The University of Auckland

Intervals of care need: need for care and support in advanced age

LiLACS NZ

LILACS NZ

THE UNIVERSITY OF
AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

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The report was commissioned by the Māori Business Unit of the Ministry of Health and produced in the School of Population Health, Faculty of Medical and Health Sciences, University of Auckland.

Members of the LiLACS NZ data collection team include academic staff, Māori advisors, community partners and data specialists. These people, as well as the funders of the LiLACS NZ data collection, can be found on the LiLACS NZ webpages https://www.fmhs.auckland.ac.nz/en/faculty/lilacs.html

We acknowledge the enormous contribution of the participants and their whānau, community organisations engaged in collecting the data and the prior funding for data collection from the Health Research Council of New Zealand.

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Introduction

Te Puāwaitanga O Ngā Tapuwae Kia Ora Tonu: Life and Living in Advanced Age, a Cohort Study in New Zealand, otherwise known as LiLACS NZ, is a longitudinal cohort study of New Zealanders living in advanced age.

All Māori aged 80 to 90 years and all non-Māori aged 85 years within the Bay of Plenty District Health Board (DHB) and Lakes DHB areas (excluding the Taupō area) were identified and invited to participate in a detailed interview and physical assessment, and to give a blood sample.[1] Those who agreed to participate (421 Māori and 516 non-Māori) constituted the two inception cohorts of LiLACS NZ, and were first interviewed in 2010.[2]

A particular strength of LiLACS NZ as a longitudinal study is its high number of Māori participants. The study design and recruitment strategies have resulted in nearly equal numbers in the Māori and non-Māori cohorts, allowing for meaningful comparisons between the two groups. The LiLACS NZ study is the first longitudinal study in the world of an indigenous population in advanced age.

Previous reports

The Ministry has already commissioned a number of short reports from LiLACS NZ, which have been published on https://www.fmhs.auckland.ac.nz/en/faculty/lilacs.html. The reports cover oral health, alcohol use, falls, medication use and perceptions of GP care, hospital visits, income, relationships and emotional support, independence in daily activities, primary care, participation in Māori society and extra help in daily activities.

Academic publications by the LiLACS NZ team are also available on https://www.fmhs.auckland.ac.nz/en/faculty/lilacs.html. These include study protocols, engagement and recruitment of the cohort, details of the cohort study overall[1–3] and publications reporting early findings from LiLACS NZ.[4, 5] An increasing number of academic publications use LiLACS NZ data and many of these are listed on the same webpage.

How this report came about

This report is part of a series of reports commissioned by the Ministry of Health in order to communicate findings from LiLACS NZ to the appropriate Ministers and policy and planning teams across the health sector. LiLACS NZ information and analysis should underpin policy and service delivery to people of advanced age, their carers, health practitioners and health planners. This will, in turn, lead to improved health outcomes for Māori and non-Māori in advanced age. However, its usage is not limited to the Ministry and DHBs; it may inform policy across a number of public policy areas including local government and ACC, and it may be of interest to other groups working with older people, the general public, whānau and family members and older people themselves.

Support and assistance for older people

The needs of older people for care and assistance can be measured in several ways. The most common way is as a scale of activities of daily living (ADL), required for basic personal care, toileting, eating, getting out of bed and dressing; and instrumental or more demanding activities of daily living (IADL), such as shopping, cooking, transport outside the home and clothes washing that are needed to maintain independent living. ADL and IADL measures then provide a framework for adding up the number of deficits in each area. This approach is useful when thinking about what type of care older people may require but does not reflect the frequency of their need for care.

An alternative framework was suggested by Isaacs and Neville[6] and focuses on the intensity or frequency of support that older people require for independent living. Frequency of support was applied at the daily or weekly interval. Older people were categorised based on the interval of need for care, rather than the number of ADLs they found difficult. Thus, a '*critical* interval of care need' refers to assistance required from another person 'more than daily'; a '*short* interval of care need' refers to assistance required on a 'daily' basis; and a '*long* interval of care need' refers to assistance required 'weekly'. Jagger established the intervals of care need of the Newcastle 85+ study[7] and then used the proportions of people in each interval to project forward needs for care. She used population projections and estimated that the need for daily care would increase by up to 75 percent by 2026 if the prevalence of intervals of care needs remained the same.[7]

This report makes no comment on the delivery mechanism for that care, such as formal or informal care, but reports the frequency with which care is needed.

Research aims

Aim 1. To establish needs for care in terms of intervals of care need in Māori and non-Māori.

Aim 2. To estimate future care needs for the New Zealand (NZ) population aged 80+.

Aim 3. To estimate the potential impact of interventions and trends in ageing on projections of care needs for the NZ population of older people.

Aim 4. To establish the intervals of care need for Māori and non-Māori with cardiovascular disease and diabetes mellitus.

This report uses the Isaacs and Neville framework for examining the interval of time that care may be needed, that is, the 'interval of care need'. We estimated the current intervals of care need in the LiLACS NZ population according to criteria set by Isaacs and Neville and operationalised by the data gathered as part of LiLACS NZ interviews. A combination of criteria relating to dementia, and dependency in IADLs and ADLs, was used. Intervals of care need were then examined according to residential care status and receipt of formal support services, home help inside and outside the house, personal care and meal support. LiLACS NZ levels of support are mapped onto the NZ population projections to 2026 to estimate the potential 10-year change in the number of people at similar intervals of care need. The process is repeated to investigate the intervals of care need associated with two common diagnoses and the prevalence of these diagnoses is also mapped forward onto the NZ population.

Sources of data

The main source of data is the core questionnaire administered to the two LiLACS NZ cohorts in Wave 1 of data collection and completed by all participants. Additional data sources are from Statistics New Zealand population projections and the Ministry of Health for verification of diagnoses.

Table 1 details the key sources of data used in this report, and the number of Māori and non-Māori in the dataset.

Table 1: Key sources of data for health and care indicators

Source	Data	Duration	Numbers
LiLACS NZ	LiLACS NZ core questionnaire: health/diagnoses, functional status	Wave 1, 2010	421 Māori aged 80–90 years in 2010, 516 non-Māori aged 85 years in 2010 completed the core questionnaire.
Ministry of Health	National Minimum Dataset of hospital records for diagnosis of CVD* and DM*	Wave 1, 2010	379 Māori and 498 non-Māori gave consent to access Ministry of Health data.
Statistics New Zealand	Population projections	2011	Population projections used to estimate forward.

* CVD = cardiovascular disease; DM = diabetes mellitus

Methodological approach

Current intervals of care need in the LiLACS NZ population were established from information in the Wave 1 core questionnaire. While all participants completed the core questionnaire, some did not complete all questions, for example 923 answered the first question (Appendix 3, Appendix Table 1). Isaacs and Neville defined a critical interval of need as applying to those with severe dementia and/or very low functional status. Information on cognition was not included in the core questionnaire. Of those with diagnoses of severe dementia in our dataset, where a full cognitive assessment had been completed, there were six cases that were not categorised as at a critical interval of care need; thus, it is possible that we underestimated the critical level in the wider sample. Short and long intervals of care need were assigned based on the frequency of assistance (daily or weekly) with ADLs and IADLs, as reported by participants.

LiLACS NZ may have not completely captured everybody in the age criteria living in residential care,[2] thus the number of people at critical interval level of care need may be underestimated. However, living in residential care and the receipt of formal support services were reported in the core questionnaire, enabling capture of the whole LiLACS NZ sample. Diagnoses of CVD and DM were made using algorithms based on electrocardiogram (ECG), self-report, Ministry of Health data, blood test and GP record review data.[8] Further detail is in Appendix 1.

The LiLACS NZ Māori sample is broadly representative with regard to gender and age of the population of the study region and of NZ overall,[2] apart from a higher proportion of men in LiLACS NZ than in the underlying population.

All participants reported information about their ADLs and whether they completed these independently or with help. In this study, the ‘interval of care need’ was determined by the times per day or per week that help with ADLs was needed and/or received from informal or formal (paid care) sources. Categorisation of intervals as ‘critical’, ‘short’ and ‘long’ was made according to the estimated time required for the types of care individuals said they received and based on the criteria from Isaacs and Neville.

The proportion of the LiLACS NZ sample coded to each of the three categories of need, and an ‘independent’ category, was used to extrapolate the NZ population need for those aged 80+ years forward to 2026. It is possible that LiLACS NZ underestimates the baseline level of need due to selection bias, where those who are more able participate in the research. As such, an extrapolation of the levels of need will amplify an underestimation. Just as likely, it is possible that intervals of care need may change over time due to population level changes in levels of ability, or health service related changes in health promotion activities, in which case the projections will overestimate care level needs.

To apply these proportions to the projected population of NZ, the Māori sample was adjusted for age (Māori who were aged 80 to 90 years) and gender, and the non-Māori sample was adjusted for gender alone (non-Māori who were aged 84 to 85 years), and applied to the population projections available in 2011 for the 80+ population of NZ.

These projections assume that the future proportions of the NZ 80+ population with each interval of care need will be the same as the current LiLACS NZ sample. The projections are appropriate as 85 is the approximate average age of the population of NZ who are aged 80 years and over for every year through to 2026 for non-Māori men (mean age 84.3 in 2010 to 84.8 in 2026) and women (mean age 84.3 in 2010 to 84.7 in 2026). For Māori, an age-adjusted projection was constructed based on the LiLACS NZ data for those aged 80–81, 82–84 and 85+. The calculations were made separately for Māori and non-Māori due to the differing population age structure. As mentioned above, there is potential for this process to underestimate future need if we have under-sampled people with more disability, or alternatively overestimate future needs if the characteristics of the population change in the interim.

The same methods were used to map the numbers and proportions of participants in LiLACS NZ with CVD or DM onto the future projections as were used with the intervals of care need. Cross-tabulations and chi-square tests established the relationship between diagnostic category and intervals of care need.

A literature review identified the relevant population-level information about trends in changing levels of disability over time and evidence-based strategies to reduce disability, including their potential effectiveness in advanced age. These trends and strategies were used to estimate potential changes in population proportions qualitatively. Descriptive statistics are used throughout the report.

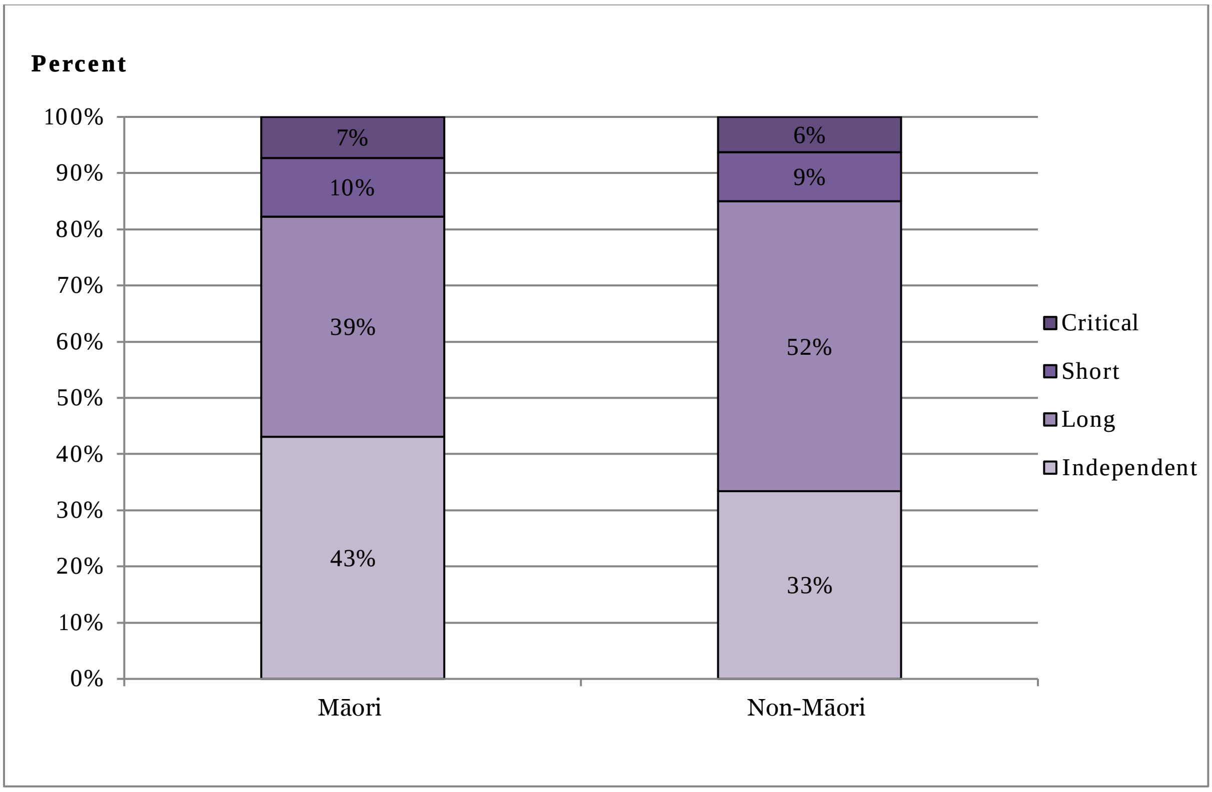
Findings

Key finding: Seventeen percent of Māori and 15 percent of non-Māori in advanced age need at least daily assistance

Seven percent of Māori and non-Māori needed assistance several times a day with toileting and feeding. This is called a **critical interval of care need**. These participants also needed daily help with personal care and weekly help with household duties. This group is mutually exclusive of lesser intervals of care need, such that those who need assistance less often are categorised as having a short or long interval of care need.

Figure 1 shows the proportions of Māori and non-Māori with each interval of care need, as well as those who were independent in terms of need for care.

Figure 1: Intervals of care need for Māori and non-Māori in advanced age



Source: LiLACS NZ
Note: Percentage of LiLACS NZ participants coded to each category. ‘Critical’ (assistance needed on a 24 hour basis or several times a day), ‘Short’ (daily assistance needed), ‘Long’ (assistance expected to be needed weekly), and ‘Independent’ (those not requiring any assistance on a weekly basis).

Ten percent of Māori and nine percent of non-Māori needed some sort of daily help with getting in and out of bed, brushing their hair and teeth and making hot drinks and carrying them to another room. This is called a **short interval of care need** and is mutually exclusive of both critical need (more often) and long interval need (less often).

Thirty-nine percent of Māori and 52 percent of non-Māori reported a need for help weekly for shopping, clothes washing and housework. This is called a **long interval of care need**.

A large proportion of both cohorts, 43 percent of Māori and 33 percent of non-Māori, were **independent** and needed no regular assistance or less than weekly assistance.

The level of housework assistance accessed by Māori and non-Māori differed, with fewer Māori accessing housework assistance. This potential differential in access was considered as a sensitivity analysis. Disregarding help needed with housework, similar proportions of Māori (42%) and non-Māori (46%) received care at least weekly (Appendix 3, Table 2).

Key finding: Overall, Māori with critical and short intervals of care need are significantly less likely to be living in residential care than non-Māori

Overall, Māori with ‘critical’ and ‘short’ intervals of care need were *significantly less likely* to be living in residential care than non-Māori with the same interval of care need. This was offset by Māori at these levels receiving support services and care from people living in the same home with them.

For Māori, less than half (36% of women, 50% of men) of those with a ‘critical’ interval of care need were living in residential care. In contrast, three-quarters (76%) of non-Māori men and women with this level of need lived in residential care. This is a *significant difference* in the pattern of need and living arrangement between Māori and non-Māori.

One-third (33%) of Māori with a ‘short’ interval of care need lived in residential care, compared with 51 percent of non-Māori.

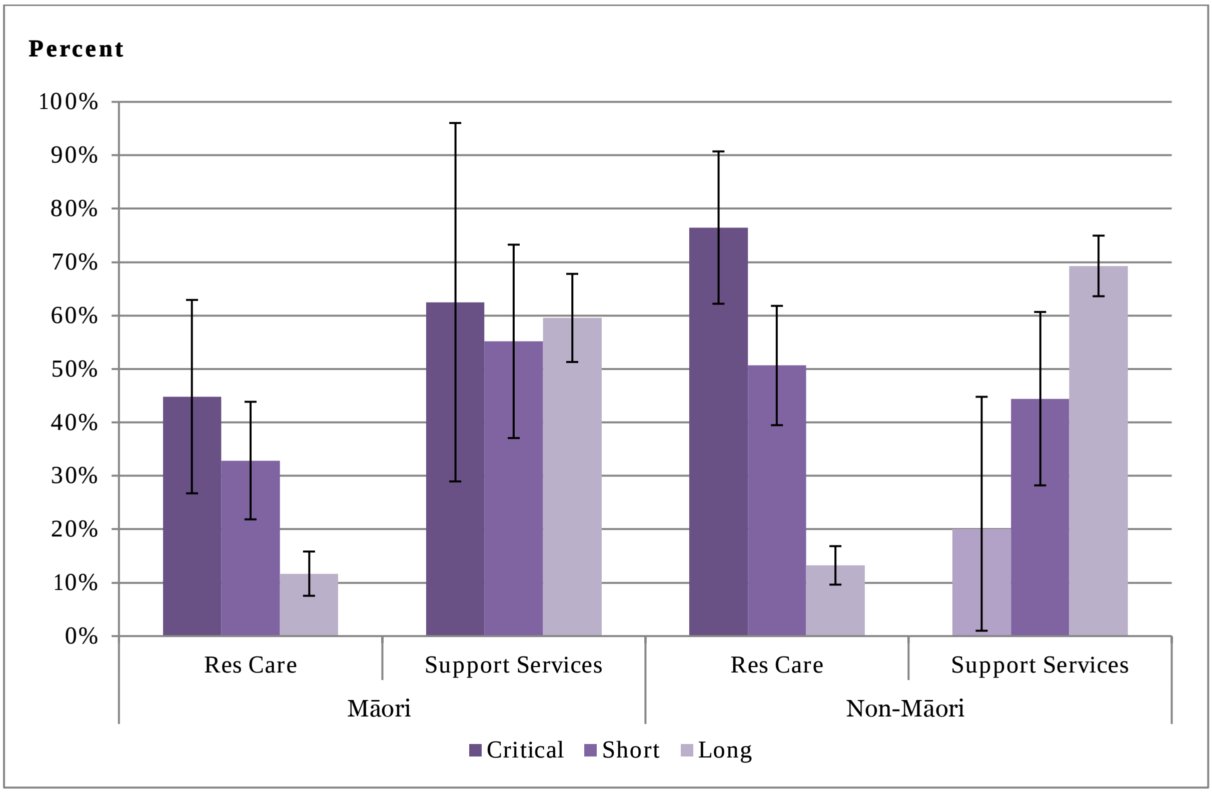
Fifty-five percent of Māori with a ‘short’ interval of care need received support services (ie, home help or personal care), whereas 44 percent of non-Māori with a ‘short’ interval of care need received support services.

The remaining 12 percent of Māori with a ‘short’ interval of care need were neither living in residential care nor receiving support services. For non-Māori, 5 percent of those with a ‘short’ interval of care need were receiving neither residential care nor support services.

Women with a ‘long’ interval of care need were *significantly more likely* to be receiving support services than men; 47 percent of Māori men and 62 percent of non-Māori men received support services, compared with 71 percent of Māori women and 76 percent of non-Māori women. Women were less often currently married, thus were less likely to have a spouse to provide informal support.

Twelve percent of Māori and 13 percent of non-Māori with a ‘long’ interval of care need lived in residential care (Figure 2, Appendix Table 2).

Figure 2: Proportion of LiLACS NZ participants with each interval of care need and their receipt of support services and residential care



Source: LiLACS NZ
Note: *Res Care - living in residential care at the time of the baseline interview

Key finding: Using NZ population projections, large increases in the need for daily and weekly care are expected by 2026

Māori

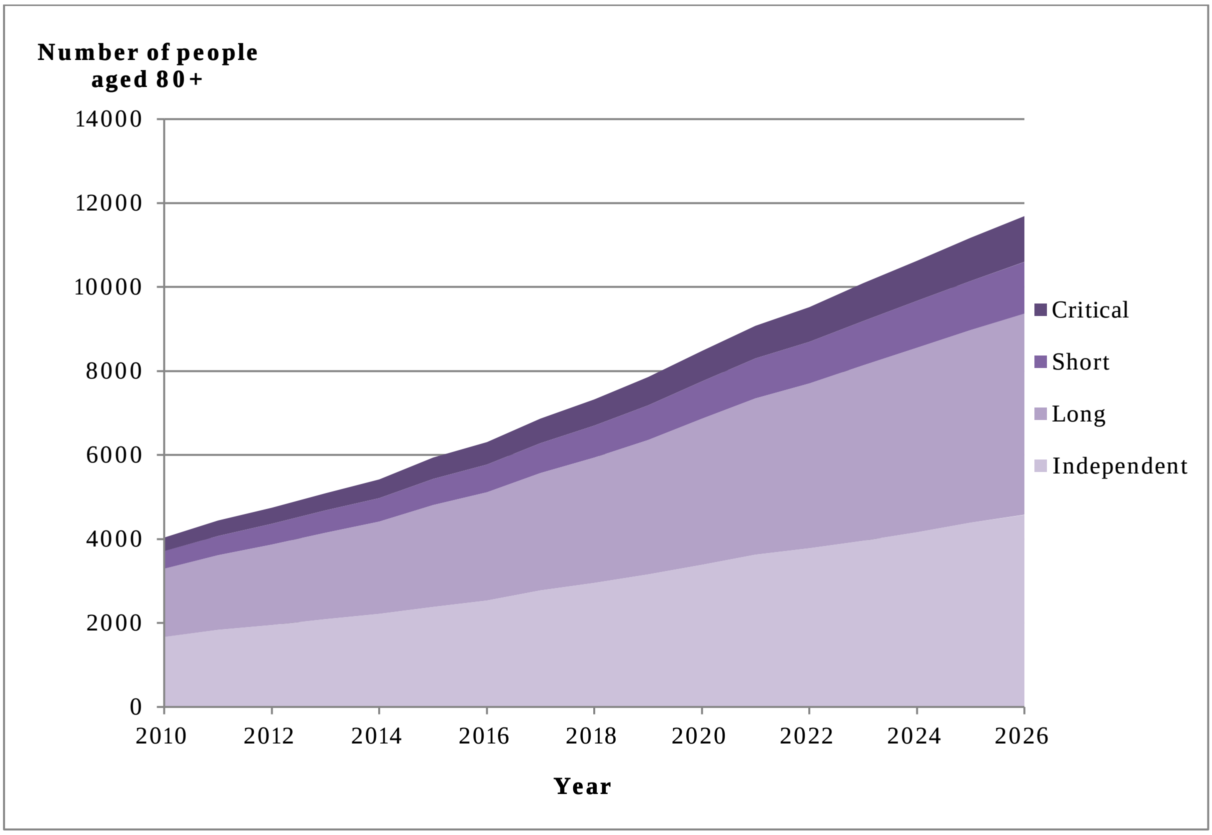
In 2010 the NZ Māori population aged 80+ comprised just under 4,000 people. By 2026, the Māori population aged 80+ is projected to increase by 190 percent, to just under 12,000 people. The proportions of the LiLACS NZ sample with each interval of care need were extrapolated onto the estimated population groups for the NZ Māori population aged 80+. This extrapolation was adjusted for gender and age differences in the population.

Using the current LiLACS NZ proportion of people who were independent, we found that the number of Māori aged 80+ who are likely to be independent in 2026 will increase by 174 percent from 2010 figures, corresponding to an increase of 2,907 people. Figure 3 shows these projections.

Of Māori aged 80+ in 2026, 195 percent more Māori than in 2010 will have 'long' and 'short' interval care needs. This corresponds to an increase of 3,175 and 805 people respectively.

By 2026, 772 more Māori aged 80+ will have a 'critical' interval of care need than in 2010, a 242 percent increase. Numbers of people in both the critical and short interval of care needs are small, which increases the uncertainty of the projection.

Figure 3: 2026 projections of Māori aged 80+ with critical, short or long interval care needs, as well as those who are expected to be independent



Source: LiLACS NZ 2010–11, Statistics NZ population projections 2011

Non-Māori

The total non-Māori population aged 80+ is projected to increase by 74 percent from 2010 to 2026.

The number of independent non-Māori aged 80+ will increase by 74 percent by 2026.

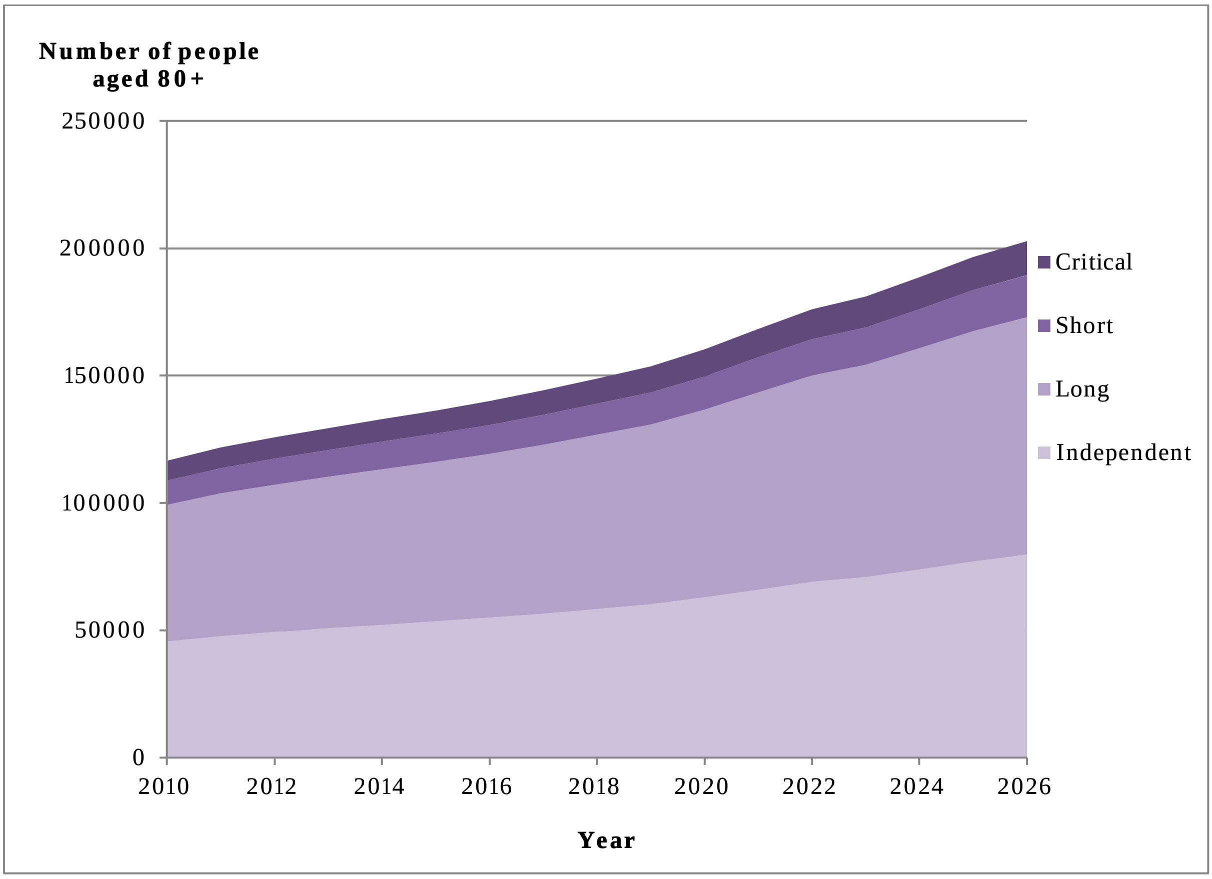
The number of non-Māori needing long interval care is estimated to increase by 74 percent from 50,605 in 2010 to 93,161 people in 2026. Figure 4 shows these projections.

The number of non-Māori needing short interval care is likely to increase by 75 percent (an increase from 9,481 in 2010 to 16,546 in 2026).

The number of non-Māori needing critical interval care will increase by 74 percent by 2026, corresponding to an increase of 5,728 people.

Even if there are changes in the proportions of those categorised as needing each level of care, these estimates present challenges to health planners, communities, whānau and family and older people themselves in contemplating the increase in absolute numbers of people.

Figure 4: 2026 projections of non-Māori aged 80+ with critical, short or long interval care needs, as well as those who are expected to be independent



Source: LiLACS NZ 2010–11, Statistics NZ population projections 2011

Key finding: The number of older Māori and non-Māori with cardiovascular disease and/or diabetes mellitus diagnoses is projected to increase by up to 200 and 75 percent respectively

Cardiovascular disease (CVD) is the most frequent cause of mortality in advanced age, associated with 89 percent of deaths among older (65+) non-Māori and 59 percent among older Māori.[9] CVD includes previous heart attack and/or current angina, congestive heart failure, cerebrovascular disease (stroke and mini-stroke) and/or peripheral vascular disease. New Zealand’s rates of hospitalisation from CVD are high, with 8 to 10 percent of older Māori people being hospitalised for CVD in 2005–2007, compared with 3 percent of those aged 35+.[10] The diagnosis of CVD does not include hypertension; over 85 percent of LiLACS NZ participants had hypertension and having hypertension did not necessarily mean there was clinical evidence of CVD. To be categorised as having CVD, LiLACS NZ participants required clinical evidence of a vascular disorder.[8]

Thirteen percent of the New Zealand population aged 65 to 74 has diabetes mellitus (DM), as do 17 percent of those aged 75+.[11] DM is more common amongst men, Māori and in areas of high socioeconomic deprivation. The consequences of DM include renal disease, vision changes and an increased risk of heart disease. For older people, management of DM can be complex as the medications needed often add to the chance of adverse drug reactions. It is because of the consequences and necessary lifestyle and medication management that DM is considered one of the health conditions that it is most important to manage well.[12]

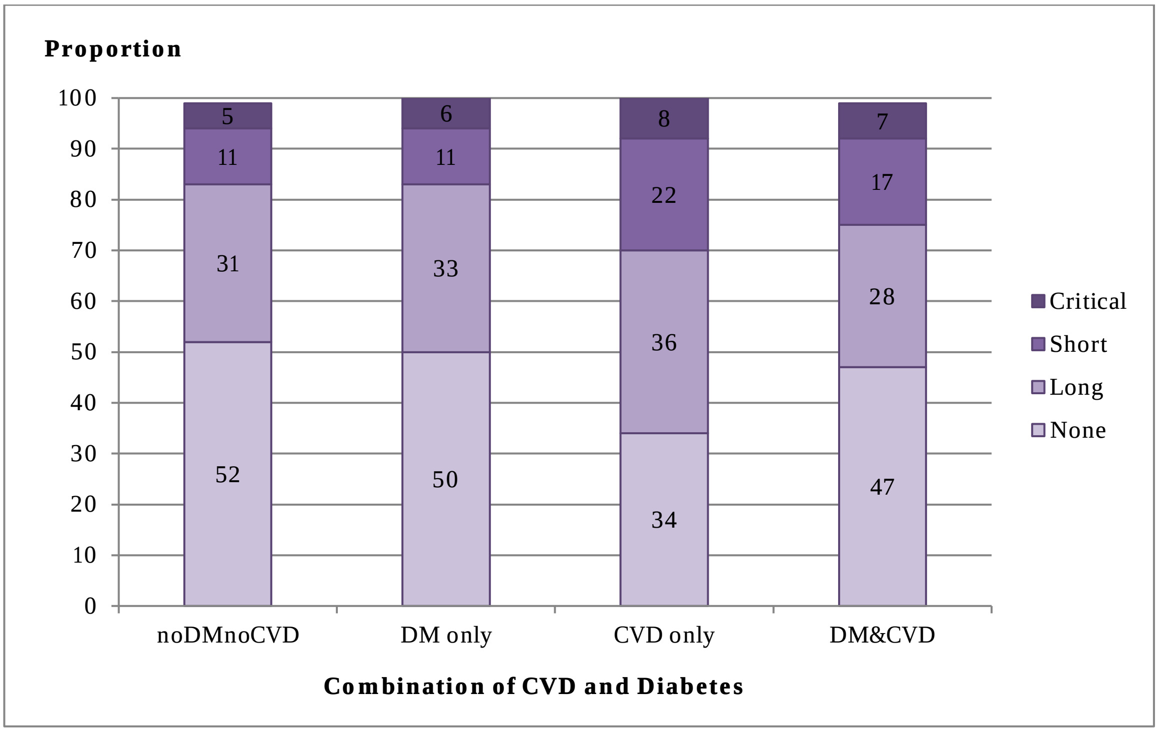
Māori

The prevalence of CVD in LiLACS NZ is high with 68 percent of Māori having CVD. DM is *significantly more* prevalent in Māori than non-Māori with 28 percent of Māori having DM (includes Type I and Type II).[4]

When considering the combination of CVD and DM, 20 percent of Māori had comorbid CVD and DM, 8 percent had DM alone, 48 percent had CVD alone and 26 percent had neither condition. The level of care need according to these diagnoses was investigated.

The intervals of care need for people with CVD and DM in Wave 1 (as well as for those with both conditions and neither condition) are shown in Figure 5.

Figure 5: Intervals of care need in relation to presence of cardiovascular disease and diabetes mellitus, neither and both diagnoses in Māori 80-90 years



Source: LiLACS NZ
Note: DM – diabetes mellitus, CVD - clinically evident cardiovascular disease

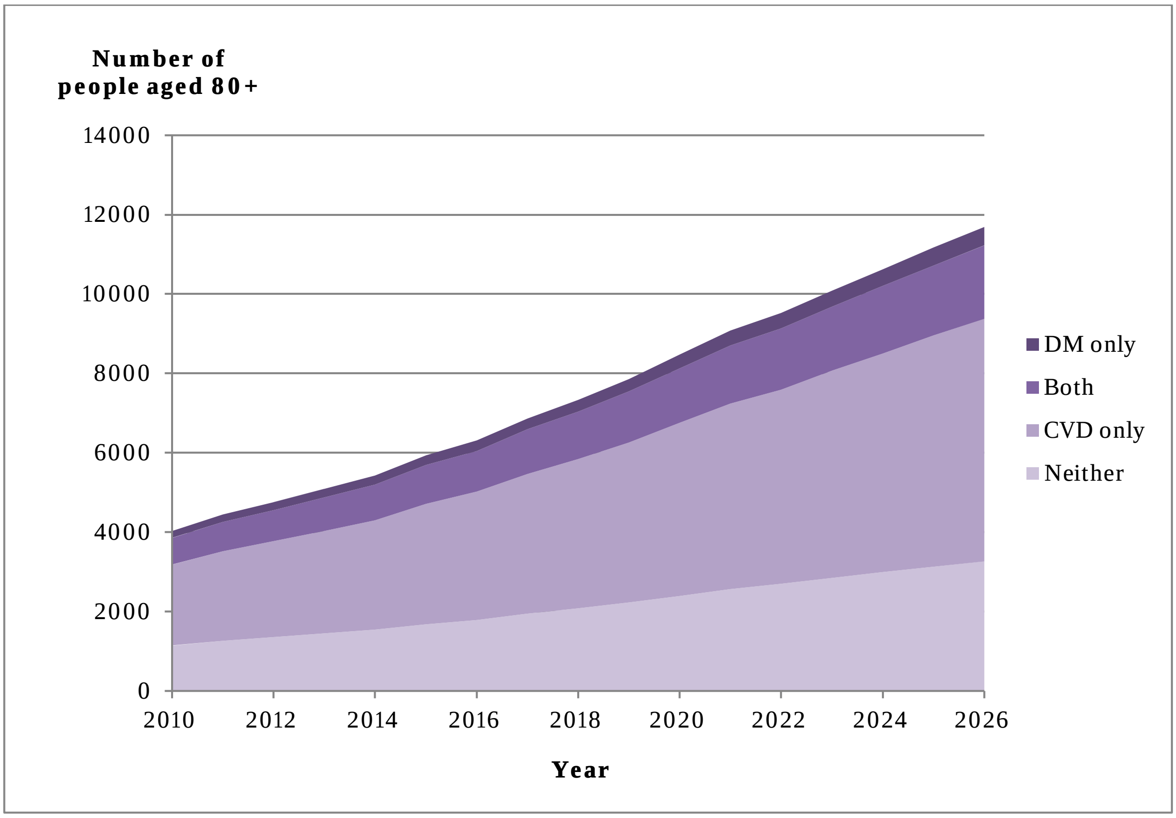
The interval of care need was *significantly higher* amongst Māori with CVD alone than amongst Māori with DM only, neither condition or both conditions. Māori with CVD alone were more likely to have a 'short' interval of care need (chi-square = 5.4, $p = 0.021$) or a 'long' interval of care need (chi-square = 11.0, $p < 0.001$) than Māori with other combinations.

The process of forward estimation of numbers of people with different health states was also applied to the groups diagnosed with CVD and/or DM. Figure 6 shows the current proportions of the LiLACS NZ Māori sample with CVD and/or DM extrapolated onto the estimated Māori population aged 80+ years for New Zealand to 2026.

The number of Māori aged 80+ with CVD or DM diagnoses, and the combination of both conditions, is projected to increase by up to 200 percent if the prevalence of these conditions is equivalent to the current prevalence in LiLACS NZ participants (Figure 6):

- Māori aged 80+ years with neither CVD nor DM may increase by 185 percent;
- those having only CVD may increase by 200 percent;
- those having both CVD and DM may increase by 175 percent; and
- those with DM alone may increase by 173 percent.

Figure 6: 2026 projections of Māori aged 80+ with cardiovascular disease and diabetes mellitus



Source: LiLACS NZ 2010–2011, Statistics NZ population projections 2011
Note: DM – diabetes mellitus, CVD - clinically evident cardiovascular disease.

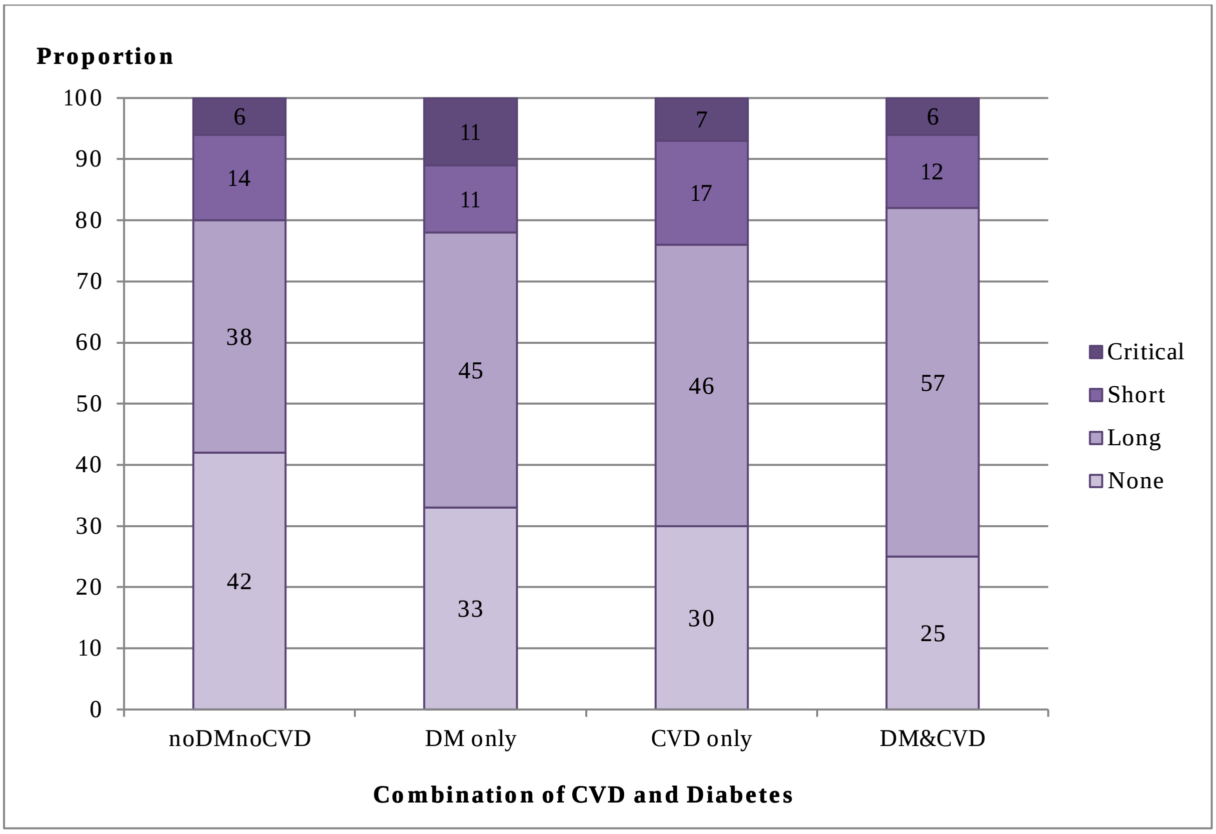
Non-Māori

The prevalence of CVD in LiLACS NZ non-Māori was 64 percent, *significantly less* frequent than amongst Māori.[4] DM prevalence was 16 percent.

Ten percent of non-Māori had comorbid CVD and DM, 56 percent had CVD alone, 5 percent had DM alone, and 30 percent had neither condition.

As shown in Figure 7, the group with CVD and DM was more likely than those with neither condition to have a 'long' interval of care need and those with neither condition were more likely to be independent (chi-square 7.8, p = 0.006). There was no real difference between the groups in the pattern of 'short' and 'critical' intervals of care need.

Figure 7: Intervals of care need in relation to presence of cardiovascular disease and/or diabetes mellitus diagnoses in non-Māori

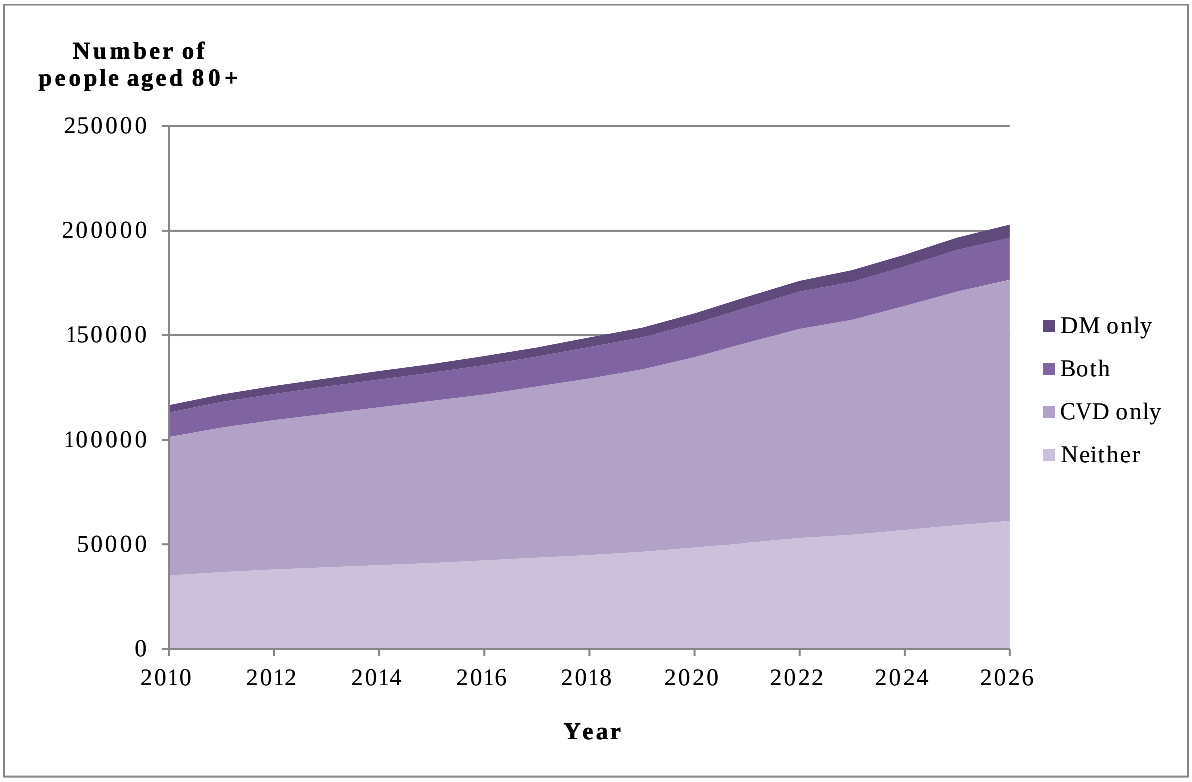


Source: LiLACS NZ
Note: DM – diabetes melliuts, CVD - clinically evident cardiovascular disease.

These patterns of diagnoses of non-Māori aged 85 years were extrapolated onto the projected population for NZ non-Māori aged 80+ years to 2026 (Figure 8).

Assuming no change in the prevalence of these diagnoses, the number of non-Māori with both CVD and DM will increase by 75 percent over 16 years consistent with the increases in population. Those with neither and those with both will also increase by a similar number.

Figure 8: 2026 projections of non-Māori aged 80+ with cardiovascular disease and diabetes mellitus



Source: LiLACS NZ
Note: DM – diabetes mellitus, CVD - clinically evident cardiovascular disease.

Key finding: Trends in dependency suggest that more recent cohorts of older people generally appear to have better levels of function than earlier cohorts

A selected literature review carried out by LiLACS NZ (see Appendix 2) examined relevant information about international and national trends in health expectancy and disability-free life expectancy. This review led to a number of conclusions.

There is a worldwide trend in OECD countries towards a reduced rate of residential care placement amongst those aged 80+ years. It would seem plausible that this reduced rate of residential care admission would continue. The international trend appears to be mainly towards later cohorts of people in advanced age being healthier and more independent than earlier cohorts, although this is country-dependent. While New Zealand data are not available at present, it is possible that a reduction in disability of somewhere between 5 and 10 percent could occur over the next decade in New Zealand, resulting in a reduction in the proportion of people with ‘short’ and ‘long’ intervals of care need.

Activities of Daily Living (ADL): basic activities such as dressing, walking.

Instrumental Activities of Daily Living (IADL): Instrumental activities such as walking up stairs, carrying things, housework, driving.

Disability in people living in the community can be reduced with relatively resource-intensive interventions, such as intensive physical exercise, although the exact impact of interventions on ADL function is difficult to estimate. The Cochrane review of functional rehabilitation in residential care suggests that modest-impact exercise and progressive resistance training improve physical function. This, in turn, could be expected to improve ADL function. Moreover, if an activity programme is intensive and adhered to, there can be a delay of disability in community populations of older people.

In addition, moderate to severe dementia is one of the main contributors to a critical level of care need. Population prevalence estimates of dementia have declined in at least one well conducted survey repeated over 20 years; thus, a decrease in prevalence of higher levels of care need is likely.

Age specific levels of disability in the general population of older people may also be reducing as longevity is increasing, although the international data are inconsistent.

While there is insufficient evidence to be certain that interventions reduce the frequency of assistance needed, or that the international trends towards reduction in age specific disability and dementia prevalence will occur in New Zealand, it is possible that a 5 to 10 percent reduction in progression of disability over time may reduce the number of people projected to have long, short and critical levels of care need. It is also uncertain whether effective interventions will be invested in within the New Zealand health and community sector.

Conclusion

The needs of older people for care to remain living independently is usefully categorised by the frequency of support that they require. Intervals of care need are categorised as ‘critical’ (needing help with activities of daily living more than daily), ‘short’ (needing help on a daily basis) and ‘long’ (needing help weekly). A small proportion of Māori and non-Māori from the LiLACS NZ study needed help more than daily and more Māori at this level of care were living at home. More than half of Māori and non-Māori needed help at least weekly. Large increases in the older population of NZ, particularly Māori, by 2026 suggest that the need for care will increase substantially in the coming years; the number of Māori needing care more than daily may increase by more than 200 percent.

CVD and DM are common in advanced age and have significant morbidity and mortality effects. Twenty percent of Māori and 10 percent of non-Māori had both conditions. Having CVD on its own was associated with the highest current interval of care need for Maori but not for non-Māori. If the current proportions remain the same, projections to 2026 for these health conditions suggest that CVD, in particular, is likely to be present for a substantial number of people aged over 80 years of age. The number of older Māori and non-Māori with CVD and/or DM diagnoses is projected to increase by up to 200 and 75 percent respectively.

However, despite these potentially increasing needs, international trends in dependency suggest that more recent cohorts of older people generally appear to have better levels of function than earlier cohorts. It seems clear that with resource-intensive physical activity interventions, there is a potential for recovery in function over time even in advanced age.

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Appendix 1: Background notes

Potential effect of interventions on the projections in this report

Specific interventions proven to have an impact on level of care and interval of care need (based on a literature review) will be used to estimate the potential impact of such strategies on service needs in the New Zealand population of those aged 80+ over the next two decades. For example, if a rehabilitative strategy can improve the independence of 10 percent of those with short interval needs for care, thereby putting them in the long interval category, the report will reflect the potential impact on longer term projections of population need at 2026.

LiLACS NZ diagnoses of CVD and DM

CVD was ascertained in the questionnaire with the question, '*Have you ever been told by a doctor that you have had a heart attack/myocardial infarction?',* with similar questions for angina, stroke, TIA or mini-stroke, congestive heart failure, intermittent claudication (pain in calves when walking) and peripheral vascular disease. This was cross-checked with the GP practice record and with hospitalisation data. Individual reviews of current diagnoses were obtained by our study nurses or GP practice nurses and hospitalisation data were obtained from Ministry of Health datasets using NHI numbers. Any clinically evident coronary artery disease, cerebrovascular disease, congestive heart failure or peripheral vascular disease was considered to indicate presence of CVD.

DM diagnoses were based on a general practice record review filled in by either the practice nurse or a research nurse when the appropriate diagnosis codes for DM DM, Type I or II, or history of DM were present or a hospitalisation record contained the appropriate ICD-9 or ICD-10 codes for any form of DM. In addition, the participant was coded as having DM if the fasting serum glucose was >7.0 mmol/l. If any one source indicated DM, the participant was coded as having DM.

Hospitalisation records were accessed up to 2011 for those who gave permission.

Statistical approach

Descriptive statistics were used to show the proportions of the cohorts in the categories of interval of care need. Subgroups were compared between the proportion of the sample in different categories using chi-square tests, with a p-value of 0.05 being considered to show a *significant difference* between proportions of Māori and non-Māori. The 2011 population projections were used to identify the numbers of people aged 80+ in the Māori and non-Māori population to 2026. Age structure of the non-Māori population showed that the average age was 85 years and this stayed steady looking forward to 2026, thus the proportions of non-Māori within categories of care need and with diagnoses in LiLACS NZ (all aged 85 years) could be mapped onto the population projections without age standardisation. For Māori, the average age of the 80+ population was 82, and thus the proportions in categories within LiLACS NZ were age standardised to the NZ Māori population aged 80+ before projecting forward.

Where to find more information

The official LiLACS NZ University of Auckland website has further information, including research methodology, community partners, objectives and contact details. Please go to the following link for more information: http://www.fmhs.auckland.ac.nz/faculty/lilacs/.

Appendix 2: Literature review of trends and interventions to reduce disability

It would seem reasonable to expect that a reduction in the rate of residential care admission by those aged 85+ will continue. The international trend appears to be mainly towards later cohorts of people in advanced age being healthier and more able than earlier cohorts, although this is country-dependent. Based on the information below it is possible that a reduction in disability may occur over the next decade of somewhere between 5 and 10 percent for short and long interval need. In Japan the proportion who are well has increased at a faster rate than the rate of those with disability. The net effect is a 16 percent reduction in disability over a decade.[13] In the UK as the population in older ages has increased, the rate of increase in the well has outstripped the rate of increase in those with disability, so over time an age-adjusted reduction of up to 4 percent in the need for care has been observed over a similar period.[14]

To estimate the potential changes in projections that may better inform our simple mapping of the current level of need onto future populations, a selected literature review was conducted. It is clear that there is a potential for recovery in function over time even in advanced age. The Cognitive Function and Ageing I study (CFAS 1, 1989–94) showed that a proportion of older people improve over time.[15] Information on trends in levels of disability-free life expectancy internationally and in NZ were sought, along with relevant analyses of cohort studies that could estimate whether present cohorts had a better or worse level of function compared with past cohorts.

Trends in function in old age may show reducing levels of disability

Trends in disability-free life expectancy vary throughout Europe[16] with only five of 13 nations showing improvement: Denmark, Finland, Italy, the Netherlands and the United Kingdom. The extrapolation of data from an OECD report to other countries can be questioned as other analyses suggest that disability is increasing in the USA.[17] In Denmark there is clear evidence that mortality in old age is decreasing and that the sequential time period, rather than the demographic change, predicts this improvement.[18]

The disability rate is reducing in Japan where, from 1993 to 2002, the proportion of people aged 65 years and over with any ADL deficit reduced from 16 to 14 percent, corresponding to a 12 percent relative reduction and a 2 percent absolute reduction in the number of people with disability.[13]

Trend analyses from England suggest a decline of between 0 and 3.4 percent in the proportion of people with ADL limitations and up to a 1 percent reduction in self-care[14] but improvement was better in those with higher socioeconomic status. Women reaching 100 years of age in 2005 in Denmark were more independent than their counterparts born 10 years earlier.[19] The differences for women between the two cohorts' time periods were marked, with more than 10 percent difference in the proportion of those able to go to the toilet and eat independently (critical interval care needs) and get dressed and take a bath (short interval care needs) between the earlier and the later cohort.[19] Similar improvements were noted in long interval care needs for women; however, men stayed the same or got worse.

Previous estimates examining changes in disability in England suggest that reduction in cognition problems and disabling conditions would result in the greatest decrease in the disabled population over time.[20] Dementia and the need for supervision is one of the main reasons that 24 hour care is needed. The Cognitive Function and Ageing Studies (CFAS I, 1989–94 and CFAS II, 2008–2011) used the same method to evaluate a population-based sample from three regions of England in the 1980s and repeated the same methodology 20 years later. Overall age-standardised rate of dementia in CFAS II was 6.8 percent (for people aged over 65 years), whereas 8.3 percent had been observed 20 years earlier, an absolute reduction of 1.8 percent and relative reduction of 18 percent. The group aged 85 to 90 was assessed as having a rate of dementia of 25 percent in CFAS I and 15 percent in CFAS II,[21] suggesting that there is a real change in the prevalence of dementia in successive cohorts over 20 years.

Analysis of information from the NZ disability and health surveys from 1981 to 1996 suggests that moderate level disability may increase and major level disability may decrease slightly over 15 years. The prevalence of self-care deficit was projected to increase from 5.7 percent to 8.5 percent for men and by 2 percent for women aged 65+ over a 15 year period.[22] Data about the exact ADLs and IADLs that are required to estimate the intervals of care need in the way we constructed the categories in this report are rare. The age-standardised rate of admissions to residential aged care has declined, and the number of residential care beds has remained the same in the Auckland region.[23] The Ageing in Place Strategy means that older people are supported at home[24]and accurate data on sequential cross sections of community levels of dependence in ADLs are not available for New Zealand.

Reducing disability with interventions is difficult

Disability can be reduced with physical activity if the activity is intensive and if participants adhere to their programmes. The exact amount of ADL impact is difficult to estimate. The Cochrane review of functional rehabilitation in residential care suggests that improvement in function is possible as a result of exercise and progressive resistance training.[25] ADL function could reasonably be expected to improve, although the intensity and duration of programmes constrains widespread use.

High-level evidence of success in interventions to reduce disability was also sought. Reports had to be relevant to older populations and impact on the frequency of care needs.

We reviewed 237 abstracts from the Cochrane trial register, examining in detail functional status as an outcome in general populations of older people where ADLs and IADLs could be extracted. Trials of systematic change in payment schedules were excluded.[26]

A Cochrane review of 67 trials with frail older people in residential care examining functional outcomes showed that overall functional rehabilitation resulted in a 6-point improvement in the Barthel index (a 100 point scale) and a timed up-and-go improvement of five seconds.[25] However, the impact on ADLs was not outlined. It is possible that a 6-point improvement in the Barthel index would correspond to a small real improvement in ADL function. Progressive resistance training is proven to improve muscle strength and physical ability with an improvement in the time taken to stand up from a chair.[27] This would also be expected to result in improvement in ADL function, but the extent is difficult to estimate. Other interventions, such as indoor gardening, resulted in improvements in ADLs for residents in nursing homes.[28]

In-home geriatric assessment has had conflicting results

Positive outcomes from in-home geriatric assessments have not included improved ADL function specifically.[29] Initial preventive assessment trials of lay people and health professionals conducting health assessments at home showed there was considerable unrecognised disability and unmet need that responded to intervention.[30–33] This issue has subsequently been the subject of 41 trials of proactive home-based assessment, 15 systematic reviews and 4 meta-analyses[34–37] and is not yet settled, as evidence from the systematic reviews has been mixed.[38, 39] There is insufficient evidence to suggest that substantial impact is possible from this type of intervention.

Physical activity trials have shown that muscle strength can be improved[40] and at least one trial purports to reduce disability with the use of supervised intensive exercise.[41] The sustained community deliveries of such programmes are rare and estimation of impact on ADL function is less than certain. Functional decline has been prevented with combination strength and progressive resistance exercises,[42] and both home-based and class-based exercises improve self-perceived function in community dwelling older people.[43] But ADL function was not measured. Time taken to do household tasks was reduced as a result of an activity programme[44] which would directly translate to a reduced need for housework assistance.

Days with disability have been reduced with a multifaceted senior centre intervention which included exercise classes.[45]

Appendix 3: Data Tables

Appendix Table 1: Number of LiLACS NZ participants who answered the questions

	Māori		Non-Māori	
	Men	Women	Men	Women
Wave 1 only				
Critical interval of care need (those requiring support several times a day from another person) was constructed from two questions:				
Do you manage to feed yourself?	173	238	235	277
Do you manage to go to the toilet?	172	238	235	277
Short interval of care need (those requiring daily support) was constructed from four questions:				
Do you manage to make yourself a hot drink?	173	238	235	277
Do you take hot drinks from one room to another?	172	238	235	277
Do you manage your personal care, for instance brushing your teeth and hair, washing your hands and face?	171	238	235	277
Do you get in/out of bed?	171	238	235	277
Long interval of care need (those requiring weekly support) was constructed using three questions:				
Do you do your own housework?	173	238	235	277
Do you do your own shopping?	173	237	235	277
Do you do a full clothes wash?	173	238	234	276

Appendix Table 2: Needs of participants in LILACS NZ study by interval of care needs

	Māori			Non-Māori			p-value
	Men	Women	All	Men	Women	All	
Number (%)	173	238	411	235	277	512	
Critical interval of care need							
Do you manage to feed yourself? No or with help	10 (6)	10 (4)	20 (5)	3 (1)	7 (3)	10 (2)	
Do you manage to go to the toilet? No or with help	11 (6)	19 (8)	30 (7)	14 (6)	18 (6)	32 (6)	
Any critical interval of care need	*11 (6)*	*19 (8)*	*30 (7)*	*14 (6)*	*20 (7)*	*34 (7)*	
Received formal support*	0 / 2 (0)	5 / 6 (83)	5 / 8 (63)	1 / 4 (25)	1 / 6 (17)	2 / 10 (20)	0.37
In residential care+	4 / 11 (36)	9 / 18 (50)	13 / 29 (45)	11 / 14 (79)	15 / 20 (75)	26 / 34 (76)	0.03
At most short interval of care need, daily care							
Do you manage to make yourself a hot drink? No or with help	14 (8)	30 (13)	44 (11)	15 (6)	29 (10)	44 (9)	
Do you take hot drinks from one room to the other? No or with help	25 (15)	42 (18)	67 (16)	25 (11)	42 (15)	67 (13)	
Do you manage your personal care, brushing hair and teeth etc? No or with help	16 (9)	20 (8)	36 (9)	12 (5)	24 (9)	36 (7)	
Do you get in and out of bed? No or with help	11 (6)	22 (9)	33 (8)	14 (6)	16 (6)	30 (6)	
At most short interval of care need	*29 (17)*	*44 (18)*	*73 (18)*	*28 (12)*	*49 (18)*	*77 (15)*	
Received formal support*	6 / 15 (40)	10 / 14 (71)	16 / 29 (55)	6 / 13 (46)	10 / 23 (43)	16 / 36 (44)	0.25
In residential care+	5 / 28 (18)	18 / 42 (43)	23 / 70 (33)	14 / 28 (50)	25 / 49 (51)	39 / 77 (51)	0.09
At most long interval of care need, weekly care							
Do you manage your own housework? No or with help	98 (57)	96 (40)	194 (47)	136 (58)	169 (61)	305 (60)	
Do you do your own shopping? No or with help	69 (40)	80 (34)	149 (36)	76 (32)	88 (32)	164 (32)	
Do you do a full clothes wash? No or with help	88 (51)	56 (24)	144 (35)	97 (41)	60 (22)	157 (31)	
Needs help with shopping and washing only	101 (58)	86 (36)	187 (45)	116 (49)	98 (35)	214 (42)	
At most long interval of care need	*118 (68)*	*116 (49)*	*234 (57)*	*161 (69)*	*180 (65)*	*341 (67)*	
Received formal support*	31 / 66 (47)	50 / 70 (71)	81 / 136 (60)	79 / 127 (62)	97 / 127 (76)	176 / 254 (69)	0.12
In residential care+	8 / 116 (7)	19 / 115 (17)	27 / 231 (12)	17 / 160 (11)	28 / 180 (16)	45 / 340 (13)	0.86

* n (%) of those with interval need who answered the full questionnaire. Numerator is the number with interval need /denominator is number answering that question.

\+ n (%) of those with interval need who answered the core questionnaire. Numerator is the number with interval need /denominator is number answering that question.

Note: p-values are for ethnicity from a logistic regression model controlling for sex and age.