THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Self-rated health, health-related behaviours and medical conditions of Māori and non-Māori in advanced age: LiLACS NZ

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Abstract

Aims To establish self-rated health, health-related behaviours and health conditions of Māori and non-Māori in advanced age.

Method LiLACS NZ is a longitudinal study. A total of 421 Māori aged 80–90 years and 516 non-Māori aged 85 years living in the Bay of Plenty and Rotorua district were recruited at baseline (2010). Socioeconomic-demographic characteristics and health-related behaviours were established using interviewer administered questionnaire. Self-rated health was obtained from the SF-12. Medical conditions were established from a combination of self-report, review of general practitioner and hospital discharge records, and analyses of fasting blood samples.

Results 61% Māori and 59% non-Māori rated their health from good to excellent. Eleven percent of Māori and 5% of non-Māori smoked; 23% Māori and 47% non-Māori had alcohol on ≥2 occasions per week. Physical activity was higher in Māori than non-Māori (p=0.035) and the relationship was attenuated when adjusted for age. More Māori (49%) than non-Māori (38%) were at high nutrition risk (p=0.005); and more non-Māori (73%) than Māori (59%) were driving (p<0.01). The three most common health conditions were hypertension (83%), eye diseases (58%) and coronary artery disease (44%). The health profile differed by gender and ethnicity. Overall, participants had a median of five health conditions.

Conclusion Self-rated health is high in this sample considering the number of comorbidities. There are differences in health behaviours and health conditions between genders and by ethnicity in advanced age. The significance of health conditions in men and women, Māori and non-Māori in advanced age will be examined longitudinally.

The population of New Zealand is ageing and will yield a unique mix of older Māori and non-Māori. The proportion aged 80 years and above is increasing more rapidly with the numbers of non-Māori predicted to increase from 151,000 to 210,630 and, for Māori, from 5,000 to 10,000 (from 0.7 to 1.3% of the Māori population) by 2026.[1]

The dependency ratio (ratio of the 65+ and children to those of working age) is projected to increase, suggesting that current services may not adequately funded by the available tax dollars in the future.[2] However, older people make a valuable contribution to society, particularly Māori elders who play essential roles in cultural protocols, decision making and maintaining te reo Māori me ngā tikanga and mātauranga Māori – Māori knowledge.[3]

Health disparities related to ethnicity are described in detail for younger population groups for example disease specific mortality and cancer,[4,5] diabetes and cardiovascular disease[6,7] show adverse disparities in prevalence and outcomes for Māori. For older Māori, there is evidence of unmet need.[8,9] However, there has not been a thorough examination of health behaviours and conditions in those aged 80 and above (advanced age). Although the exact profile of health conditions in the oldest age groups (age 85+) have been described in Newcastle[10] and Leiden[11] for mainly European populations, this has not been adequately outlined in New Zealand.

Te Puāwaitanga O Ngā Tapuwae Kia Ora Tonu: Life and Living in Advanced Age, a cohort study in New Zealand (LiLACS NZ) began in 2010 and is following Māori (aged between 80 and 90 years in 2010) and non-Māori (aged 85 years in 2010) to establish predictors of successful ageing. The aim of this paper is to describe the health behaviours, health conditions and self-rated health of Māori and non-Māori in advanced age.

Methods

Background and study design—LiLACS NZ is a longitudinal study of advanced age in New Zealand.[12,13] The study began in 2010 using equal explanatory power sampling methodology as directed by Te Kūpenga Hauora Māori, University of Auckland. A comprehensive sampling strategy recruited 937 octogenarians living in Rotorua and the Bay of Plenty between March 2010 and April 2011. At baseline, the sample consisted of 421 Māori aged between 80 and 90 years (born in 1920-1930) and 516 non-Māori aged 85 years (born in 1925). The recruitment procedures and response rate have been reported, with the overall response rate being 57%.[12] In brief, complete population inception cohorts were attempted for all age-eligible older adults in the defined geographic boundaries of the Bay of Plenty District Health Board (DHB) and the Lakes DHB (excluding the Taupo region).

Participants were identified from the electoral rolls (general and Māori), primary care and tribal databases, word of mouth, advertising; whakawhanaugatanga (to establish good relations with people), whakapapa and kōrero (relationships to the earth and oral narrative about the relationships). Potential participants were approached by someone they knew (mainly their general practitioner).

Kaupapa Māori methods were used to ensure appropriate research methods with Māori.[12,14] The study was approved by the Northern X Regional Ethics Committee (NXT 09/09/088) in 2009. Written informed consent was obtained from all the participants.

A comprehensive questionnaire was developed for the study[15] and translated by Te Rōpū Kaitiaki o ngā tikanga Māori (The protectors of the principles of proper conduct in Māori research). The questionnaire was administered through a face-to-face interview by trained interviewers, and physical assessments were completed for those who consented to this part of the study, by research trained nurses. The general practitioners' records were audited by practice and research staff and administrative hospitalisation discharge diagnosis records were obtained by National Health Index matching from the Ministry of Health. A brief questionnaire consisting of core questions was administered for those who were unable to manage the comprehensive questionnaire. Details of the study protocol[13] and method used to ascertain the selected 19 chronic conditions[16] have been published previously.

Measures—Interviewer-administered questions yielded demographic information including education and main lifetime occupation of the participant or spouse. Occupation was coded using the "New Zealand Standard Classification of Occupations 1999".[17] The New Zealand Deprivation (NZ Dep) index, a measure of small area deprivation based on the participant's address, was used as an indication of socioeconomic deprivation and was obtained from the Ministry of Health[18].

Self-rated health was asked using the standard question: "In general, would you say your health is: excellent, very good, good, fair, poor"; and in a separate part of the questionnaire "In general, compared with other people your age, would you say your health is: excellent, very good, good, fair, poor". This measure is a robust predictor of hospitalization, disease exacerbation and mortality for older people.[19]

Driving status was established from the item on the Nottingham Extended Activities of Daily Living scale[20] "Do you drive a car?". Smoking status was ascertained by the questions "Do you currently smoke cigarettes?; Have you ever smoked?". Tobacco smoking was converted to pack-year history using standard methods. Alcohol use was asked using the first two items of the Alcohol Use Disorders Identification tool (AUDIT).[21] Use of denture was established by a direct question "Do you wear dentures?".

Nutrition risk was ascertained by the Seniors in the Community: Risk Evaluation for Eating and Nutrition (SCREEN II)[22] and a cut off score of <49 identified those at high nutrition risk as validated in this age group.[23] Hearing disability was asked using a modified question from the Cognitive Function and Ageing Studies[24] "How much does your hearing interfere with your day-to-day functioning?" Disability related to vision was asked using the question "Does your eyesight interfere with normal day-to-day functioning?" Pain was asked on a numerical scale of 0 (no pain) to 10 (worst pain), and dichotomized to no pain (0) or any pain (≥1).

Falls were assessed using the questions "How many times have you fallen in the last 12 months?" The response was dichotomized to 0 or ≥1. Urinary incontinence was asked with the question "Do you have a problem with losing control of urine when you don't want to?—and if so the severity was gauged with a 4-level Likert scale from "no problem" to "severe problem". The same question substituting "bowels" for "urine" was used to assess faecal incontinence.

The Geriatric Depression Scale (GDS)[25] was used for assessment of depressive symptoms, and the Modified Mini-Mental Status score (3MS)[26] expressed as both total score and the subscore for the mini-mental state examination (MMSE) were used to assess cognition. The score was adjusted for those with severe visual impairment who were unable to complete the visual parts and for those who were unable to write because of a limb disability. Physical activity was assessed using the Physical Activity Scale for the Elderly (PASE).[27]

Grip strength was assessed using a Takei digital handgrip dynamometer–Grip D, which was attempted three times in each hand in a standing position and the best performance by either hand was reported. Gait speed was assessed using the timed 3-metre walk according to the protocol in the Short Physical Performance Battery[28] and expressed in metres per second (m/s). Numbers of prescribed medications were ascertained by direct view of the pill bottles in the house and expressed as median number of medications (rather than pills per day).

The presence of chronic medical conditions was established from a combination of self-report, general practitioners' record review, and reviews of hospital discharge record.[16] In brief, cardiovascular diagnoses were asked in the interview as "Have you ever been told by a doctor that you have high blood pressure…", "…heart attack", "…angina stroke", "…transient ischemic attack or mini-stroke", "…congestive heart failure", "…intermittent claudication (pain in the calves when walking)", "…peripheral vascular disease". These were validated against the GP medical records and the hospital discharge records.

Atrial fibrillation (AF) was established from a 12-lead electrocardiogram (ECG) and the hospital discharge record. 'Any AF' is either of the two sources being positive and current AF represents the ECG showing AF. "Have you ever been told by a doctor that you had" "… osteoporosis" and "…arthritis, rheumatism or trouble with your joints" was asked and participants asked if it was osteoarthritis or rheumatoid arthritis.

Depression was asked "Have you ever been told by a doctor that you have had depression?" The remaining medical conditions were established using reviews of the GP and hospital medical records, with the exception of anaemia which was defined from full blood count, analysed the same day as the blood draw in a public laboratory using standardized procedure, as haemoglobin level <120 g/L for women and <130 g/L for men. Blood glucose was drawn as a fasting sample, frozen at -80ºC and then analysed in batches in a publically funded laboratory.

Number of chronic conditions was summed from the 19 possible diagnoses mentioned above and the participants' hospitalisations were counted as any overnight hospital admission in the 12 months before date of enrolment and was determined from the national administrative records on hospitalisation.

Statistical analysis—The sample size aimed for in the inception cohorts was based on an estimation of 20% mortality over two years. With a sample of 500 we have estimated 80% power to detect a relative risk of 1.67 related to a score of <15 in the functional measure using the Nottingham Extended Activity of Daily Living scale (NEADL). [20] Similarly 450 people was determined to be sufficient to detect a

relative risk of mortality of 1.6 related to a score of <50 using the nutrition screening tool SCREEN II. Two equal size Māori and non-Māori samples were attempted.[29]

Descriptive statistics are presented for all variables, frequency and percentages (%) of non-missing values for categorical data and mean (standard deviation, SD) for continuous variables with a normal distribution and median (25^{th}, 75^{th} percentile) for non-Gaussian distribution. For univariate analyses, parametric and non-parametric tests were used to determine the relationships with gender and ethnicity. Generalised linear models were used to examine the potential disparities in socioeconomic status and health behaviour between Māori and non-Māori.

Comparisons of medical conditions between men and women, Māori and non-Māori were adjusted for age, education, occupation and deprivation status (NZ Dep Index) using logistic or generalised linear regression (Poisson distribution) depending on the form of the outcome variable. Interaction between ethnicity and gender were examined by adding the interaction term [ethnicity*gender] in the regression models. Statistical analyses were performed with IBM SPSS version 19. A p-value of less than 0.05, two tailed test, was considered statistically significant.

Results

All the participants answered a core set of questions; 61% Māori (n=255) and 78% of non-Māori (n=403) completed the comprehensive interview.

In the Māori cohort of 421 participants, 176 (42%) were men and 245 (58%) women. The mean age at baseline was 82.8 (SD 2.8) years. Six-percent men and 11% of women had attained a tertiary education. More than half of the participants (60%) lived in areas of high deprivation (NZ Deprivation Index 8–10).

Table 1 shows the general health status of the Māori participants. More than half of this sample rated their health as good/very good/excellent and 59% were driving. About a third of the participants had a significant hearing impairment (31%), visual impairment (37%), had fallen in the past 12 months (34%), reported having experienced pain at the time of interview (36%) or had been admitted to hospital in the 12 months before study enrolment (40%). Three-quarters of the participants wore dentures, 49% were at high nutritional risk. The median number of prescribed medications was 5 (minimum 1, maximum 14).

Gender differences were noted in driving (more men were driving), smoking (more women never smoked and men had a greater pack year history), alcohol consumption (more men had alcohol on ≥2 occasions per week), cognitive function (more men had impairment), physical activity (men did more), grip strength (men were stronger) and hospital admission (more men were admitted to a hospital 12 months prior to study enrolment).

In the non-Māori cohort, 237 (46%) men and 279 (54%) women were recruited. A tertiary level of education was attained by 11% of women and 16% of men. Participants were spread about equally between low, medium and high deprivation areas.

Table 1. General health status of Māori participants

Variables	Total, n=421	Men, n=176	Women, n=245	P values
Education				
Primary	115 (28%)	56 (33%)	59 (25%)	
Secondary	237 (59%)	99 (58%)	138 (59%)	
Trade	17 (4%)	5 (3%)	12 (5%)	
Tertiary	37 (9%)	10 (6%)	27 (11%)	
Main occupation				
Legislators, administrators, professionals, agricultural and fishery workers	109 (26%)	47 (27%)	62 (25%)	0.480
Technicians, associate professionals and trades workers	45 (11%)	15 (9%)	30 (12%)	
Clerks, service workers, sales workers, plant/machine operators, assemblers, elementary workers	266 (63%)	114 (65%)	152 (62%)	
Deprivation, NZDep score				
1–4 (low)	60 (14%)	19 (11%)	41 (17%)	0.099
5–7 (medium)	109 (26%)	53 (30%)	56 (23%)	
8–10 (high)	251 (60%)	104 (59%)	147 (60%)	
Self-rated health, n (%)				
Excellent	15 (4%)	5 (3%)	10 (4%)	0.151
Very good	82 (20%)	43 (25%)	39 (16%)	
Good	151 (37%)	56 (32%)	95 (40%)	
Fair	129 (31%)	57 (33%)	72 (30%)	
Poor	35 (8%)	12 (7%)	23 (10%)	
Self-rated health compared to same age, n (%)				
Excellent	39 (15%)	17 (17%)	22 (14%)	0.636
Very good	101 (39%)	35 (34%)	66 (43%)	
Good	86 (33%)	37 (36%)	49 (32%)	
Fair	29 (11%)	12 (12%)	17 (11%)	
Poor	3 (1%)	2 (2%)	1 (1%)	
Driving, n (%)				
Currently	148 (59%)	73 (74%)	75 (49%	<0.01
Stop driving <12 months ago	7 (3%)	4 (4%)	3 (2%)	
Stop driving >12 months ago	67 (27%)	19 (19%)	48 (32%)	
Never drove	29 (12%)	3 (3%)	26 (17%)	
Smoking, n (%)				
Never	177 (43%)	57 (33%)	120 (51%)	<0.01
Past	188 (46%)	101 (59%)	87 (37%)	
Current	43 (11%)	14 (8%)	29 (12%)	
Pack year history, mean (SD)	9.3 (13.9)	11.5 (14.3)	7.9 (13.4)**	0.006
Alcohol, n (%)				
Monthly or less	61 (24%)	22 (22%)	39 (25%)	0.002
2–4 times Monthly	16 (6%)	6 (6%)	10 (7%)	
≥2 times/week	57 (23%)	35 (35%)	22 (14%)	
Dentures (upper, lower, full mouth, partial), n (%)	191 (76%)	69 (69%)	122 (79%)	0.177
At high nutrition risk [a], n (%)	126 (49%)	42 (42%)	84 (54%)	0.057
Hearing impairment [b], n (%)	128 (31%)	65 (38%)	63 (26%)	0.011
Visual impairment, n (%)	150 (37%)	63 (37%)	87 (36%)	0.927
Pain, n (%)	81 (36%)	25 (30%)	56 (40%)	0.123
Fall in the past 12 months (≥ once), n (%)	138 (34%)	56 (33%)	82 (35%)	0.645
Urinary incontinence, n (%)				
Mild problem	55 (22%)	16 (16%)	39 (26%)	
Moderate problem	19 (8%)	10 (10%)	9 (6%)	0.190
Severe problem	4 (2%)	1 (1%)	3 (2%)	
Bowel incontinence, n (%)	23 (9%)	9 (9%)	14 (9%)	0.935
Depressive symptomatology GDS≥8	7 (3%)	3 (3%)	4 (3%)	1.000
Depressive symptomatology GDS≥5	38 (15%)	15 (15%)	23 (15%)	0.989
Cognitive impairment, MMSE<24	40 (15%)	23 (21%)	17 (11%)	0.017
Physical activity (PASE score), median (25^{th}, 75^{th})	95 (51, 158)	113 (53, 194)	89 (50, 133)	0.013

Variables	Total, n=421	Men, n=176	Women, n=245	P values
Grip strength (kg), mean (SD)	24.4 (8.1)	30.8 (6.9)	19.8 (5.2)	<0.01
Gait speed (m/s), mean (SD)	0.7 (0.3)	0.7 (0.3)	0.7 (0.4)	0.444
Number of prescribed medications, median (min, max)	5 (0, 14)	4 (0, 14)	5 (0, 14)	0.548
Hospital admission 12 months prior	148 (40%)	76 (47%)	72 (34%)	0.009

P values from univariate analyses [a] Nutrition risk is defined as SCREEN II<49

[b] Those who reported "moderately", "very" or "Extremely" to the question "*How much does your hearing interfere with normal day-to-day functioning"*

GDS=Geriatric Depression Scale; MMSE=Modified Mini Mental State Examination; PASE=Physical Activity Scale for the Elderly; kg=kilogram; SD=standard deviation.

More than half of the non-Māori participants rated their health as very good to excellent and 73% were still driving a car (Table 2). About a quarter reported having experienced pain at the time of interview (26%) and 40% had fallen in the past 12 months. About half (47%) of this sample had alcohol at least twice a week, 38% were at high nutrition risk and 35% had been admitted to the hospital in the previous 12 months prior to enrolment to the study. Similar to the Māori sample, three quarters of non-Māori wore dentures and the median number of prescribed medications was 5 (minimum 1, maximum 18).

Gender differences were noted in driving (more men), smoking (more women reported never smoking and men had a higher pack year history), alcohol (more men took alcohol), high nutrition risk (more women), hearing impairment (more men), pain (more women), bowel incontinence (more women), physical activity (men were more active), grip strength (men were stronger) and gait speed (men were faster).

To examine potential disparities in socioeconomic status and health behaviour-related determinants of health, comparisons were made between Māori and non-Māori using generalised linear regression models after adjusting for age, education, occupation, and NZ Dep Index. The key findings were that:

- Educational status differed between ethnicities, more non-Māori achieved a tertiary education (68, 13%) than Māori 37 (9%), p<0.01;
- Occupational group status was higher for non-Māori, 109 (26%) of Māori and 200 (39%) of non-Māori were in the group of legislators, administrators, professionals, agriculture and fisheries workers, p<0.01;
- More Māori lived in areas of high deprivation, 251 (60%) of Māori vs. 179 (35%) of non-Māori p<0.01;
- Māori had a high pack year history of smoking, 9.3 (sd 13.9) for Māori vs. 6.6 (sd 10.6) for non-Māori, p<0.01;
- Māori drank alcohol less frequently, 57 (23%) Māori vs. 187 (47%) non-Māori took alcohol at least 2 times per week respectively p=0.01;
- Māori were not at a higher nutrition risk, 126 (49%) Māori vs. 153 (38%) non-Māori, p=0.73 when the differing proportions of each gender was taken into account;

- Māori were not more physically active, PASE score for Māori median 95 vs. 89 for non-Māori, p=0.29 when the differing proportions of each gender was taken into account.

Interactions between gender and ethnicity were noted for smoking and physical activity.

Table 2. General health status of non-Māori participants

Variables	Total n=516	Men n=237	Women n=279	P values
Education				
Primary	83 (16%)	44 (19%)	39 (14%)	0.710
Secondary	295 (58%)	125 (54%)	170 (62%)	
Trade	60 (12%)	26 (11%)	34 (13%)	
Tertiary	68 (13%)	38 (16%)	30 (11%)	
Main occupation				
Legislators, administrators, professionals, agricultural and fishery workers	200 (39%)	93 (39%)	107 (39%)	0.891
Technicians, associate professionals and trades workers	87 (17%)	38 (16%)	49 (18%)	
Clerks, service workers, sales workers, plant/machine operators, assemblers, elementary workers	228 (44%)	106 (45%)	122 (44%)	
Deprivation, NZDep score				
1–4 (low)	129 (25%)	60 (25%)	69 (25%)	0.691
5–7 (medium)	208 (40%)	91 (38%)	117 (42%)	
8–10 (high)	179 (35%)	86 (36%)	93 (33%)	
Self-rated health, n (%)				
Excellent	21 (4%)	13 (6%)	8 (3%)	0.144
Very good	96 (19%)	36 (15%)	60 (22%)	
Good	184 (36%)	93 (40%)	91 (33%)	
Fair	174 (34%)	76 (32%)	98 (36%)	
Poor	36 (7%)	17 (7%)	19 (7%)	
Self-rated health compared to same age, n (%)				
Excellent	70 (18%)	38 (20%)	32 (15%)	0.455
Very good	158 (40%)	73 (39%)	85 (40%)	
Good	111 (28%)	53 (28%)	58 (27%)	
Fair	49 (12%)	18 (10%)	31 (15%)	
Poor	9 (2%)	4 (2%)	5 (2%)	
Driving, n (%)				
Currently	287 (73%)	154 (82%)	133 (64)	<0.01
Stop driving <12 months ago	20 (5%)	10 (4%)	10 (5%)	
Stop driving >12 months ago	73 (18%)	23 (12%)	50 (24%)	
Never drove	16 (4%)	1 (1%)	15 (7%)	
Smoking, n (%)				
Never	263 (51%)	77 (33%)	186 (67%)	<0.01
Past	225 (44%)	144 (61%)	81 (29%)	
Current	24 (5%)	14 (6%)	10 (4%)	
Pack year history, mean (SD)	6.6 (10.6)	10.4 (12.0)	3.7 (8.3)	<0.01
Alcohol, n (%)				
Monthly or less	59 (15%)	13 (7%)	46 (22%)	<0.01
2–4 times Monthly	49 (12%)	22 (12%)	27 (13%)	
≥2 times/week	187 (47%)	120 (63%)	67 (32%)	
Dentures (upper, lower, full mouth, partial), n (%)	309 (77%)	139 (74%)	170 (81%)	0.114
At high nutrition risk[a]	153 (38%)	50 (27%)	103 (49%)	<0.01
Hearing impairment[b]**, n (%)**	133 (26%)	75 (32%)	58 (21%)	0.005
Visual impairment, n (%)	147 (29%)	65 (28%)	82 (30%)	0.594
Pain, n (%)	89 (26%)	29 (19%)	60 (32%)	0.011
Fall in the past 12 months (≥ once), n (%)	205 (40%)	90 (38%)	115 (42%)	0.459
Urinary incontinence, n (%)				

Variables	Total n=516	Men n=237	Women n=279	P values
Mild problem	72 (18%)	33 (18%)	39 (19%)	
Moderate problem	41 (10%)	14 (7%)	27 (13%)	0.279
Severe problem	21 (5%)	9 (5%)	12 (6%)	
Bowel incontinence, n (%)	42 (11%)	12 (6%)	30 (14%)	0.011
Depressive symptomatology GDS≥8	11 (3%)	8 (4%)	3 (2%)	0.089
Depressive symptomatology GDS≥5	42 (11%)	22 (12%)	20 (10%)	0.498
Cognitive impairment, MMSE<24	35 (9%)	20 (11%)	15 (7%)	0.200
Physical activity (PASE score), median (25^{th}, 75^{th})	89 (50, 140)	107 (58, 170)	77 (34, 120)	<0.01
Grip strength (kg), mean (SD)	24.2 (8.0)	30.3 (6.2)	18.5 (4.6)	<0.01
Gait speed (m/s), mean (SD)	0.8 (0.3)	0.9 (0.3)	0.8 (0.3)	<0.01
Number of prescribed medications, median (min, max)	5 (0, 18)	4 (0, 16)	5 (0, 18)	0.286
Hospital admission 12 months prior	173 (35%)	84 (36%)	89 (34%)	0.564

P values from univariate analyses [a] Nutrition risk is defined as SCREEN II<49

[b] Those who reported "moderately", "very" or "Extremely" to the question "*How much does your hearing interfere with normal day-to-day functioning"*

GDS=Geriatric Depression Scale; MMSE=Modified Mini Mental State Examination; PASE=Physical Activity Scale for the Elderly; kg=kilogram; SD=standard deviation.

Table 3 shows the prevalence of common chronic medical conditions in Maori and non-Māori. Hypertension was the most common condition. When cases of hypertension were limited to those identified only from the medical records, 72% of Māori and 66% of non-Māori had hypertension. Cardiovascular disease was present in 66-68% of all participants. The next most prevalent conditions observed in the sample were eye disease (49% in Māori and 66% in non-Māori and then coronary artery disease (Māori 46%, non-Māori 42%).

Congestive heart failure, atrial fibrillation, diabetes, asthma or chronic lung disease and dementia were more prevalent in Māori men, whereas eye disease, osteoarthritis and cancer were more prevalent in non-Māori men. Diabetes was also more prevalent in Māori women than non-Māori women and eye disease, osteoarthritis and cancer were more prevalent in non-Māori women than Māori women. In women, we observed a higher proportion of rheumatoid arthritis in Māori and thyroid disease in non-Māori.

Differences by gender were noted with more women having hypertension, cerebrovascular accidents, eye disease, arthritis, osteoporosis and thyroid disease, whereas men were more likely to have coronary artery disease, peripheral vascular disease, atrial fibrillation, anaemia, cancer and Parkinson disease. Overall participants had a median of 5 conditions and 19 participants had none of the identified conditions.

Ethnic disparities in medical conditions were present with Māori being more likely to have congestive heart failure, atrial fibrillation, asthma/chronic lung disease, diabetes, rheumatoid arthritis and dementia. Non-Māori were more likely to have eye disease, osteoarthritis, cancer and thyroid disease.

Table 3. Medical conditions and hospitalisations in Māori and non-Māori in LiLACS NZ

Variables	Men		Women		OR (95% CI)[§] Gender (Ref: Men)	OR (95% CI)[§†] Ethnicity (Ref: Māori)
	Māori	Non-Maori	Māori	Non-Maori		
Hypertension	138 (78%)	188 (79%)	215 (88%)	238 (85%)	**1.88 (1.31–2.71)**	0.82 (0.54–1.25)
Any clinical evident CVD	119 (68%)	158 (67%)	160 (66%)	169 (61%)	0.87 (0.66–1.14)	0.87 (0.62–1.20)
Coronary artery disease	88 (50%)	110 (46%)	105 (43%)	106 (38%)	**0.73 (0.56–0.96)**	0.83 (0.61–1.14)
Congestive heart failure	63 (36%)	48 (20%)**	65 (27%)	60 (22%)	0.82 (0.61–1.12)	**0.58 (0.41–0.82)**
Cerebrovascular accident	34 (19%)	57 (24%)	66 (27%)	79 (28%)	**1.41 (1.04–1.92)**	1.23 (0.86–1.76)
Peripheral vascular disease	30 (17%)	41 (17%)	35 (15%)	27 (10%)	**0.67 (0.46–0.98)**	0.96 (0.52–1.49)
Any AF	58 (35%)	51 (22%)**	62 (27%)	54 (20%)	0.80 (0.59–1.09)	**0.62 (0.43–0.89)**
AF on ECG	28 (27%)	27 (15%)*	23 (16%)	21 (11%)	**0.61 (0.39–0.94)**	**0.56 (0.32–0.96)**
Eye disease	70 (41%)	151 (65%)**	132 (55%)	186 (68%)**	**1.52 (1.14–2.02)**	**1.62 (1.17–2.25)**
Asthma or chronic lung disease	62 (36%)	57 (24%)**	78 (34%)	77 (29%)	1.29 (0.95–1.76)[§§]	**0.64 (0.45–0.89)**[§§†]
Type II diabetes	49 (28%)	40 (17%)**	73 (31%)	41 (15%)**	1.04 (0.75–1.45)	**0.53 (0.36–0.78)**
Blood glucose ≥7.0 mmol/L	12 (13%)	7 (4%)*	15 (13%)	10 (6%)*	1.11 (0.59–2.10)	**0.37 (0.17–0.82)**
Any arthritis	50 (30%)	93 (40%)*	96 (43%)	124 (46%)	**1.49 (1.12–1.97)**	1.29 (0.93–1.79)
Osteoarthritis	38 (23%)	85 (36%)**	75 (33%)	115 (43%)*	**1.44 (1.08–1.92)**	**1.63 (1.16–2.29)**
Rheumatoid arthritis	22 (13%)	21 (9%)	50 (22%)	31 (12%)**	**1.62 (1.07–2.43)**	**0.59 (0.37–0.93)**
Depression	38 (22%)	54 (23%)	71 (30%)	71 (26%)	1.34 (0.98–1.83)	1.19 (0.82–1.71)
Anaemia	30 (33%)	50 (28%)	15 (13%)	25 (14%)	**0.36 (0.23–0.56)**	0.84 (0.49–1.44)
Cancer	36 (21%)	129 (55%)**	41 (18%)	110 (41%)**	**0.60 (0.45–0.89)**	**3.64 (2.52–5.26)**
Skin cancer	13 (8%)	92 (39%)**	16 (7%)	83 (31%)**	**0.68 (0.48–0.95)**	**6.21 (3.82–10.11)**
Melanoma	2 (1%)	18 (8%)**	1 (0.4%)	13 (5%)**	0.50 (0.24–1.03)	**9.46 (2.23–40.18)**
Non–skin cancer	26 (15%)	52 (22%)**	33 (15%)	39 (14%)**	**0.68 (0.47–0.97)**	**1.56 (0.97–2.48)**
Osteoporosis	11 (6%)	17 (7%)	53 (23%)	89 (33%)*	**5.37 (3.48–8.31)**	1.33 (0.87–2.03)
Dementia [a]	31 (18%)	22 (9%)**	33 (15%)	25 (9%)	0.97 (0.63–1.49)	**0.59 (0.37–0.95)**

Variables	Men		Women		OR (95% CI)[§] Gender (Ref: Men)	OR (95% CI)[§†] Ethnicity (Ref: Māori)
	Māori	Non-Maori	Māori	Non-Maori		
Renal impairment [b]	1 (1%)	2 (1%)	3 (3%)	2 (1%)	1.61 (0.37–6.99)	2.10 (0.39–1.30)
Parkinson disease	2 (1%)	9 (4%)	0 (0%)	3 (1%)	**0.15 (0.03–0.69)**	4.02 (0.53–30.62)
Thyroid disease	5 (3%)	7 (3%)	10 (4%)	31 (12%)**	**3.01 (1.55–5.86)**	**2.14 (1.03–4.44)**
Chronic conditions, median (min, max)	5 (0, 13)	5 (0, 12)	5 (0, 12)	5 (0, 12)	0.04 (-0.02–0.10)	0.02 (-0.05–0.09)

Chi-squared test *p<0.05, **p <0.01,

CVD: cardiovascular disease, AF: atrial fibrillation, ECG: electrocardiogram, min: minimum, max: maximum.

[a] Dementia from the GP record, NZHIS and adjusted 3MS for vision impairment <75.

[b] Renal impairment from estimated glomerular filtration rate <30 mL/min/1.73 m^2.

We found no interaction between ethnicity and gender; interaction term [ethnicity*gender] with all outcome measures p>0.05.

[§]Controlled for ethnicity, age, education, occupation, and NZ Dep Index using regression techniques.

[§†]Controlled for gender, age, education, occupation, and NZ Dep Index using regression techniques.

[§§] Controlled for ethnicity, age, education, occupation, and NZ Dep Index, smoking status using regression techniques.

[§§†] Controlled for gender, age, education, occupation, and NZ Dep Index, smoking status using regression techniques.

Discussion

The main findings are that both Māori and non-Māori have high self-rated health but health behaviours and health conditions differ by ethnicity and gender.

One in five Māori and non-Māori reported "very good/excellent" for the general self-rated health question and more than half reported "very good/excellent" for health considering your own health compared with others your own age. This is better than the Newcastle 85+[10] where 11% of their sample rated their health as "excellent" compared with others the same age.

Self-rated health is a very salient health outcomes[19] and generally declines with age,[34] however when compared with "others your age", very old people tend to rate themselves better than their peers,[30] and view of one's own health tend to be stable over time.[30] The impact of each accumulated disease on self-rated health tends to be less incremental in those in advanced age compare with the younger old,[31] thus reaching advanced age may mean well-being, as reflected in self-related health, is relatively robust despite multiple morbidities. However, careful comparison of outcomes over time is needed to confirm this and the differences may be due to sampling bias.

Health behaviours—In this study, smoking was more common over the life-course for Māori than non-Māori, and there was a corresponding disparity in respiratory disease. Potentially marked differences in outcomes from respiratory disease observed in other studies[32] were also observed in our study.

Older people are at particular risk from poor nutrition,[33] and this risk may increase with advanced age. In our sample, two-fifths were at risk of undernutrition. The ability to drive plays a role in accessibility to a variety of foods, particularly in rural areas. Our results suggest most Māori and non-Māori in advanced age continue to drive, probably reflecting the regionalisation of the NZ population and our sampling frame which included large areas with no public transport, thus the need to drive to maintain independence.[34] In the univariate analyses, we observed fewer Māori continue to drive and more of them were at high nutrition risk. Factors related to nutrition risk will be examined further.

All people over age 85 years are at increased CVD risk.[35] Our study found that Māori were undertaking more physical activity than non-Māori and also drink less alcohol. Both of these health behaviours should protect them from ongoing cardiovascular events. The ongoing observation of cardiovascular events will allow estimation of the contribution of health behaviours to CVD risk in this age group.

Physical function and health conditions—In LiLACS NZ, both Māori and non-Māori have a higher grip strength compared with international studies; we found 30.8 kg for Māori men and 30.3 kg for non-Māori men compared with 27.5 kg for men; and 19.8 kg for Māori women and 18.5 kg for non-Māori women compared with 16.0 kg for women ascertained in a systematic review of the 85 year olds.[36] Gait speeds observed in our study are modest. A gait speed of less than 0.8 m/s is considered to highlight significant risk from poor health outcomes[37] and the mean for Māori was below this speed and for non-Māori it is about the same.

Falls were prevalent with 34% of Māori and 40% of non-Māori falling in the prior year. This is similar to the Newcastle 85+ study where 38% fell. This is higher than the expected 30% predicted for people aged 65+. Our findings suggest that those in advanced age are at increased risk from poor health outcomes thus impacting overall function.

More than four-fifths of the sample was found to have hypertension. This is higher than observed in the Leiden 85+ and Newcastle 85+ (58%) studies.[10] There were different definitions and methods used in these studies and the definition of hypertension has changed over the last two decades. When we used similar definitions from the Leiden 85+ and Newcastle 85+ studies, the prevalence of hypertension in LiLACS NZ was still higher (79% in Māori; 70% in non-Māori). The optimal SBP for older group beyond 85 years of age is yet to be determined.[38] In the Umea 85+ study, lower SBP was found to be associated with risk of mortality.[39] In a subsample of the Leiden 85+ study it was found that a low SBP was associated with low cardiac output meaning impaired cardiac performance.[40] The health outcomes related to the level of hypertension (systolic BP 140mmhg vs. 160mmHg) will be examined longitudinally.

One in five of the LiLACS NZ participants were anaemic; twice as prevalent in men as in women. In adults aged 65+ living in the community, the prevalence of anaemia is 14% to 15% and increases to about 20%-25% in those aged 85 and above.[41] The Leiden 85+ study findings suggest that the excess anaemia in men was in part due to folate deficiency.[42]

We seek to examine cardiac size and function in these cohorts. The differences between Māori and non-Māori in congestive heart failure and potentially atrial fibrillation means that examination of the left ventricular function and the atrial size and function[43] are critical to informing clinical management of cardiac diagnoses and symptoms in advanced age. The Newcastle 85+ echocardiographic study showed that there was a high prevalence of undiagnosed cardiac abnormalities[44] and without detailed examination and follow up the significance of these findings is unknown.

Gender and ethnic disparities—For both health behaviours and health conditions, there were differences between genders and ethnicity. For both Māori and non-Māori, more men than women reported that they had smoked, drank alcohol more frequently but had higher physical activity. The risk of under nutrition was more prevalent in non-Māori women than men.

This study shows persistent differences between Māori and non-Māori for diabetes and congestive heart failure which are not only statistically but might be clinically significant. Diabetes is an important predictor of early mortality even in old age[45] and differences are noted at all ages in New Zealand.[4]

Our study suggests that attention to diabetes will continue to be important for Māori throughout the life-course. There were greater prevalence of atrial fibrillation and congestive heart failure for Māori. Atrial fibrillation in this age group can be a significant contributor to congestive heart failure.

New Zealand research suggests a higher prevalence of CVD has been observed for Māori younger than 80 years old, [7] contrasting with our finding of equal prevalence in CVD. It is possible that the marked differences in CVD and CVD outcome observed

between Māori and non-Māori of middle age[7] may attenuate in advanced age, but further follow up and more studies are needed to be certain.

We found rheumatoid arthritis to be more common among Māori and osteoarthritis to be more common among non-Māori with the highest prevalence of any arthritis to be 43% among non-Māori women. The morbidity associated with arthritis is well described but is less than the prevalence of 69% for women and 58% for men in the Newcastle 85+ study.[46] Occupational, activity and dietary patterns between Newcastle UK and New Zealand may differ in part potentially explaining this difference.

The differences in prevalence of conditions underline the need for an individualised approach to health management with differing emphases for men and women, Māori and non-Māori in older age groups.

It is known that poorer health outcomes are associated with social and economic deprivation.[47] Lower education, occupational status and neighbourhood deprivation for Māori underline the impact of colonization and unfair opportunities for this age group over the last decades. This cohort of octogenarians Māori had documented limited access to health services as they grew up and has had a lifetime of inequalities in health services access, delivery and outcomes. [48] Although the 1938 Social Security Act enabled access to publicly funded health care for Māori, this cohort was already in their teens by then. If these inequalities had been addressed earlier in life, health disparities now may not have been as marked. Overall disparities for Māori observed here may reflect the life-course of Māori and we acknowledge the legacy of a life time of disparities. The ongoing observations of LiLACS NZ will seek to quantify the impact of disparities on health outcomes.

Limitations—This study is limited by the response rate of less than 60%. However, the age distributions for Māori and gender distribution for Māori and non-Māori who participated are the same as the underlying target populations.[12] Generalisation of the health patterns observed here may not be appropriate outside the Bay of Plenty region for Māori. There is a diversity of tribal identification by Māori participants in the study demonstrating that they have wide whakapapa (genealogical connections) across the country. Diagnostic accuracy may be in doubt for some diagnoses as self-report may be influenced by other socioeconomic and health factors in advanced age.[16]

Future work is planned to focus on the outcomes related to these patterns of health behaviours and chronic conditions. CVD risk and outcomes over time will be a main focus as little is known about the utility of aggressive or conservative treatment in this age group. The prevalence of hypertension is such that most of the participants receiving some CVD medications and management patterns and outcomes over time will be examined.

Conclusion

Differences in socioeconomic status and chronic condition patterns are observed for Māori, compared with non-Māori in advanced age. Self-rated health is high for Māori and non-Māori, especially considering comorbidities and lower socioeconomic status for Māori suggesting resilience in ageing and positive health behaviours are common.

The significance of health behaviours and pattern of health conditions will be examined longitudinally.

Competing interests: Nil.

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Acknowledgements: We acknowledge the expertise of the Western Bay of Plenty Primary Health Organisation, Ngā Matāpuna Oranga Kaupapa Māori Primary Health Organisation, Te Korowai Aroha Trust, Te Rūnanga o Ngati Pikiao, Rotorua Area Primary Health Services, Ngati Awa Research & Archives Trust, Te Rūnanga o Ngati Irapuaia and Te Whanau a Apanui Community Health Centre in conducting the study through the Bay of Plenty and Rotorua areas. We thank all participants and their Whānau for participation, and the local organisations that promoted the study.

We thank the Rōpu Kaitiaki: Hone and Florence Kameta, Betty McPherson, Paea Smith, Leiana Reynolds and Waiora Port for their guidance.

Funding for this study was from a programme grant from the Health Research Council of New Zealand, a project grant from Ngā Pae o te Māramatanga and Heart

Foundation. The Rotorua Energy Charitable Trust supported meetings and activities in Rotorua. The Ministry of Health provides funds for ongoing data collection and we acknowledge their support for manuscript preparation.

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This article was corrected on 30 January 2015 as outlined in the Erratum published the same day at

http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2015/vol-128-no-1408/6427