk of CVD, particularly Māori, Pacific and those living in the most deprived areas.

Methods

The Auckland Region is the largest metropolitan area in New Zealand, with a population of 1.5 million people, which constitutes approximately one-third of the national population.[10] About 90% of its residents reside in urban areas and it is the most ethnically diverse region in New Zealand.[11]

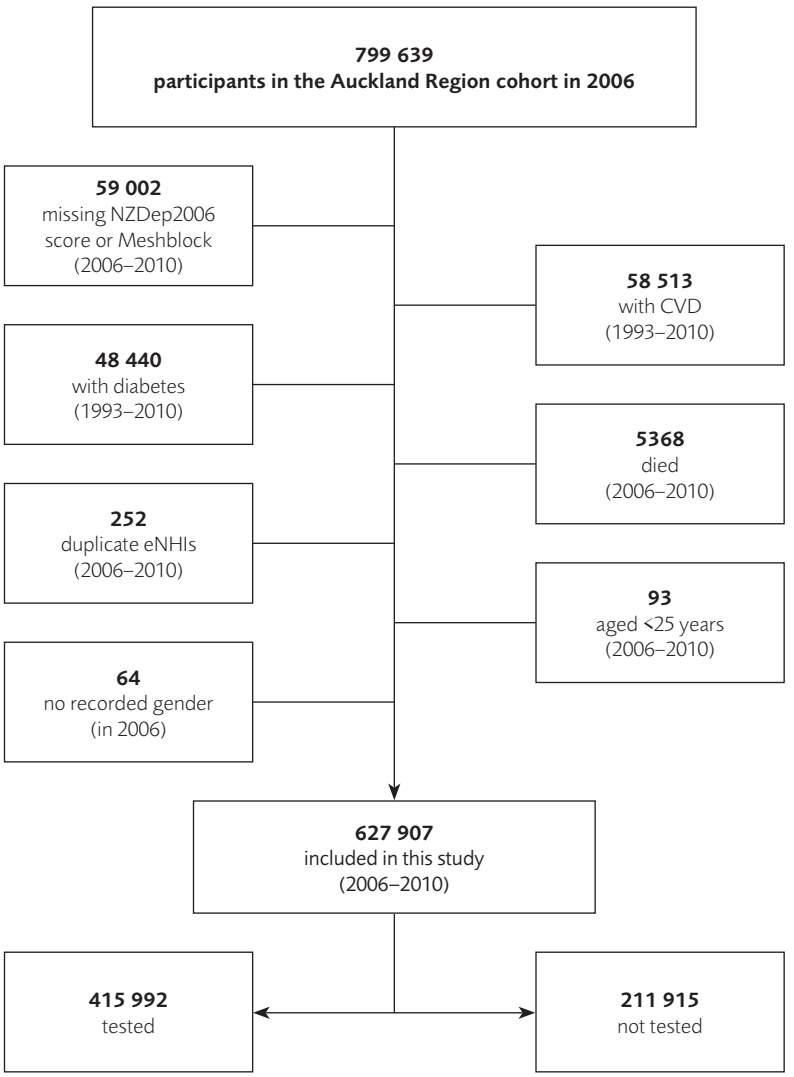
Every New Zealand resident has a unique health identifier, the National Health Index (NHI) number, which enables anonymous and secure linkage of data from patient electronic medical records within the health and disability support sectors.[12,]

This study used encrypted NHIs (eNHIs) to link nationally held datasets that record a patient's interaction with New Zealand's universal health care system, including primary health organisation (PHO), community laboratory test utilisation, community pharmaceutical dispensing claims, hospital discharges and mortality data. We developed a regional cohort, comprising the residing population aged 25 years and older enrolled in an Auckland regional PHO in the first quarter of 2011. For each eNHI, we obtained the patient's history of having any blood lipid measure (total cholesterol, HDL-cholesterol, TC:HDL ratio, LDL-cholesterol and triglycerides) for the period 2006–2010, from the national community laboratory test claims database. During this five-year period, 99% of all blood lipid test claims included this full 'series' of lipid tests. Although there were multiple lipid measures derived per patient visit to the community testing laboratory, we refer to each visit as a single event.

Age, gender, ethnicity, area of residence (according to Census meshblock and General Electoral District) and area-level deprivation for each person in the PHO enrolment database were obtained. A person's ethnicity was defined using the prioritised method[13] and was aggregated into four groups in the following order: Māori, Pacific, Indian and New Zealand European/Other (NZEO). Māori, Pacific and Indian ethnicity categories were used in these analyses because national guidelines have identified these groups to be at high risk of CVD.[3,4] The NZEO group was mainly New Zealand European (68%), with 14% 'Other Asian' and 18% 'Other ethnicities'. Census meshblocks are the smallest available statistical output from the 2006 Census, with an average population of approximately 87 residents.[14] By contrast, the General Electoral District populations are between 40 000 and 60 000 residents and are used in this study to demonstrate geographical variations in lipid testing.[15] Socioeconomic deprivation was determined according to the 2006 New Zealand Deprivation Index (NZDep2006), which is an area-level (census meshblock) measure of socioeconomic status based on nine variables from the 2006 Census.[16] In this study, the NZDep2006 score was aggregated into quintiles, with ranking from 1 (least deprived) to 5 (most deprived).

Participants were eligible for inclusion in this analysis if they were enrolled in an Auckland Region PHO during the first quarter of 2011 (1 January to 31 March 2011), were aged 25 years or older on 1 January 2006, and

Figure 1. Exclusion criteria flowchart



had complete demographic information (age, gender, ethnicity, deprivation status and area of residence), as shown in Figure 1. Between 2006 and the end of 2010, those who died or had established CVD or diagnosed diabetes were identified from national datasets so that they could be excluded. CVD was defined as having a previous hospitalisation for a diagnosis of acute coronary syndrome, ischaemic or haemorrhagic stroke, peripheral arterial disease or a procedure for these conditions (e.g. percutaneous coronary intervention or coronary artery bypass grafting), or congestive heart failure.

Diagnosed diabetes was identified by having a previous hospitalisation with a diagnosis of diabetes, or being prescribed oral hypoglycaemic agents, alpha-glucosidase inhibitors, or insulin.

Statistical analysis was performed using STATA Version 12.0. The proportion of the population having at least one blood lipid test event in 2006–2010, with corresponding 95% confidence intervals (CI), was calculated to assess variations by gender, age, ethnicity and area deprivation score. Risk ratios (RR) were calculated by comparing the most deprived areas to the least deprived areas, in order to investigate the deprivation gradient in lipid test utilisation. Logistic regression analyses were conducted to estimate the likelihood of testing, expressed as odds ratios (ORs) and 95% CIs, both unadjusted and after adjustment for known sociodemographic covariates. Existing evidence suggests that patients living in more deprived neighbourhoods and those of Māori, Pacific and Indian ethnicity have an elevated risk of CVD.[4] Furthermore, the risk of CVD increases with age and, although the New Zealand CVD guidelines recommend that males commence CVD risk assessment 10 years earlier than females, males are considerably less likely to attend primary care than females.[17] Therefore, in our logistic regression analyses, our focus was to understand whether the odds of having at least one test for lipids were higher among these high-risk population groups.

This research is part of the Auckland Region Vascular Atlas study and ethical approval was granted by the Northern X Regional Ethics Committee in 2010 (Ref. NXT/10/EXP/224).

Results

A total of 799 639 people aged 25 years and older were enrolled in an Auckland Region PHO during the first quarter of 2011 (1 January to 31 March 2011). After excluding participants with missing demographic information (59 002), prior CVD (58 513), diagnosed diabetes (48 440), who had died (5368), had duplicate eNHIs (252), were aged below 25 years (93), or whose gender was unrecorded or unknown (64), there were 627 907 participants included in this study (Figure 1).

Characteristics of those with no geographic identifiers or deprivation information

Of the 59 002 participants excluded from this analysis due to missing geo-locators and deprivation information, 49 676 met the other criteria for inclusion in this study, of whom 26 589 (53.5%) were female and 23 087 (46.5%) were male. The overwhelming majority (41 209 or 83.0%) of those missing deprivation data were of NZEO ethnicity, compared to the 2817 (5.7%) Māori, 3107 (6.3%) Pacific, and 2543 (5.1%) Indian participants. Nearly two-thirds (65.6%) of those 59 002 patients excluded for missing geo-locators were aged below 55 years and 32 008 (54.2%) had at least one lipid series completed between 2006 and 2011.

Characteristics of the eligible population

Of the 627 907 people included in the study, 341 393 (54.4%) were women. Half (315 757; 50.3%) were between the ages of 35 and 54 years. There were 492 218 (78.4%) participants who were classified as being of NZEO ethnicity, with 40 271 (6.4%) Māori, 62 380 (9.9%) Pacific and 33 038 (5.3%) Indian participants. There were similar proportions of patients in each deprivation quintile.

The annual proportion of the total study population tested for blood lipid levels increased from 24.7% in 2006 to 35.1% in 2010 (further data not included in this paper).

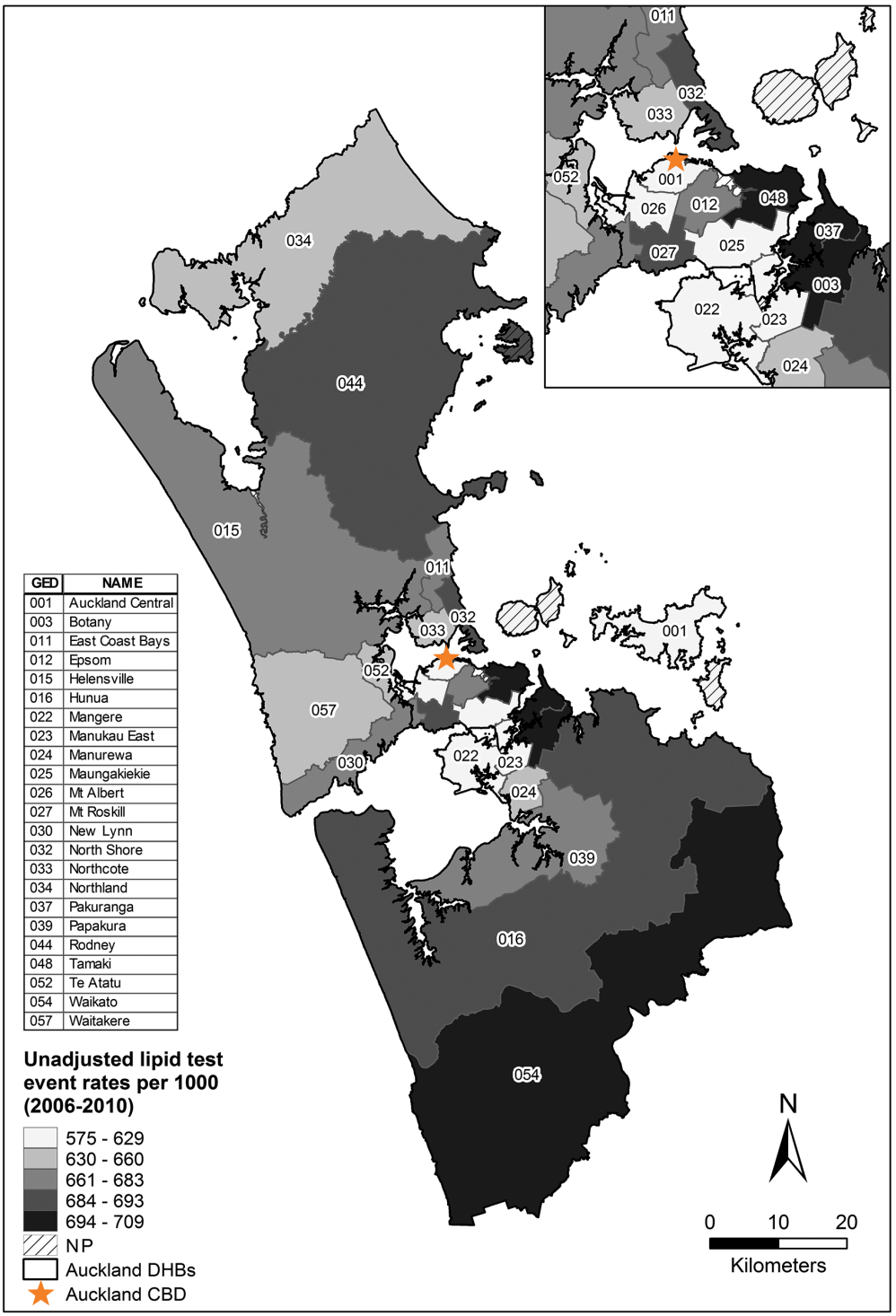
There were 211 915 (33.7%) patients who did not have any lipid tests in the five-year study period, of whom 117 886 (55.6%) were female and 107 087 (50.5%) were aged between 25 and 34 years in 2006. Furthermore, 160 391 (75.7%) were categorised to the NZEO ethnic group, 16 684 (7.9%) Māori, 25 171 (11.9%) Pacific, and 9669 (4.6%) Indian. In terms of area deprivation, 22% lived in the least deprived areas of the Auckland Region, compared to 18.5% from the most deprived areas (RR=1.19).

Overall, 415 992 people (66.3% of the study population) had at least one lipid test over this period; 223 507 (53.7%) were women and 192 485 (46.3%) men. Among those people who had at least one test, 23.7% had only one event between 2006 and 2010, while during the same period, 12% had five or more lipid testing events.

Variation by area of residence

Figure 2 shows that the geographic variation in the population having at least one lipid test between 2006 and 2010 by GED increases with distance from the Auckland Central Business District. The crude rate of one or more lipid tests was lowest in the Auckland Central GED (575.33 per 1000) and highest in the Pakuranga GED (708.8 per 1000), located in the central eastern suburbs of the region. There was an apparent cluster of relatively low rates of lipid testing in the Mangere (620.6 per 1000), Manukau East (628.8 per 1000), and Manurewa GEDs (641.0 per 1000) towards the south of the city. The neighbourhoods located within these three GEDs (Mangere, Manukau East and Manurewa) are among the most deprived areas in New Zealand according to the NZDep2006 measure of deprivation. In the north of the city, the lipid testing rates were higher along East Coast Bays than the GEDs that bound the inner-harbour, which also reflects variations in the relative socioeconomic position in these areas. There was moderate geographic variation in the west of the region, with rates per 1000 ranging from 651.0 in the Waitakere GED to 666.7 in the Helensville GED. Unlike the GEDs in the central, north and south of the city already discussed, the Waitakere and Helensville GEDs predominantly comprise rural landscapes, with a series of small settlements dispersed intermittently along the main highways connecting these localities to the rest of the region. The populations in the northern-most GED (Northland) and the Waikato (southern-most) GED are considerably less than the other GEDs, at 2454 and 2868 respectively. The GED boundaries do not coincide with the northern or southern limits of the Auckland Region. Therefore, the population counts reported for the Northland and Waikato GEDs represent the population living in the Auckland Region part of those GEDs. Complete data for Northland and Waikato GEDs were not available in the present study, as only data for residents living in the Auckland Region was requested in this study.

Figure 2. Unadjusted rates per 1000 patients of the population who had at least one lipid series test in 2006–2010, by General Electoral District (GED)



GED	NAME
001	Auckland Central
003	Botany
011	East Coast Bays
012	Epsom
015	Helensville
016	Hunua
022	Mangere
023	Manukau East
024	Manurewa
025	Maungakiekie
026	Mt Albert
027	Mt Roskill
030	New Lynn
032	North Shore
033	Northcote
034	Northland
037	Pakuranga
039	Papakura
044	Rodney
048	Tamaki
052	Te Atatu
054	Waikato
057	Waitakere

NP in the legend refers to localities with no population
CBD Central Business District
DHBs District Health Boards

Variation by age, gender and ethnic group

Table 1 presents the number and percentage of men and women who received lipid tests at least once during the five-year period from 2006 to 2010, stratified by age and ethnic group. The cells in the table are shaded (the darker the colour, the larger the value) using percentile classifications, with midpoints being 50th percentile in order to highlight testing patterns. Lipid test frequency increased linearly by age among men and women, peaking at age 65–74 years with 89.8% of women and 90.4% of men. Testing plateaued for those aged 75–84 years and dropped to under 80% for those in the oldest age group. In univariate analyses, Indian women and men (71.3 % and 70.1%, respectively) were tested most, with Māori men (57.8%) and Māori (59.1%) and Pacific women (59.0%) having the lowest levels of lipid testing. While national guidelines do not recommend CVD screening (and therefore cholesterol testing) of those aged less than 35 years, over 28 000 men and women in this age group had at least one lipid test in the last five years, with the highest proportions seen for Indian men (46.9%) and Indian women (47.1%).

Variation by socioeconomic deprivation

Figure 3 shows a steady decline by area deprivation score in the proportion of men and women with at least one lipid series test event in 2006–2010. Proportionally, there were more men than women living in the least deprived areas

*Table 1. Number and percentage of men and women receiving at least one lipid test event between 2006 and 2010 in Auckland, by age and ethnicity.**

Age group (Years)		Men					Women				
		Māori	Pacific	Indian	NZEO	Total	Māori	Pacific	Indian	NZEO	Total
Number	25–34	983	1933	1558	8409	12 883	1413	2119	1802	10 061	15 395
	35–44	3028	5825	3899	33 246	45 998	4090	6114	4320	36 025	50 549
	45–54	3050	4961	3016	46 410	57 437	4912	6505	3718	49 570	64 705
	55–64	1562	2602	1402	37 843	43 409	2702	3345	1912	41 383	49 342
	65–74	556	1078	566	20 421	22 621	918	1610	728	24 665	27 921
	75–84	108	369	168	7934	8579	244	598	226	11 305	12 373
	85+	2	49	19	1488	1558	19	101	35	3067	3222
	Total	9289	16 817	10 628	155 751	192 485	14 298	20 392	12 741	176 076	223 507
Percentage	25–34	30.60%	33.10%	46.90%	32.80%	33.90%	30.50%	30.50%	47.10%	32.00%	32.90%
	35–44	50.20%	56.10%	69.50%	52.80%	54.20%	47.50%	49.20%	69.00%	49.30%	50.30%
	45–54	71.20%	73.90%	83.00%	74.70%	74.80%	75.00%	75.80%	85.20%	73.70%	74.50%
	55–64	85.20%	83.90%	84.30%	86.90%	86.60%	87.60%	86.00%	85.60%	85.60%	85.70%
	65–74	92.70%	86.40%	81.10%	90.90%	90.40%	90.40%	87.50%	85.30%	90.10%	89.80%
	75–84	88.50%	80.20%	81.60%	89.10%	88.50%	90.40%	82.00%	78.50%	87.70%	87.30%
	85+	33.30%	72.10%	57.60%	77.30%	76.70%	70.40%	69.20%	72.90%	71.30%	71.20%
	Total	57.80%	60.50%	70.10%	68.50%	67.20%	59.10%	59.00%	71.30%	66.50%	65.50%

NZEO New Zealand European/Other ethnicity

* Note that with the exception of overall totals, the cells are shaded (the darker the colour, the larger the value) using percentile classifications, with midpoints being 50th percentile in order to highlight testing patterns

Figure 3. Frequency of lipid series testing among men and women in 2006–2010, by NZDep2006 quintile

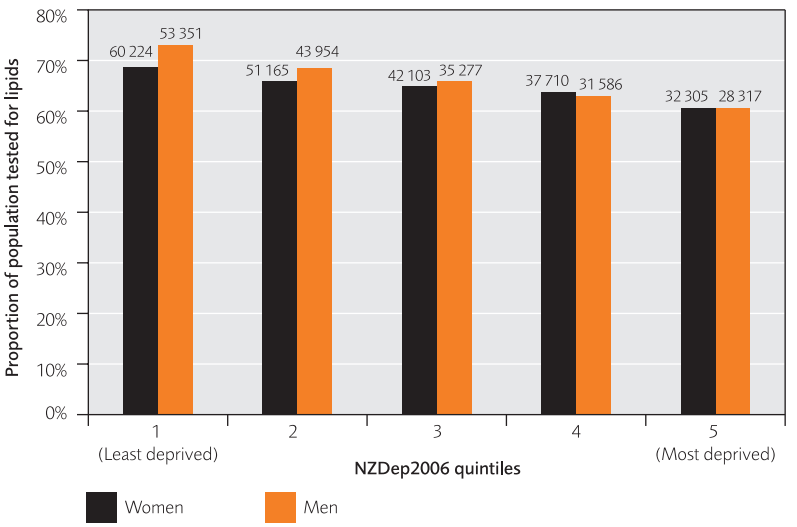
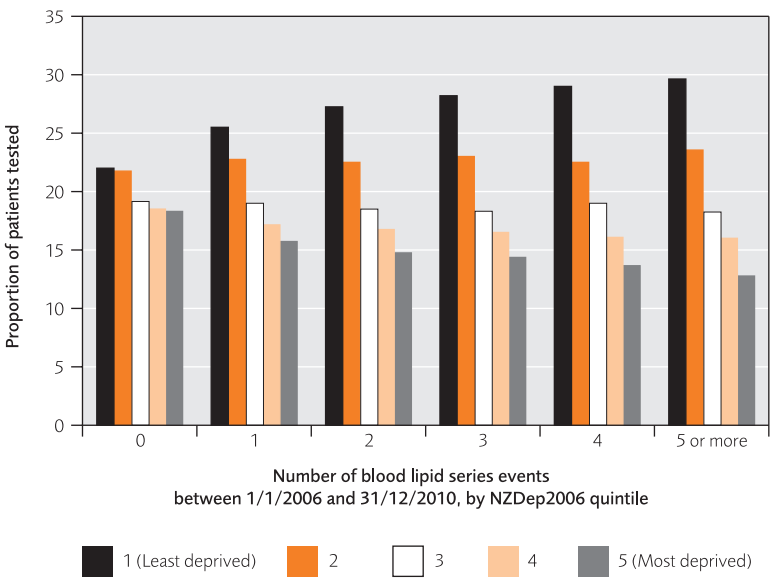


Figure 4. Frequency of lipid series events in 2006–2010, by NZDep2006 quintile



who had completed at least one blood lipid series test event in 2006–2010. However, as deprivation increased, equal proportions of men and women received tests in the most deprived areas. The deprivation gradient is much more apparent when we consider the number of times a blood lipid series test was done for patients (Figure 4). Indeed, as the number of tests increased, so too did the inequities in blood lipid series test events, with RRs ranging from 1.62 among those patients who had one lipid test series done, to an RR of 2.32 among those patients who had blood lipid series tests five or more times between 2006 and 2010.

Modelling the likelihood of testing

Controlling for gender, age, ethnicity and deprivation quintile, logistic regression analyses (Table 2) showed that women were 9% less likely than men to be tested over a five-year period (OR=0.91; 95% CI 0.90–0.92). The odds of patients aged 35–44 years having a lipid series test done were 83% lower than those aged 55–64 years. However, older patients aged 65–84 years were more likely to have at least one lipid series test done than those aged 55–64 years. The odds of Māori patients having a lipid series test done at least once between 2006 and 2010 were not statistically different from patients of NZEO ethnicity, whereas the odds of Pacific and Indian patients having a lipid series test were 8% (OR=1.08; 95% CI 1.06–1.11) and 87% (OR=1.87; 95% CI 1.82–1.92) higher than for patients of NZEO ethnicity, respectively. After adjusting for age, gender and ethnicity, those living in the most deprived areas of residence (Quintile 5) were 18% less likely than those in Quintile 1 (least deprived) to be tested (OR=0.82; 95% CI 0.80–0.84).

Discussion

This is the first study to examine population-based patterns of lipid testing in a New Zealand population and the variations found provide a baseline for future quality improvement initiatives. Annual lipid testing in the Auckland Region increased from 24.7% in 2006 to 35.1% in 2010. Over the five-year period between 2006 and 2010, approximately two-thirds of Auckland adults had at least one blood lipid test and over 10% were tested five or more times. The frequency of measurements should range from annually for those with a five-year CVD risk over 15% or on lipid-lowering treatment, to 10-yearly for those with a five-year CVD risk below 5%. Without cholesterol and HbA1c test results and other risk factor information (blood pressure, smoking, and medical history, such as dietary-controlled diabetes or renal disease), determining an individual's recommended frequency of lipid monitoring is difficult.

Similar trends for increasing lipid testing have been found abroad. An audit of laboratory utilisation in the UK ascertained that, in the 20 years from 1987, there was a 15-fold increase in the number of lipid tests ordered.[18] Over-utilisation of laboratory testing represents an opportunity cost, where scarce resources could be better spent towards improving health outcomes.

After adjustment for age and other covariates, we found that women were 9% less likely to be tested than men. This could possibly be due to a social perception that men are more vulnerable to heart disease than women, despite the fact that females are more likely to visit their GP and have more opportunity to be tested. However, we were unable to determine other CVD risk factors (e.g. gender-specific proportions of diabetes, smoking or high blood pressure) that might have contributed to this finding. We found substantial variance in lipid testing by age, with linear increases, for both men and women, between the ages 55 and 75 years. Both these findings are reflected in international research.[19,20]

Although we excluded most of the patients with CVD and diabetes, we were unable to exclude other very high risk groups for whom annual lipid monitoring is recommended, such as those with dietary-controlled diabetes, renal disease, angina, and those not hospitalised but who have a history of transient ischaemic attacks and peripheral vascular disease. However, as Māori, Pacific and Indian ethnic groups as well as those living in more deprived residential areas have documented higher morbidity, this pattern is clearly not reflected in laboratory service utilisation (with the exception of Indian people). The variation in lipid testing between ethnic groups found in this study is a cause for concern. After adjusting for sociodemographic factors, the odds of Māori patients having had a lipid series completed were similar to patients of NZEO ethnicity, whereas the odds ratios for Pacific were 8% and Indian patients 87% higher than patients of NZEO ethnicity. Māori, Pacific and Indian people in New Zealand bear a disproportionate burden of CVD mortality and its risk factors compared with the NZEO ethnic group.[5,21,22] National guideline recommendations to screen these high-risk populations 10 years earlier than those with NZEO ethnicity[3] were introduced to help address this problem. Inadequate testing for lipids among Māori has been reported previously,[6] reflecting international evidence of lower lipid testing among non-European ethnic groups.[7,23] Therefore, the implementation of recommended earlier screening in New Zealand for Māori, Pacific and Indian populations[24] appears to have succeeded for Indians but not for Māori or Pacific people. This is contrary to New Zealand's strategic health equity goals[25,26] and the District Health Boards' Māori Health Plans, which underpin efforts to improve Māori health and reduce disparities between Māori and non-Māori.

We found geographical variation, whereby residents of the most deprived areas had significantly lower odds of having completed a lipid series than residents of the least deprived areas. International evidence on the relationship between deprivation and lipid testing is inconclusive, with studies reporting both higher[27] and lower rates of lipid testing[28] among patients in deprived areas.

A strength of this study was its large sample size, including all people enrolled in Auckland Region PHOs. Since 2008, over 97% of the New Zealand population have been enrolled with a PHO and approximately one-third of the total New Zealand population lives in the Auckland Region.

One major limitation of this study is the inability to account for the influence of other patient risk factors and comorbidities, or lipid-lowering treatment, on patient testing patterns. The recommended timeliness of risk factor monitoring is dependent on an individual's predicted five-year risk of having a CVD event and whether they are on lipid-lowering treatment. At the time this study was conducted, patient-level risk assessments for this regional cohort were not available. Furthermore, we were unable to exclude some patients whose medical histories place them at high risk and for whom annual monitoring is recommended. For example, diabetes-related hospitalisations and pharmaceuticals were used to identify and exclude people with diabetes, but this approach is likely to result in incomplete identification of this patient group.

*Table 2. Crude and adjusted odds ratios (OR) of receiving lipid tests in men and women in Auckland 2006–2010—results of regression analysis for patients without CVD or diabetes (n=627 907)**

	Crude OR (95% CI)	Gender, age, ethnicity and deprivation adjusted OR (95% CI)
Gender		
Men	1.00	1.00
Women	**0.93** (0.92–0.94)	**0.91** (0.90–0.92)
Age group		
55–64 years	1.00	1.00
25–34 years	**0.08** (0.08–0.08)	**0.08** (0.08–0.08)
35–44 years	**0.18** (0.17–0.18)	**0.17** (0.17–0.18)
45–54 years	**0.48** (0.47–0.49)	**0.47** (0.46–0.48)
65–74 years	**1.47** (1.42 - 1.52)	**1.48** (1.43–1.53)
75–84 years	**1.16** (1.11 - 1.21)	**1.18** (1.13–1.23)
85+ years	**0.43** (0.41–0.46)	**0.45** (0.42–0.48)
Ethnicity		
NZ European/Other	1.00	1.00
Māori	**0.68** (0.67–0.70)	1.00 (0.97–1.02)
Pacific	**0.71** (0.70–0.73)	**1.08** (1.06–1.11)
Indian	**1.17** (1.14–1.20)	**1.87** (1.82–1.92)
Deprivation		
Quintile 1	1.00	1.00
Quintile 2	**0.85** (0.83–0.86)	**0.93** (0.91–0.94)
Quintile 3	**0.78** (0.77–0.80)	**0.90** (0.88–0.92)
Quintile 4	**0.72** (0.71–0.73)	**0.87** (0.85–0.89)
Quintile 5	**0.64** (0.63–0.65)	**0.82** (0.80–0.84)

* ORs labelled in bold denote statistically significant values with *p* values <0.05

The exclusion of 59 002 patients due to missing meshblock codes is also of particular concern, as this detracts from the study's power and ability to generalise findings to the wider population. Nevertheless, it was reassuring to note that the distributions by age, ethnicity and population receiving a lipid series test of this excluded group were broadly consistent with the characteristics of the 627 907 participants that were included in our analyses. For example, many (36.1%) of the patients from this analysis who would potentially be categorised as 'tested' only had one lipid series between 2006 and 2010.

A minor limitation of this study is that it does not account for the small proportion of people not enrolled in a PHO who may be from a high-risk population. The NZDep2006 also has its limitations. The scores represent the average measurement of meshblock-level area deprivation and therefore are only a proxy measurement for personal socioeconomic status.

This is the first study to examine variation in lipid testing in the Auckland Region and provides a baseline for future monitoring. We found evidence of ongoing disparities in lipid screening for Māori and Pacific populations and targeted strategies are needed to ensure that these populations receive greater access to these essential preventive services. In contrast, the increased screening observed among Indian people is consistent with national guideline recommendations. Further research linking the frequency of lipid testing with test results and clinical outcomes will be undertaken, to identify where targeted health funding and resource allocation is best directed.

The results from this research offer a number of opportunities for practitioners in primary care and the broader community of health providers to improve lipid testing in the Auckland Region. In order for our indigenous population to make the same gains in testing as seen among other ethnicities, consultation with iwi and Māori health providers must be undertaken in order to conceive a clear strategy to raise screening and monitoring. We endorse the current Government's health target focusing on CVD risk assessment; however, the success of such a target will be dependent on the effective monitoring and maintenance of patients who are identified at high risk of CVD, including those with abnormal lipid results. We envisage that the recent trends in electronic health registers and patient portals will facilitate better linkage between primary and tertiary care providers, while also improving opportunities for electronic reminders to be sent to patients and primary care providers in a timely manner.

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COMPETING INTERESTS
None declared.